UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1

Memorandum

Date: September 27, 2002

Subj: Executive Summary: Record of Decision for the Pownal Tannery Superfund Site

From: Leslie McVickar, RPM
ME/VT/CT Superfund Section

To: Richard Cavagnero, Acting Director
OSRR

Summary of Action:

This ROD sets forth the selected remedy for the Pownal Tannery Superfund Site (the Site) located in Pownal, Vermont. The selected remedy for the Site will address contaminated lagoon sludge where elevated concentrations of hazardous substances were detected. Among the contaminants detected at elevated levels are dioxin, chromium, lead, arsenic and benzo(a)pyrene. This remedy entails the excavation and consolidation of tannery lagoon waste, construction of a low permeability cap over the consolidated wastes on-site, long-term monitoring of river sediments and ground water, and institutional controls to protect the cap from disturbance and prevent ground water consumption and excavation of waste in the lagoon area. The remedy also encompasses the maintenance of a landfill cap at an area of the Site remediated under a previous non-time critical removal action (NTCRA).

The selected remedy is a comprehensive approach for this Site that addresses all current and potential future risks caused by Site wastes. At the former tannery lagoons the cleanup approach will prevent direct contact risks with contaminated lagoon waste and will significantly decrease further off-site migration that the lagoon sludge could cause through leaching to the ground water or erosion to the adjacent river through flooding events. As a result of previous removal actions, the soil and sludge contamination in the lagoon area was the only medium requiring remedial action.

Description of the Site:

The Pownal Tannery Superfund Site consists of a 28 acre set of parcels located adjacent to the Hoosic River in the Village of North Pownal, Vermont (in the south-western corner of the State) The Site was a former hide tanning and finishing facility owned by the Pownal Tanning Company, Inc. They operated between 1937 until 1988, when they declared bankruptcy. EPA, during a 1993 time-critical removal action and a 2001 non-time-critical removal, addressed two of three source areas that make up the Site. These actions included permanently capping a landfill and decontaminating and removing the building complex. Under a Memorandum of

Agreement between EPA and the VT DEP, the State of Vermont is responsible for the long-term operation and maintenance of the landfill.

Significance of Action/Major Issues:

As noted above, EPA has taken two removal actions to date to address two major source areas of contamination. This action will represent the final action to address all remaining concerns with site contamination. The remediation seeks to eliminate all remaining direct contact threats that the Site poses, through the excavation, consolidation and capping of the majority of sludge which currently sits beneath the water table and poses an ongoing risk of leaching into the groundwater or washing downstream during a flood. Without this action, the sludge would continue to pose a threat to surface water and sediments in the Hoosic River, as the lagoons are located in a 100-year flood plain . Both groundwater and river sediments will be monitored post-construction to evaluate potential contaminant fluctuations. Institutional controls will be implemented to prevent any potential disturbance of the cap and to prevent groundwater beneath the lagoons from being utilized. The selected remedy has a projected cost of $8.8 million dollars.

The Town of Pownal was a recipient of a $100,000 EPA grant in 2000, to develop one of the first ten national Site Redevelopment Plans. The town is in the process of taking title to the lagoon parcels, as well as other parcels within the Site, that they're interested in reusing. Pownal's redevelopment plans include building a wastewater treatment facility in the lagoon area, post-construction of the remedial action. They have received substantial grants from both EPA and the USAD (Farm Bill) to build this facility, which they plan to begin in the Spring of 2004. Their community also supports utilizing the Site for mixed recreational use, including a potential soccer field, seasonal ice skating rink, picnic area, and a boat launch. EPA has worked very closely with them on their redevelopment plans and anticipates further coordination with them as both of our concurrent designs develop.

One of the more significant issues associated with this response action, is locating a solid waste facility within a 100-year flood plain of the Hoosic River. Off-site disposal was investigated during the FS stage, but no solid waste facility was identified that could take the volume of dioxin-contaminated waste that would be generated. The waste could be exported to Canada for treatment and disposal, but for an impracticably high cost. It was determined that the selected remedy of on-site disposal of the waste in a consolidated landfill located within the higher area of the flood plain (outside of the higher energy flood way) is the most practicable and cost-effective alternative to address the former lagoons. This finding is required under federal Executive Order 11988, which addresses federal actions within flood plains. It has been determined that the selected alternative can be designed and implemented to be resistant to flood damage, up to a 100-year flood event, and will minimize the effects on the existing flood plain. Therefore, the ROD includes a finding that, under Executive Order 11988, the selected remedy is the best practicable alternative to addressing the existing contaminated lagoons within the Hoosic River flood plain.

Similarly, the response action does not meet certain siting requirements under the VT Solid Waste Management Rules (VT SWMR) for solid waste facilities pertaining to location of the facility in State jurisdictional wetlands, in flood plain, within six feet of the seasonal high water table, within 300 feet of waters of the State, within 1000 feet of a drinking water source, and within 50 feet of the property line. The proposed facility also lacks a liner and leachate collection system. However, the Rules also permit EPA to invoke a waiver of these standards upon a finding that alternative measures will be protective of public health, safety, and the environment. EPA made the required findings necessary to invoke the regulatory waiver under the Rules in the ROD.

Headquarters Perspective or Involvement:

HQ has been kept informed of the progress at the Site. HQ has reviewed the ROD and has indicated that it acceptable.

Public Involvement:

The public has been very involved at this Site. EPA has worked closely with the Town officials and local residents during the RI/FS. They both support the remedy presented in this ROD and are eager to see the remedy occur, which will pave the way for the completion of their waste water treatment facility. Currently, raw sewage is being dumped into the Hoosic River on-site and they are under order by the State of Vermont to complete this project.

Media/Congressional Involvement:

Media coverage has been very positive. Congressional involvement has been high due to the State's decision to concur and take responsibility for long-term O&M and their 10% cost share. Additionally, interest has been high due to their receipt of three large grants to fund the waste water facility.

State Coordination:

The State of Vermont has been fully involved and supportive of the EPA activities at the Site and has concurred with this selected remedy. The State has already entered into a Memorandum of Agreement with EPA to carry out operation and management of the tannery landfill elsewhere at the Site.

Recommendation:

It is recommended that you sign the ROD, which also includes the necessary findings under the federal flood plain Executive Order and the Vermont Solid Waste Rules which permit the selected remedy to proceed.

Contact Persons:

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U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA NEW ENGLAND

RECORD OF DECISION

FOR

POWNAL TANNERY SUPERFUND SITE

POWNAL, VERMONT

September 2002

Record of Decision
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DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Pownal Tannery Superfund Site
Bennington County, Vermont
VTD069910354
EPA Lead
Entire Site, No separate Operable Units

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Pownal Tannery Superfund (Site), in North Pownal, Vermont, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC § 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 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 was 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 Solomon Wright Public Library in North Pownal, Vermont and at the United States Environmental Protection Agency (EPA), Region 1, OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix C) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of Vermont concurs with the Selected Remedy (Appendix A).

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect human health and 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 the entire Site at the Pownal Tannery Superfund Site, which involves the excavation and consolidation of tannery lagoon waste, construction of a low permeability cap over the consolidated wastes on-site, long-term monitoring of river sediments and ground water, and institutional controls to prevent ground water consumption and excavation of waste in the lagoon area. The remedy also encompasses the maintenance of a landfill cap at an area of the Site remediated under a previous non-time critical removal action (NTCRA). The selected remedy is a comprehensive approach for this Site that addresses all current and potential future risks caused by Site wastes. At the former tannery lagoons the cleanup approach will prevent direct contact risks with contaminated lagoon waste and will significantly decrease further off-site migration that the lagoon sludge could cause through leaching to the ground water or erosion to the adjacent river through flooding events. As a result of previous removal actions, the soil and sludge contamination in the lagoon area was the only medium requiring remedial action.

The major components of this remedy are:

1. Excavation and consolidation of waste in three of five lagoons on-site, and construction of a solid waste cover system. Excavated areas and the cap will be restored consistent with current and future site usage.

2. Land-use restrictions in the form of deed restrictions, such as easements and covenants to prevent the disturbance of the capped soil and sludge, and to prevent the ingestion of ground water from beneath the five existing lagoons, will be used to control the Site, which will be owned by the Town of Pownal;

3. Long-term monitoring of ground water, residential wells and river sediments will be performed to evaluate the success of the remedial action. Additional biota sampling (fish, mammals, and plants) may also be performed, as necessary, should the concentrations of site related contaminants increase significantly;

4. Long-term operation and maintenance of the landfill cap constructed as part of the NTCRA by the State of Vermont (see the Memorandum of Agreement between the State of Vermont and EPA - Appendix D); and

5. Five-year reviews will be performed to assess future ongoing protectiveness of the remedy until such time as EPA determines that the CERCLA cleanup goals identified in the ROD have been achieved.

This action represents the first and only anticipated operable unit for the Site. Both time-critical and non-time-critical removal actions taken at other locations on tannery property were implemented at the Site to address contaminated buildings, soil/sludge, drums, cylinders, other containers and the partially capped tannery landfill.

Previous removal actions at the Site addressed principal and low-level threat wastes. In all of the areas removal actions were undertaken, except the tannery landfill, EPA has determined that human health and environment are protected and that no further response measures were necessary. As previously discussed, the NTCRA tannery landfill site will require long term operation and maintenance to ensure that the landfill cap remains protective of human health and the environment. The selected remedial response action described in this ROD addresses the remaining source of contamination found in soil, the ground water and river sediments at the tannery lagoons. Excavation, consolidation, and containment of the contamination will eliminate the principal threat of direct contact to the waste and will significantly reduce infiltration and precipitation of contamination to the ground water, prevent erosion of contamination into the floodplain, and eliminate surface water runoff to river sediments.

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 , is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Based on the significant additional cost of excavation and off-site disposal at a treatment facility and the significant uncertainty associated with establishing an available treatment facility to take dioxin-containing waste, EPA concluded that it was impracticable to excavate and treat the chemicals of concern. Additionally, there would be short-term technical, risk, and schedule implementation issues associated with excavation and de-watering of a high volume of contaminated sludge. Furthermore, removal of the contaminated material would create an additional waste stream for treatment, would create a large volume of contaminated waste to be trucked through residential neighborhoods, and would extend the schedule to complete the action considerably. Thus, the selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (resulting in ground water and/or land use restrictions being necessary), a review will be conducted within five years after initiation of remedial action, and at least every five years after that as required by CERCLA and the NCP, to ensure that the remedy continues to provide adequate protection of human health and the environment. These reviews will continue until such time as all cleanup levels under this ROD are achieved and the Site no longer is a threat to human health and the environment, as defined under CERCLA.

F. SPECIAL FINDINGS

1. Federal Floodplain Standards:

Issuance of this ROD embodies a specific determination made by EPA that construction of a solid waste landfill within the 100-year floodplain of the Hoosic River is the most practicable alternative to address the former lagoons, which are located in the floodplain. This finding is required under federal Executive Order 11988, which addresses federal actions within floodplains. A 100-year flood plain is a plain bordering a river subject to flooding on average of at least once every 100 years. The Site is located within the 100-year flood plain of the Hoosic River in Vermont and a determination that no other practical alternative exists and that the selected remedy minimizes impacts to the maximum extent practical has to be met to meet the requirements of Executive Order 11988. It has been determined that the selected alternative can be designed and implemented to be resistant to flood damage and to minimize the effects on the existing flood plain. The cap will be inspected regularly and maintained by the State of Vermont. Preliminary design calculations indicate that the selected remedy will increase, rather than decrease, the flood storage capacity of the Hoosic River and will have small localized effects on the 100-year flood water elevation. The consolidated cap will not be constructed within or obstruct the current flood way of the Hoosic River under the selected remedy [a flood way is the channel of a river or other water course and the adjacent land area that must be reserved to discharge the 100-year floods, without accumulatively increasing the water surface elevation more than one foot, and is the most hazardous section of a flood hazard area]. Removal of all of the contaminated soil and sludge from the lagoons to an off-site facility, out of the flood plain, was determined to be significantly less practicable alternative as few facilities accept disposal of waste containing dioxin and the disposal costs are extremely expensive. Under Executive Order 11988, EPA has determined that due to the nature of the Pownal Tannery Superfund Site, full compliance with these requirements will be met by the selected remedy.

2. The VT Solid Waste Management Rules:

EPA has determined that certain requirements of the VT Solid Waste Management Rules (VT SWMR) cannot be met in order to implement the cleanup action consistent with treatment/disposal limitations for addressing dioxin-contaminated waste, community concerns regarding remedy delays negatively affecting reuse of the Site, and significant delays and increased costs associated with off-site disposal/treatment. The specific siting and capping requirements within the VT SWMR are:

6-502(a)(4) - location in a Class III wetland;
6-502(a)(9) - location within the floodway or the 100-year floodplain;

6-503(b)(4) - location within 6' of the seasonal high water table;
location within 300' of waters of the state;
location within 1000' of a drinking water source;
location within 50' of the property line
6-606(b)(2)(A) - lack of a liner and leachate collection system

EPA is making the finding that these specific standards can be waived under the regulations and that alternative measures can be taken in implementing the remedy given that:

1. the proposed alternative measures to the requirements of the VT SWMR will not endanger or tend to endanger public health, safety, or the environment:

2. compliance with certain VT SWMR would produce serious hardship by delaying the remedy and increasing costs significantly without equal or greater benefit to the public;

3. the material at the Site is not considered to be a hazardous waste subject to regulation under the Resource Conservation and Recovery Act (RCRA) Subtitle C; and

4. there is no practicable means known or available to meet both on-site disposal of the waste and certain requirements of the VT SWMR, however, the substitute or alternative measures proposed in this cleanup plan would achieve an equivalent level of protection of public health and the environment.

The specific alternative measures proposed to the waived requirements of the VT SWMR, regarding the siting of solid waste landfills within the 100-year floodplain are as follows:

> The consolidation of the lagoons into the upper edge of the 100-year floodplain will remove contamination from the higher energy floodway and consolidate the waste into one capped disposal facility that will be designed, constructed, and maintained to prevent erosion of the cap and release of contaminants during flood events. Performance objectives for the landfill cap will be to mitigate infiltration of surface water into the consolidated wastes, prevent releases of material through erosion and other causes, and prevent movement of wastes into the groundwater and adjacent Hoosic River.

The State of Vermont has reviewed EPA’s findings and concurs with them (see Attachment A - State Concurrence letter)

G. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. 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. Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD
5. Land and ground water use that will be available at the site as a result of the selected remedy
6. 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
7. Decisive factor(s) that led to selecting the remedy

H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for the soil and sludge at the Pownal Tannery Superfund Site lagoons and the State of Vermont's long-term operation and maintenance of the tannery landfill cap that was constructed as part of the NTCRA at the Site. This ROD also makes certain findings regarding Executive Order 11988, Protection of Floodplains, and invokes certain regulatory waivers of standards and makes certain findings under the Vermont Solid Waste Rules. This remedy was selected by EPA with concurrence of the Vermont Agency of Natural Resources (Attachment A).

U.S. Environmental Protection Agency

By: [signature] Date: 9-30-2002

Richard Cavagnero, Acting Director
Office of Site Remediation and Restoration
Region 1

THE DECISION SUMMARY

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

Pownal Tannery Superfund Site
Bennington County, Vermont
VTD069910354
EPA Lead
Entire Site, No separate Operable Units

The Pownal Tannery Superfund Site consists of a 28 acre set of parcels located between Route 346 and the Hoosic River in the Village of North Pownal, Vermont which is in the south-western corner of the State (Figure B1). The Site was a former hide tanning and finishing facility owned by the Pownal Tanning Company, Inc. The Site has been inactive since 1988, when the company declared bankruptcy. The Site originally consisted of three contamination sources: the former tannery building complex, a capped sludge landfill and a lagoon system. EPA, during a non-time-critical removal that was completed in 2001 permanently capped the landfill and removed the building complex. Under a Memorandum of Agreement between EPA and the VT DEP, the State of Vermont is operating and maintaining the landfill (Appendix D).

The area surrounding the Site is a rural and residential community with approximately 3,500 residents, with the nearest residences being approximately 200 feet from the lagoons. These residences rely upon ground water from private wells for their water supply. Currently, the lagoon area is fenced and locked, but is regularly broken into by the neighboring population to use it for recreational purposes. The lagoon complex is partially covered with soil, over which disturbed wetlands vegetation occurs (although the area is not a federal jurisdictional wetland). Three of the five lagoons on its western side borders the Hoosic River, which is also used for recreational purposes during the warm months (VT Water Quality Standards, Class B for high quality habitat). On the Site's eastern border there is an access road to Route 346 which is adjacent to train tracks owned and currently operated by the Guilford Transportation Rail Company. To the south of the lagoon complex is the former tannery building parcel and an empty warehouse. On the former tannery building parcel, there remains a dam and a hydro-electric facility that was built in 1955 for use by the tannery(Figure B2). The remaining area (except the tannery's landfill) was removed of all contamination to CERCLA residential standards, re-graded and seeded and is awaiting future reuse plans to be developed.

A more complete description of the Site can be found in Section 1 of the Remedial Investigation Report prepared by M&E, Inc. for EPA and released in July 2002.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

The former tannery was built in 1866 as the North Pownal Manufacturing Company, and was owned by A.C. Houghton and Co. The Site was originally used to make cotton print cloth. The mill manufactured an estimated five million yards of cotton goods per year. In 1935, the cotton mill was converted to a tannery. The operation consists of hide cleaning (beaming) using a variety of chemicals (pesticides, solvents), hydrochemical stabilization of the purified leather (tanning) using trivalent chromium, dyeing and lubrication of the tanned leather, followed by pasting and finishing of the leather into a variety of textures and thicknesses for commercial sale.
From approximately 1937 until 1962, untreated tanning process wastewater was directly discharged into the Hoosic River. A lagoon system comprising six lagoons, was constructed in several stages between 1962 and 1971 to receive the tannery's wastewater. The lagoon system was operated until 1988. In 1982, a state permitted lined landfill was constructed on site which received sludge dredged from a portion of the lagoons.

The tannery landfill is situated on a parcel of land across from the Hoosic River and southwest of the tannery building complex. In 1987, two-thirds of the landfill was covered and closed. The remaining portion remained uncovered. Current groundwater sampling data indicates that federal safe drinking water standards are not being exceeded. The tanning of hides required use of a variety of chemicals to remove animal tissues and fats, and to prepare the hides for tanning, coloring, and finishing. Chemicals used included lime, acids, ammonium salts, sulfuric acid, mineral tannin (trivalent chromium), dyes, pigments, solvents, acrylics, butadiene, polyurethanes, resins, waxes, and lacquers. In addition, pentachorophenol, which contains dioxins, was used as a biocide to treat the hides. From approximately 1937 until 1962, untreated tanning wastewater was discharged directly to the Hoosic River. Various attempts at wastewater treatment were employed from 1962 through 1988 - including the use of the series of lagoons currently on the site. A more detailed description of the Site history can be found in Section 1 of the Remedial Investigation Report.

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

The earliest regulatory history related to the Site concerned site operations and complaints from residents about odors and other issues. Later milestones are associated with state and federal involvement and eventual NPL listing. A summary is provided below.

- 12/30/81: Pownal Tannery applied for a permit to construct and operate a lined landfill to hold de-watered sludge.

- 1/21/82: The Vermont Agency of Natural Resources determined that the sludge in the lagoons should not be regulated as hazardous waste.

- 6/9/82: A disposal Facility Certification was issued to permit construction and operation of a lined landfill to receive sludge from lagoons. The landfill was comprised of three lined cells into which sludge was deposited, via truck, from the tannery lagoons approximately twice a week. A leachate tank was also installed to collect leachate from the landfill, and as the tank filled, the leachate was removed and disposed at a nearby waste water treatment works (Surwillo, 1991). The landfill was to be operated under a specific set of conditions, including daily cover with six inches of soil, drainage of the leachate tank and disposal into the Pownal Tanning Company wastewater treatment plant There was also to be semi-annual sampling of eight ground water monitoring wells (at two locations in Halifax Brook, and six at nearby residential drinking water wells).

- 1985: The Vermont Agency of Natural Resources issued a letter to the Pownal Tannery alleging deficiencies and maintenance problems at the site.

- 1987: Two-thirds of the Landfill was closed and covered by the Pownal Tanning Company.

- 4/6/88: Vermont Agency of Environmental Conservation issued an Administrative Order to Pownal Tannery. The order required Pownal Tannery to take additional precautions to control odors, accelerate excavation of sludge from Lagoon No. 2, present a cleanup plan for Lagoons 4 and 5, conduct further testing of ground water monitoring wells, and complete a risk assessment

- 1995: The Hazard Ranking System Package, a part of the CERCLA site listing process, was completed by TRC for EPA.

- 9/29/98: The Site was proposed for the National Priorities List (NPL) on September 29, 1998.

- 1/11/99: The Site was added to National Priorities List.

- 8/99: The Town of Pownal was awarded a Superfund Redevelopment Initiative Grant from EPA to study reuse options for the site after remediation is completed

- 2/01: The Town completed their reuse study. After a thorough review of citizen and Town needs the Town developed a reuse plan for the Former Tannery Building Area, the

Warehouse Area, and the Lagoon Area. The reuse plan includes construction of a sewage treatment plant, a skating rink, recreational open areas, and nature trails through the Lagoon Area.

3. History of CERCLA Enforcement Activities

The Pownal Tanning Company, who solely owned and operated the Site, became insolvent in 1988. They were never issued a CERCLA notice of liability letter and they have never been a recipient of an EPA enforcement measure. No other potentially responsible parties PRPs have been identified for this site, therefore this is a federal lead Site. The Town of Pownal is in the process of taking title to certain parcels of the Site, which includes the lagoon area. A waste water treatment plant is currently planned to be sited in lagoon 2 and a portion of lagoon 1, following EPA's remediation (Figure 3).

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been moderately high. EPA has kept the community and other interested parties appraised of Site activities through informational meetings, fact sheets, press releases and public meetings. Below is a brief chronology of public outreach efforts.

In October 2000, the EPA released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities. In July 2000, August 2000, and November 2000, the EPA participated in a series of town informational meetings in Pownal to describe the plans for the Remedial Investigation and Feasibility Study and progress of the activities.

On July 3, 2002, EPA published a media advisory to alert the press of a July 18th public informational meeting and, on July 11, 2002, EPA published a notice and brief analysis of the Proposed Plan in the Bennington Banner. Also on July 11, 2002, EPA mailed the Proposed Plan to approximately 350 individuals on the mailing list of interested parties.

On July 18, 2002, EPA held the informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study 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 meeting, representatives from EPA and the Vermont ANR answered questions from the public. During this meeting, EPA described their proposal to site the remedial activities in the 100-year floodplain of the Hoosic River. The Proposed Plan requested comments on several findings made by the Agency under federal Executive Order 11988, regarding federal projects in floodplains, and the Vermont Solid Waste Rules which found that the consolidated landfill could be sited in the floodplain while being protective of public health, safety and the environment. This notice was included in the Proposed Plan, which was made available in the Solomon Wright Public Library in North Pownal and was subsequently mailed to all the individuals on the Site mailing list.

On July 18, 2002, EPA made the administrative record available for public review at EPA's offices in Boston and at the Solomon Wright Public Library in North Pownal. These are the primary information repositories for local residents and will be kept up to date by EPA.

From July 18 to August 19, 2002, the Agency held a 30 day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public.

Throughout the Town of Pownal’s development of a Site Reuse Plan to identify the reasonably anticipated future land use and potential beneficial uses of the potentially restored lagoon area, EPA participated in the public meetings required to complete this effort, as well as provided technical information to the reuse steering committee and individuals responsible for the development of the study. 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 (Appendix C).

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The remedy described in this ROD is the third major cleanup action to be performed by EPA at this Site. In 1993 a time-critical removal action was conducted to: remove compressed gas cylinders and asbestos-containing materials; package and remove small laboratory containers of hazardous materials; empty, clean and remove tanks and drums; incinerate on site one-gallon cans of tetrahydrofuran; dispose of suspected dioxin-containing wastes off-site; seal underground storage tanks located in the lagoons to prevent public access and potential exposure; repair a breach in one of the lagoons; and remove one drum containing pentachlorophenol off-site. Between 1999 and 2001 EPA conducted its second major cleanup at the Site through the NTCRA to address the contaminants at the tannery buildings and at the sludge landfill. This action included decontamination, de-construction and off-site removal of all contaminated buildings; removal of a tannery contaminated bank along the Hoosic River; and permanently capping the tannery landfill.

The remedy described in this ROD will be the third and final cleanup action for the Site. The selected remedy addresses the final source area of identified tannery contamination. EPA’s proposal involves excavation of saturated and unsaturated contaminated soil and sludge in lagoons 1 and 5 and consolidation of these materials over lagoon 3 and in the southeast corner of lagoon 4. To reduce the potential human-health risks associated with direct contact with the contaminated material, the proposed remedy will include covering the soil and sludge with a low permeability landfill cap. The consolidated wastes would be graded and storm water controls would be installed to minimize ground water infiltration into the wastes. This cap would be designed to resist future flooding events, up to a 100-year flood event, and to protect future users of this property. Maintenance of the landfill cap would be required for at least 30 years, and likely indefinitely since the wastes under the cap will continue to pose a risk if exposed for an indeterminable period beyond 30 years. Maintenance of the lagoon site would include environmental monitoring which would be performed to ensure ongoing protection of human health and the environment. To assess the migration of low levels of contaminants in the ground water, existing ground water monitoring wells would be periodically sampled. Samples from adjacent private water supplies will continue to be tested to ensure that site contaminants are not adversely impacting local residents. Sediment samples will be collected from the Hoosic River and tested yearly to assess future potential impacts from the site to the environment. Furthermore, long-term State operation and maintenance of the NTCRA tannery landfill cap will ensure that the landfill cap over that area will remain protective.

In addition, five-year site reviews would be performed to ensure that the remedial alternative remains protective of human health and the environment. The primary contaminants of concern include dioxin, semi-volatile organic compounds (semi VOCs) and metals. With respect to principal threats, the initial removal action and the recent NTCRA have addressed the highly contaminated source materials at the Site and eliminated the serious physical hazards that the deteriorated and contaminated buildings posed. The selected remedy in this ROD will eliminate the remaining principal threats that the contaminated soil and sludge at the lagoons pose. The selected remedy also targets the remaining low-level threats that the lagoon sludge poses by reducing infiltration and precipitation of contaminants into the ground water and its possible migration to the Hoosic River sediments.

E. SITE CHARACTERISTICS

Chapter 1.6 of the Feasibility Study contains an overview of the Remedial Investigation. The significant findings of the Remedial Investigation are summarized below.

1. General Characteristics

Included in the Remedial Investigation were the following areas and media: lagoon area soil, sludge and surface water; warehouse soils; ground water; Hoosic River surface water and sediment; and wetland/plant/animal identification and delineation. This section will focus on summarizing the general characteristics of each of these areas (Lagoon Area). The Lagoon Area consists of four open depressions that represent remnants of the five original tannery lagoons. The area is undeveloped and overgrown with native vegetation. Portions of the lagoons have ponded water. A gravel road leads into the Site with three locked gates and fences around lagoons 1, 3, and 5. There are earthen berms surrounding each lagoon. One of the lagoons (lagoon 3) is filled in and covered with gravel, forming a broad unpaved flat area in the central portion of the lagoons.

There are five lagoons on the Site. Each lagoon is described below:

Lagoon 1: Lagoon 1 occupies 3.3 acres in the southern end of the Lagoon Area. Approximately half of the Site (1.7 acres) is State, but not federal, jurisdictional wetland. There is up to eight feet of sludge (approximately 27,400 cubic yards) in lagoon 1 that is underlain by gravel, and overlain by about one foot of soil and one foot of clay. Pursuant to a Consent Order against the Pownal Tanning Company by the VT DEC, lagoon 1 was closed in place in 1983. The closure consisted of removal of the surface water and the construction of a cap consisting of a layer of lime (reportedly for odor control) and 12 to 18 inches of clay. The surface of lagoon 1 has subsequently subsided, forming a depression on the top of the cover.

Lagoon 2: Lagoon 2 is adjacent to the northern boundary of lagoon 1, and occupies 1.6 acres. While the tannery was operational, an undocumented amount of sludge was removed from lagoon 2 and disposed in the landfill. No sludge was observed in lagoon 2 during the Remedial Investigation. This lagoon is currently uncapped and contains ponded water with approximately 1 acre of State, but not federal, jurisdictional wetlands.

Lagoon 3: Lagoon 3 is comprised of two sub-lagoons, referred to as 3A and 3B (total acreage 1.1 acres). In 1993, lagoon 3 was capped in place with lime and 12 to 18 inches of clay. Containers of fuel oil, sawdust, rags, lignosulfonate filler, finishing materials (including solvents), burned wood and chromium III crystals were discovered in Lagoon 3 in 1987 and were removed by the Pownal Tanning Company. Lagoon 3A contains up to 8 feet of sandy black sludge, covered with 2 feet of soil and one foot of gravel or lime. Lagoon 3B contains up to 8 feet of clayey sludge mixed with gravel and sand (approximately 11,400 cubic yards of sludge). A layer of gravel and soil is now present over most of this Lagoon, resulting in a flat upper surface with no wetlands.

Lagoon 4: Lagoon 4 is the largest lagoon (9.4 acres), located at the northern end of the Lagoon Area, bordering the Hoosic River. A portion of lagoon 4 is covered with a foot of clay and lime. No sludge was noted in lagoon 4, but a layer of soil/fill is present up to 12 feet thick, underlain by gravel. There are approximately 6 acres of State, but not federal, jurisdictional wetlands in lagoon 4.

Lagoon 5: Lagoon 5 occupies 2 acres south of lagoon 4, west of lagoon 1, and is bounded to the east and south by the Hoosic River. A 6 to 8 foot deep pond covers much of lagoon 5 and approximately 1.2 acres are State, but not federal, jurisdictional wetlands. A discharge culvert exists at lagoon 5. Lagoon 5 contains approximately 6,600 cubic yards of sludge.

<u>Warehouse Building</u>

The warehouse building and adjacent land was used by the tannery to store raw materials and hides. EPA's investigation mainly focused on the area adjacent to the eastern side of the building where hides were reportedly stored and stacked. The portion where the hides were stored is exposed soil. Another portion of this parcel is asphalt and is used as a parking lot. During the NTCRA cleanup action, EPA closed and decontaminated the interior manholes, pits and drains in the warehouse that were filled with soil, sludge, and wood chips. A small number of over-packed drums and an accumulation of potentially asbestos containing materials were also removed. EPA's sampling programed focused on an evaluation of the surface soil and subsurface soil. Several soil borings were advanced through the floor of the warehouse to evaluate potential subsurface soil contamination. Concentrations of contaminants detected were determined in the human health risk assessment not to pose a threat which would warrant any further remedial action be taken.

<u>Hoosic River</u>

The Hoosic River represents a Class B Water as defined by the Vermont Water Resources Board (1997). Class B waters have an objective of providing water quality that consistently exhibits good aesthetic value and to provide high quality habitat for aquatic biota, fish and wildlife. Uses of Class B waters include public water supply (with filtration and disinfection); irrigation and other agricultural uses; swimming; and recreation. The Hoosic River is also classified by the State as a Cold Water Fish Habitat (i.e., suitable for cold water fish such as trout).

The Hoosic River runs adjacent to the Tannery Area and the Lagoon Area. All ground water from the Site discharges to the river. Surface runoff from the site can also enter the Hoosic River. A reported breach in the berm at lagoon 4 occurred once during a flood in the 1980's and was repaired by the State. In addition, there are out-falls into the river at the Tannery Area and lagoon 5, and there is one sewage outfall across the river from the Woods Road Waste Disposal Area. Surface runoff from the Landfill is directed to a small stream or to a wetland and pond located between the landfill and the Hoosic River. During most of the year the pond is separated from the river by a narrow strip of land.

A hydroelectric dam was built on the Hoosic River in 1955 at the tannery building for power generation. The dam is still in place, but is no longer used for hydro-power.

<u>Off-site Private Drinking Water Supply Wells</u>

Residents in the area utilize ground water from private wells as their primary source of water. Most of the wells are completed in bedrock at depths ranging from 100 to 700 feet. There do not appear to be any private drinking water wells located directly downgradient of any of the contaminant source areas.

2. Geology/Hydrogeology

The former Pownal Tannery Site is situated on the Hoosic River, an upper tributary of the Hudson River, between the Green and Taconic Mountain Sections of the New England Province. The site, located on the narrow lowlands of the Vermont Valley physiographic zone, has twice been covered by glacial lakes of the Pleistocene epoch. At the maximum depths of Lakes Bascom and Shaftsbury, the valley was covered to more than 1,000 feet above mean sea level.

The topography of the region reflects the structure and lithology of the underlying bedrock. The major landform features within the Hoosic Valley are low-gradient fluvial terraces associated with Pleistocene glaciation and modern floodplain sediment developed on an eroded valley fill of glacial lake sediment.

Ground water flow in the area is predominantly influenced by the Hoosic River. Generally, overburden ground water flows toward and discharges to the Hoosic River. Based on observations during the installation of monitoring wells and the advancement of borings at the site, the following four principal stratigraphic units were identified.

Fill: An upper layer of miscellaneous fill is present on the surface across much of the Site.

Sand and Gravel: A sand and gravel layer was observed beneath the entire Site, at depths up to approximately 24 feet. This stratigraphic unit generally consists of medium dense to very dense, light to dark brown, fine to coarse sand and gravel.

Gray Clay: This layer is present beneath the entire site except where bedrock is exposed at the surface, and in areas where the bedrock is very shallow (<10 feet). Two areas where the Gray Clay may be thin or absent include limited areas in the former building area and the west side of the Hoosic River across from Lagoon 4. The Gray Clay unit is thickest near the landfill, reaching thicknesses of over 120 feet.

This layer is relatively homogeneous and generally consists of medium-stiff, light gray, highly cohesive clay, with an occasional presence of very thin (<1/8-inch) lenses of fine silty sand. The upper surface of this layer varies in depths below grade from 17 to 79 feet, and extends to depths ranging from 57 to 151 feet.

Bedrock: The bedrock encountered at the site is a fissile, gray green to silver and/or purple phyllite with interbeds of white to green quartzite. The upper 20 to 40 feet of the bedrock is highly weathered and rock cores could not be retrieved from this interval.

3. Plant Community

The project area falls within the Hemlock-White Pine Northern Hardwoods Region of the Eastern North American Deciduous Forest that stretches from Minnesota to the Atlantic Coast. The region is covered with a mixed community of deciduous and coniferous forest. Floral species include hemlock, white pine, sugar maple, beech and yellow birch. No State or federal rare, threatened, or endangered plant species were identified on the Site.

4. Animal Community

Faunal species include eastern cotton-tailed rabbit, white tailed deer, moose, black bear, eastern gray squirrels, woodchuck, and various songbirds. Anadromous fish species, such as salmon and herring are not found in the Hoosic River due to impassable falls at the mouth of the river. Trout and other cold water resident fish species occur in the river. No State or federal rare, threatened, or endangered animal species were identified on the site.

5. Wetlands

Six areas of State, but not federal, jurisdictional wetlands were identified on the Pownal Tannery site.

- Lagoon 1 Wetland (Palustrine Emergent)
- Lagoon 2 Wetland (Palustrine Emergent/Palustrine Scrub-Shrub)
- Lagoon 4 Wetland (Palustrine Emergent/Palustrine Scrub Shrub)
- Lagoon 5 Wetland (Palustrine Emergent/Open Water)
- Hoosic River Fringe Wetlands (Palustrine Forested/Scrub-Shrub/Emergent)
- Hoosic River Floodplain Wetlands (Palustrine Emergent/Forested/Open Water)

Since these wetlands have developed on man-made waste storage lagoons and are not connected to the Hoosic River they do not meet the federal Clean Water Act's definition of "waters of the United States". Therefore they are not regulated by federal statute. However, under the Vermont Wetland Rules, as adopted under Title 10 V.S.A. Chapter 37, section 905 (7-9), all wetlands in the state of Vermont are designated as either Class One, Class Two, or Class Three wetlands. Those wetlands designated as Class One or Class Two have been deemed to be so significant that they merit protection under the Vermont Wetland Rules.

The State of Vermont made a determination that these man-made lagoons are Class Three wetlands and have no significant functions and values under the Vermont Wetlands Rules. Consequently, the State concluded that if any of these wetlands were to be destroyed as a consequence of remedial actions at the site, replication would not be needed (Appendix E).

6. Cultural Resource Survey

During October and November 2000, a Phase I archeological investigation of the lagoon area was completed. The purpose of the survey was to determine whether significant cultural deposits may exist within the project area. Hand-excavated auger tests and a series of backhoe test pits revealed no evidence of buried archaeological sites or potential cultural strata (e.g., A horizons). Based on these findings and after consultation with the State Historic Preservation Office, EPA determined that no additional cultural resource investigations at the Site are necessary.

F. Nature and Extent of Contamination

The following sections describe the nature and extent of contaminants in the areas investigated during the Remedial Investigation.

1. Soils and sludge

Lagoon 1: Lagoon one contains the thickest accumulation of sludge. The sludge is generally buried beneath a thin layer of cover material and therefore the surficial soil samples do generally contain elevated concentrations of Site contaminants. Lagoon 1 generally has the highest contaminant concentrations on the entire Site.

- The sludge present in lagoon 1 generally consisted of moist organic silt including layers of gray clay and varying quantities of hair and hide fragments. The sludge in lagoon 1 contains layers of various colors (black, blue, white, red, and gray). The upper surface of this deposit was often coated with thin (<1 inch) layers of dry white powder, which may be lime that was added to the sludge to minimize odor generation.
- Several VOCs were observed in lagoon 1, including surface cover soil and sludge, but the highest concentrations were detected in the sludge. Total VOC concentrations in the sludge were generally observed to range from 50-200 ppm and in one sample the total VOC concentrations exceed 1 per cent.
- Several SVOCs were detected in lagoon 1, with the highest concentrations present in the sludge buried below 1-2 feet of cover material.
- Elevated metals concentrations were detected in the buried sludge including chromium at concentrations typically ranging from 10,000-70,000 ppm and lead from 1,000 to 2,000 ppm.

- PCBs are present in surface soil and in the sludge at concentrations ranging up to 400 ppb.
- Pesticides are present in both surface and subsurface soils in lagoon 1, but the concentrations detected in the subsurface are approximately one order of magnitude higher than the concentrations detected in the surface soils.
- Dioxin Toxicity Equivalence Quotient (TEQs) exceeded 1 ppb in several samples.
- None of the samples tested for Toxic Characteristic Leachate Procedure (TCLP) exceeded the RCRA Hazardous Waste threshold.

Lagoon 2: Lagoon 2 contains only a very small quantity of sludge, so there is no significant contrast in chemical concentrations versus depth. In general, fewer site contaminants are present in lagoon 2 and the chemical concentrations in the Lagoon Area are generally lowest in lagoon 2. A summary of the laboratory test results is presented below.

- The inorganic constituents are present at concentrations that are closer to background soil conditions. Representative maximum concentrations for some metals detected include arsenic at 5.2 ppm, cadmium at 11.4 ppm, chromium at 2,690 ppm, lead at 192 ppm, nickel at 19.7 ppm and cyanide at 2.5 ppm.
- All dioxin TEQs were less than 1 ppb.
- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Lagoon 3: Lagoon 3 is the smallest of the lagoons. Samples were collected from seven borings. In previous investigations lagoon 3 was divided into two sub-lagoons, 3A and 3B, though there are no present day landmarks or other features that distinguish the two sub-lagoons. The lagoon is now covered with gravel fill and is largely un-vegetated. A summary of the laboratory test results is presented below.

- Metals are present in the greatest concentration within the sludge layer. Cadmium was not detected in surface soils, nor in the underlying gravel layer, but is present in the sludge at concentrations up to 42 ppm. Chromium and lead are present at concentrations up to two orders of magnitude greater (chromium up to 18,000 ppm, lead up to 565 ppm) than in surface soils or the underlying soil.
- All dioxin TEQs were less than 1 ppb.
- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Lagoon 4: Lagoon 4 is the largest lagoon. Samples were collected from 29 borings.

- The maximum total VOC concentration is less than 200 ppb.
- Eleven SVOCs are present in lagoon 4.
- The highest metals concentrations in lagoon 4 are present in the surficial soils. Lead, chromium and cadmium are present at higher concentrations (one to two orders of magnitude greater) in the surface soils than in the subsurface soils.
- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Lagoon 5: Lagoon 5 is mostly underwater throughout the entire year. A summary of the contaminants found in lagoon 5 is presented below.

- Two SVOCs were detected in lagoon 5: pentachlorophenol (6,300 ppb at one location) and bis(2-ethylhexyl)phthalate (less than 800 ppb).
- Several metals are present in lagoon 5, including arsenic (up to 2.1 ppb), chromium (up to 16,100 ppb), lead (up to 624 ppb) and mercury (up to 4.1 ppb).
- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

2. Ground Water

Thirteen overburden and one bedrock ground water monitoring wells were sampled in the Lagoon Area. Five rounds of sampling were performed. A summary of the findings is presented below.

- Nine VOCs were detected (acetone, methylene chloride, MTBE, carbon tetrachloride, toluene, tetrachloroethylene, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene) in Lagoon Area ground water samples, generally at low concentrations. Methylene chloride was only detected in the August 2000 sampling round, and appears to be a field contaminant, since it was also detected in the rinseate blank, it was detected in numerous ground water samples from other areas at the site, and it was detected from this sampling event only.
- Tetrachloroethylene was detected above the MCL in well MW-114U.
- Three SVOCs were detected in Lagoon Area ground water (diethylphthalate, atrazine, bis(2-ethylhexyl)phthalate). These compounds were only detected during one sampling event (August 2000), and each compound was detected only once. Each of these compounds was detected in separate wells. Only atrazine was detected at a concentration (7 ppb) above the MCL (3 ppb) in well MW-L-11. Note that the turbidity of this ground water sample was also elevated, so it is possible that the atrazine is not dissolved in the ground water, but is present in particulate form. No SVOCs were detected in this well during the other sampling events.
- All metals/cyanide present except thallium, were detected at concentrations below their respective MCL. Thallium was detected at a concentration of 7 ppb (versus MCL of 1 ppb) in well MW-109U during only one sampling event (May 2000).
- No PCBs were detected in any Lagoon Area ground water samples.
- Low concentrations of dioxin compounds were detected only in two Lagoon Areas wells. One dioxin (1,2,3,4,6,7,8-HpCDF) was detected in MW-109U (May 2000 sampling event) and four dioxins were detected in MW-114U (September 2000 sampling event).

3. Surface Water, Sediments and Ponded Water

Surface water samples were collected at locations in the Hoosic River up stream of the Site and adjacent to all three down gradient source areas, including the sludge landfill, former tannery building and the lagoons. Down stream samples were also collected. Aluminum and barium are present in unfiltered river surface water samples at concentrations that exceed the National Water Quality Criteria-Chronic levels. Surface water samples were collected from ponded water in lagoons 1, 2, 4 (there are three ponds in Lagoon 4), and 5. Surface water was also collected from the reach of the Hoosic River, adjacent to the Lagoon Area, at four locations. Aluminum, barium and magnesium are present in unfiltered surface water samples from the lagoon ponds at concentrations that exceed the National Water Quality Criteria-Chronic levels. None of the filtered samples from the lagoon ponds contained metals or cyanide at concentrations above their respective National Water Quality Criteria-Chronic levels.

Six SVOCs are present in Hoosic River sediment samples. Five of these compounds are present at concentrations that exceed their respective Ontario Ministry of the Environment Lowest Effect Level values. No pesticides were observed above their respective detection limits in any of the sediment samples.

PCBs were detected in four Hoosic River sediment samples from the Lagoon Area, ranging in concentrations of 86 to 270 ppb. Dioxins were detected in the two Lagoon pond sediment samples (TEQ ranging from 106 to 127 ppt) and in the Lagoon Area Hoosic River sediment samples (TEQ less than 3 ppt).

All exceedences in the Hoosic River surface water and sediments were detected at higher concentrations upstream of the Site, including the tannery sludge landfill, former tannery building area, and the lagoons. Therefore, the exceedences of national standards for both surface water and sediments can be linked to non-site related discharges or background levels.

4. Residential Wells

- Only two VOCs were observed in residential wells above their respective detection limits. Acetone was detected at a low concentration (3 ppb) in RW-009 during the June 2000 re-sampling of that well. MTBE was detected in RW-006 at a concentration of 4.4 ppb during the August 2000 sampling event.
- No SVOCs, pesticides or PCBs were detected in any residential well above the detection limit.
- Only one well (RW-010) contained a metal (lead) at a concentration (493 ppb) that exceeded the MCL (15 ppb). This exceedance was observed in the May 2000 sampling

round. Due to this anomalous result, this well was re-sampled in June 2000, and lead was not found to be present above the MCL. This finding was confirmed in the August 2000 sampling round where lead was detected at a concentration of only 4 ppb. The May 2000 anomalous lead measurement appeared to be related to the homeowner's well filtration unit.

G. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

All of the affected properties are situated within two town zoning districts: the "Village Residential" district and the "Rural Residential" district. The purpose of both the Village Residential and Rural Residential districts is to preserve the natural rural and scenic qualities of the Town, allowing residential and agricultural uses of property as well as some non-residential uses. Non-residential uses are permitted as long as they do not create certain nuisance conditions (noise, dust, vibration, glare heat, odor or smoke). Allowable uses include, but are not limited to, multiple family dwellings, recreation, construction or contracting businesses, manufacturing, research, auto repair and animal boarding. Any non-residential or non-agricultural use is subject to the conditions that are specified in the Town Zoning Bylaws (April 1,1991, amended February 23, 1995).

There are several residences that border the property occupied by the Pownal Tannery and there are a few commercial businesses that abut the property. The nearest residence is approximately 75 feet from the Site and a recently vacated retail store is located approximately 40 feet from the Site boundary. Within a mile radius from the Site, approximately 275 people are served by private drinking water wells completed in either the overburden or bedrock.

Currently, the on-site warehouse is available for private lease, but is vacant. It is anticipated that the Town of Pownal is going to take title to this property, as well as the lagoon area and the former building area. The park located on the site of the former Tannery building was created as a result of EPA's 2001 removal effort, and is open for use by the community. This property is currently deeded to the former Pownal Tannery Company, to be acquired by the Town of Pownal in the future. It is an un-enhanced four to one graded grassy space that slopes down to a fence overlooking the Hoosic River dam. The area is currently used for picnicking and fishing. A portion of the this parcel is listed on the Vermont Register of Historic Places (SR No. 0208-8), as is the adjacent general store (now closed), and the steel truss bridge that spans the Hoosic River (now closed). These areas, as well as 16 off-site residences located east of Route 346, are designated as the North Pownal Mill Historic District. To satisfy historic protection standards requiring documentation before the removal of historic structures, EPA situated a plaque at the park to memorialize the former mill building and tannery's history. Additionally, localized trees and shrubs were planted at this location.

Access to the lagoons on the Site is posted, prohibited, gated and fenced. There are dirt access roads running around the fenced and unfenced lagoons, which are regularly used by the public for walking, hunting, and for running off-road vehicles, snow mobiles, etc. Currently, a number of residential homes are tied to a sewer pipe which discharges just off of the access road to the lagoons and dumps directly into the Hoosic River. The town is under a State order to design and build a waste water treatment plant to alleviate the Town's sewer issues. The Town's current design for this system has the facility located over the area of lagoon two and a portion of lagoon one. In February 2001, the Town and their contractor, Forcier and Aldrich and Associates, completed a Site Reuse Assessment, utilizing EPA grant money provided through the Superfund program (one of the first ten pilot sites in the Region to be issued one). The Town of Pownal worked closely with EPA, the State, and the community to conclude that the lagoon area, once the remediation is completed, should potentially be used for a variety of purposes including:

- walking trails
- seasonal skating rink
- warming hut with public restrooms
- soccer field
- equipment storage shed
- canoe/kayak launch area
- water, sewer, and electrical utilities

EPA utilized the potential future reuse decisions to develop exposure assumptions for the Human Health Risk Assessment (see Appendix J of the Feasibility Study).

The town is substantially funded from the federal government to build their waste water treatment system on a schedule to coincide with EPA's planned cleanup schedule. During EPA's pre-design phase of the development of the Feasibility Study, EPA worked very closely with Town officials, the State, the community and the Site Reuse Steering Committee to ensure that they had the information necessary to complete the Reuse Assessment. Multiple public outreach meetings, and mailings were provided to the community to maximize input into their effort to develop reasonable alternatives for reuse at the Site. EPA utilized the Town of Pownal's proposed design plans for the treatment plant to aid in the cap configuration developed for the alternatives which included leaving waste in place at the lagoons. The current location of EPA's selected remedy accommodates the Town's current treatment plant design. This remedy will alleviate all direct contact and ingestion risk to the consolidated waste left in place and will aid the Town in their efforts to eliminate the discharge of Town sewage into the Hoosic River. This remedy will also potentially increase the future positive use of the former lagoons to the residents of Pownal.

H. 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. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The human health risk assessment 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) toxicity assessment, which considered the types and magnitude of adverse health 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 uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below followed by a summary of the environmental risk assessment.

1. Human Health Risk Assessment

Soil/sludge analytical results were evaluated for the five lagoons and the Warehouse Area. Surface water analytical results were also evaluated for the lagoons. Surface water and sediment analytical results were evaluated for the Hoosic River and associated wetlands (including lagoon wetlands). Ground water analytical results from two aquifers (overburden and bedrock) were evaluated in ten off-site private wells and 24 on-site monitoring wells.

For soil/sludge, surface water and sediment, the 95% upper confidence limit (UCL) concentration was used as the exposure point concentration (EPC) unless it exceeded the maximum detected value, in which case, the maximum detected value was used as the EPC. For ground water, the arithmetic mean concentration for each contaminant of potential concern (COPC) in each well or all on-site wells combined was used in calculating the central tendency (CT) exposure, and the maximum concentration for each COPC in each well was used to calculate the reasonable maximum exposure (RME) exposure, rather than using the 95% UCL. If the arithmetic mean concentration exceeded the maximum detected concentration, the maximum detected concentration was used for the CT exposure.

Exposure Assessment

To evaluate current exposures, adolescent (i.e., 7 to 16 years old) trespassers and young child/adult off-site residents were considered as receptor populations. Exposures of trespassers to surface soil/sludge through incidental ingestion of and dermal contact with COPCs were evaluated. Since the lagoon surface waters are shallow, trespassers were assumed to wade, rather than swim. Therefore, only dermal contact with lagoon surface water was evaluated. Exposures of adolescent trespassers to river sediment and surface water were also evaluated. Pathways associated with river surface water and sediment exposures that were evaluated include incidental ingestion of and dermal contact with sediment and surface water. The ingestion of surface water was assessed since, even though swimming is unlikely because of rapidly flowing waters, accidental submersion is possible resulting in incidental surface water ingestion.

Since private drinking water wells exist in the vicinity of the site, exposures to COPCs in off-site private wells were assessed under current land-use conditions. Routes of exposure associated with residential ground water use may include ingestion of drinking water, inhalation of chemicals that have volatilized from ground water during use (e.g., while showering), and dermal contact with ground water during use (e.g., while bathing). Drinking water ingestion exposures of residents were quantitatively evaluated. Potential exposures from other pathways, such as inhalation or dermal contact during bathing, were not quantitatively evaluated.

To evaluate future exposures, young child/adult park visitors, commercial workers and utility workers were considered as receptor populations. Exposures of park visitors, commercial workers and utility workers to soil/sludge through incidental ingestion of and dermal contact with COPCs were evaluated. Dermal contact with lagoon surface water was evaluated for the park visitor and utility worker scenarios only. In addition, for the utility worker, exposures to volatile COPCs in air during trenching activities were quantitatively evaluated. Exposures of park visitors to river sediment and surface water were also evaluated. Pathways associated with river surface water and sediment exposures that were evaluated include incidental ingestion of and dermal contact with sediment and surface water.

Under a future land-use scenario, it was also assumed that area residents would use ground water from the Site for domestic use. As for the current scenario, only drinking water ingestion exposures of future residents were quantitatively evaluated.

The following items summarize the pathways evaluated for each exposure scenario.

- Off-site child/adult resident scenario, current
  Ingestion pathways: ground water from private wells

- On-site adolescent trespasser scenario, current
  Ingestion pathways: surface soil/sludge
  Dermal contact pathways: surface soil/sludge, surface water

- C Hoosic River adolescent recreational user scenario, current
  Ingestion pathways: surface water, sediment
  Dermal contact pathways: surface water, sediment

- C On-site adult and young child park visitor scenario, future
  Ingestion pathways: soil/sludge
  Dermal contact pathways: soil/sludge, surface water

- C Hoosic River adult and young child park user scenario, future
  Ingestion pathways: surface water, sediment
  Dermal contact pathways: surface water, sediment

- C On-site commercial worker scenario, future
  Ingestion pathways: soil/sludge
  Dermal contact pathways: soil/sludge

- C On-site utility worker scenario, future
  Ingestion pathways: soil/sludge
  Dermal contact pathways: soil/sludge, surface water
  Inhalation pathways: volatiles from soil/sludge and ground water

- C On-site child/adult resident scenario, future
  Ingestion pathways: soil, ground water
  Dermal pathway: soil

The risk assessment used the default CT exposure parameters to evaluate average exposures and high-end exposure parameters to calculate RME estimates.

Risk Characterization

Since no toxicity values are available for lead, lead toxicity was assessed using an interim approach recommended for use with non-residential adult exposures (U.S. EPA, 1996) for the future commercial worker scenario. This method relates soil lead intake to blood lead concentrations in women of childbearing age; this group is assumed to be the most sensitive to lead exposure, among adults. The method does not provide a quantitative estimate of risk; instead it predicts a central estimate of blood lead concentrations in women of child-bearing age that have exposures to soil lead at site concentrations. Risks associated with lead are described by comparing the central estimate of blood lead concentration in women of childbearing age to a goal blood lead concentration associated with a fetal blood lead concentration of 10 ug/l. For the model, it was assumed that a typical blood lead concentration in women of child-bearing age in the absence of site exposures was 1.7 ug/l, which is a low end default assumption. The biokinetic slope factor for lead was assumed to be 0.4 ug/l per ug/day. A representative intake rate of soil was assumed to be 0.05 g/day based on occupational, indoor exposures to dust from outdoor soil (50 mg/day). The absolute gastrointestinal absorption fraction for ingested lead in soil and soil-derived dust was assumed to be 0.12. The exposure frequency was assumed to be 219 days per year. Using these assumptions, the goal for the central estimate of blood lead concentration in adults was calculated as 4.2 ug/l for the Site. Predicted blood concentrations were compared to this value based on site soil/sludge concentrations.

For the young child park visitor, lead toxicity was assessed using EPA's Integrated Exposure Uptake Biokinetic Model (IEUBK) for Lead in Children (U.S. EPA, 1994). This method relates soil lead intake to blood lead concentrations in young children (i.e., ages 1-6 years); this group is assumed to be the most sensitive to lead exposure, among children. The method does not provide a quantitative estimate of risk; instead it predicts a percent of children with a blood lead concentration above a goal blood lead concentration of 10 ug/l. The percent of children with a blood lead level exceeding the goal was set at no more than 5%. The exposure frequency was assumed to be 112 days per year. The exposure time was conservatively assumed to be 4 hours per day. Using these assumptions, a soil lead level was calculated which did not exceed the goal of no more than 5% of children with blood lead levels above 10 ug/l.

Carcinogenic and non-carcinogenic risks were estimated using both the CT and RME exposure assumptions. The significance of the risk estimates are relative to guidelines set forth in EPA policy (i.e., an incremental lifetime cancer risk [ILCR] above the target risk range of 10^{-6} to 10^{-4} and a hazard index [HI] above 1). Risk estimates, as presented in the RI for the RME case, are presented below by area. When risks were estimated for a young child and adult receptor (i.e., residents and park visitors), the young child non-carcinogenic risks (hazard indices) have been presented as the most conservative, while carcinogenic risks presented represent the sum of the young child and adult risks (i.e., a total receptor risk).

Lagoon Areas: In the five lagoon areas, potential exposures to soil/sludge, surface water and air were evaluated. Health risks from air and surface water are expected to be below or within the EPA risk range of 10^{-6} to 10^{-4} for cancer risk and below a hazard index of 1 for non-cancer risk. Health risks from potential future ingestion and dermal contact with soil/sludge at Lagoons 1, 3 and 5 exceed EPA risk guidelines. Soil/sludge contaminants contributing to risks above EPA risk guidelines, under central tendency and RME scenarios were: lagoon 1 (benzo(a)anthracene, benzo(a)pyrene, pentachlorophenol, dioxins, chromium, mercury and arsenic); lagoon 3 (dioxins, chromium and arsenic); and lagoon 5 (benzo(a)pyrene, N-nitroso-di-n-propylamine, dioxinschromium, and arsenic). Future childhood exposures to lead in soil may result in excess blood lead levels in park visitors at lagoon 1.

Warehouse Area: In this area, potential exposures to soil were evaluated. Health risks from surface soil are expected to be below or within the EPA risk range of 10^{-6} to 10^{-4} for cancer risk and below a hazard index of 1 for non-cancer risk.

Hoosic River and Associated Wetlands (including lagoon surface water): In this area, potential exposures to surface water and sediment were evaluated. Health risks from surface water are expected to be below or within the EPA risk range of 10^{-6} to 10^{-4} for cancer risk and below a hazard index of 1 for non-cancer risk. Health risks from future ingestion and dermal contact with sediment exceed EPA risk guidelines. Sediment contaminants contributing to risks above EPA risk guidelines, under central tendency and RME scenarios were PCBs, dioxins and arsenic.

All of the samples containing elevated contaminant concentrations detected in the Hoosic River sediments that resulted in a risk exceedence, were detected at higher concentrations in samples collected upstream of the dam, including the seeps, ponds and wetlands near the tannery sludge landfill. Therefore, the exceedences of national standards for both surface water and sediments can be linked to non-site related discharges or background levels. As a result of EPA's concern that future potential town reuse plans may include recreational use of the Hoosic River adjacent to the Site, EPA completed supplemental calculations, using the same methods and assumptions as the baseline risk assessment, to identify the risks to public health from only those sediments downstream of the dam at the Site. The baseline risk calculations included data collected upstream of the dam and Site, which indicated much higher concentrations. The supplemental risk calculations, as discussed in Appendix F, indicated that the cumulative receptor carcinogenic risks are within the EPA risk management cancer risk range of 10^{-6} to 10^{-4}, and non-carcinogenic risks are below EPA's target risk of HI 1.

Off-Site Private Wells: Current exposures via ground water ingestion were evaluated. Health risks from current ingestion of ground water exceed EPA risk guidelines for four of the ten private wells evaluated. Ground water constituents contributing to risks above EPA risk guidelines, under an RME scenario were: RW-003 (arsenic); RW-006 (thallium); RW-008 (arsenic and manganese); RW-010 (manganese). As discussed in Section E and F above, the contaminant detections in off-site private wells were sporadic and cannot be specifically linked to the Site. Groundwater is moving north-west and discharging to the Hoosic River away from private wells. The detections which indicated the risk exceedences were sporadic and are believed to be related to home plumbing materials and/or naturally occurring minerals in the local geology.

On-Site Monitoring Wells: Potential future exposures via ground water ingestion were evaluated. Health risks from future ingestion of ground water exceed EPA risk guidelines for 13 of the 24 monitoring wells evaluated (MW-104U; MW-106U; MW-107R; MW-107U; MW-109U; MW-110R; MW-110U; MW-111U; MW-113R; MW-114U; MW-B-7; MW-L-3; and MW-L-10). Ground water constituents contributing to risks above EPA risk guidelines under an

RME scenario were manganese, dioxin, arsenic, carbon tetrachloride, heptachlor epoxide, thallium, methylene chloride, 1,4-dichlorobenzene, tetrachloroethene, atrazine and pentachlorophenol.

Table 1: Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Time frame: Future
Medium: Soil
Exposure Medium: Soil/sludge

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Lagoon 1 - Dermal Contact and Ingestion	Benzo(a)anthracene	0.059	2	mg/kg	7/22	2	mg/kg	Max
	Benzo(a)pyrene	0.055	2	mg/kg	7/22	2	mg/kg	Max
	Pentachlorophenol	1	92	mg/kg	13/27	30	mg/kg	95% UCL
	Arsenic	2.2	20.6	mg/kg	23/23	8.4	mg/kg	95% UCL
	Chromium	10.7	73000	mg/kg	29/29	31,000	mg/kg	95% UCL
	Lead	7.4	2870	mg/kg	29/29	1,100	mg/kg	95% UCL
	Mercury	0.042	85.2	mg/kg	23/29	85.2	mg/kg	Max
	Dioxin TEQ	7.9E-7	1.2E-2	mg/kg	15/15	1.2E-2	mg/kg	Max
Lagoon 3 - Dermal Contact and Ingestion	Arsenic	2.2	9.4	mg/kg	10/10	8.3	mg/kg	95% UCL
	Chromium	23.3	18100	mg/kg	12/12	18,100	mg/kg	Max
	Dioxin TEQ	5.7E-8	2.6E-3	mg/kg	18/18	2.6E-3	mg/kg	Max
Lagoon 5 - Dermal Contact and Ingestion	Benzo(a)pyrene	0.064	0.31	mg/kg	3/14	0.31	mg/kg	Max
	N-nitroso-di-n-propylamine	0.49	0.49	mg/kg	1/14	0.49	mg/kg	Max
	Arsenic	1	5	mg/kg	8/9	5	mg/kg	Max
	Chromium	9.4	16100	mg/kg	13/13	8,100	mg/kg	95% UCL
	Dioxin TEQ	8.3E-5	3.4E-3	mg/kg	13/13	1.9E-3	mg/kg	95% UCL

Key
mg/kg: Parts per million
95% UCL: 95% Upper Confidence Limit
MAX: Maximum Concentration

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in soil (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the soil). 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 (EPC), and how the EPC was derived.

The table indicates that chromium, lead and dioxin are the most frequently detected COCs in soil at Lagoon 1. Arsenic, chromium, and dioxin were all detected in each sample in Lagoon 3. Chromium, and dioxin were the most common COCs detected in Lagoon 5.

The 95%UCL on the arithmetic mean was used as the exposure point concentration for COCs where there was sufficient data. However, due to the limited amount of sample data available for some COCs, the maximum concentration was used as the default exposure point concentration.

Table 2: Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil/sludge

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Lagoon 5 Surface soils - Ingestion	Chromium	9.4	16,100	mg/kg	4/4	16,100	mg/kg	Max

Key

mg/kg: Milligrams per kilogram

95% UCL: 95% Upper Confidence Limit

MAX: Maximum Concentration

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in soil (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the soil). 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 (EPC), and how the EPC was derived.

Due to the limited amount of sample data available for all COCs, the maximum concentration was used as the default exposure point concentration.

Table 3: Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations								
Scenario Timeframe: Future								
Medium: Sediment								
Exposure Medium: Sediment								
Exposure Point	**Chemical of Concern**	**Concentration Detected**		**Units**	**Frequency of Detection**	**Exposure Point Concentration**	**Exposure Point Concentration Units**	**Statistical Measure**
		Min	**Max**					
River and Wetlands-Dermal Contact and Ingestion	PCB TEQ	9.7E-7	4.1E-2	mg/kg	21/31	5.0E-3	mg/kg	95% UCL
	Arsenic	1.4	14.2	mg/kg	21/31	5.3	mg/kg	95% UCL
	Dioxin TEQ	7E-9	7.3E-5	mg/kg	28/31	7.3E-5	mg/kg	Max

Key

mg/kg: Milligram per kilogram

95% UCL: 95% Upper Confidence Limit

MAX: Maximum Concentration

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in sediment (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the sediment). 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 (EPC), and how the EPC was derived.

The table indicates that Dioxin TEQ is the most frequently detected COC in soil at the site. The 95%UCL on the arithmetic mean was used as the exposure point concentration for PCBs and arsenic. However, due to the limited amount of sample data available for dioxin, the maximum concentration was used as the default exposure point concentration.

TABLE 4
SUMMARY OF RECEPTOR RISKS, HAZARDS, LIMITATIONS
HUMAN HEALTH RISK ASSESSMENT
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Location	High Lead	Scenario/Receptor	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Major contributors to risk (> 1E-06, HI > 1)
Lagoon 1	No	Current Adolescent Trespasser	RME CT	4E-06 3E-07	6E-01 6E-02		NA
	Yes	Future Park Visitor Young Child / Adult	RME CT	**1E-03** 2E-05	**5E+01** **1E+01**	soil/sludge	(C) - Dioxins, benzo(a)anthracene, benzo(a)pyrene, pentachlorophenol, As (NC) - Hg, Cr, Pb
		Future Adult Commercial Worker	RME CT	**7E-04** 2E-05	**1E+01** **5E+00**	soil/sludge	(C) - Dioxins, benzo(a)pyrene, pentachlorophenol, As (NC) - Cr
		Future Adult Utility Worker	RME CT	1E-05 8E-07	**6E+00** **2E+00**		(NC) - Cr
Lagoon 2	No	Current Adolescent Trespasser	RME CT	4E-06 6E-07	1E-01 4E-02		NA
	No	Future Park Visitor Young Child / Adult	RME CT	2E-05 2E-06	1E+00 3E-01		NA
		Future Adult Commercial Worker	RME CT	1E-05 2E-06	2E-01 1E-01		NA
		Future Adult Utility Worker	RME CT	3E-07 9E-08	1E-01 5E-02		NA
Lagoon 3	No	Current Adolescent Trespasser	RME CT	2E-06 1E-07	7E-02 9E-03		NA
	No	Future Park Visitor Young Child / Adult	RME CT	**2E-04** 2E-06	**3E+01** **2E+00**	soil/sludge	(C) - Dioxins, As (NC) - Cr
		Future Adult Commercial Worker	RME CT	1E-04 3E-06	**6E+00** 8E-01		(NC) - Cr
		Future Adult Utility Worker	RME CT	3E-06 1E-07	**3E+00** 3E-01		(NC) - Cr
Lagoon 4	No	Current Adolescent Trespasser	RME CT	9E-06 5E-07	6E-01 2E-01		NA
	No	Future Park Visitor Young Child / Adult	RME CT	7E-05 2E-06	4E-01 9E-02		NA
		Future Adult Commercial Worker	RME CT	5E-05 2E-06	8E-02 3E-02		NA
		Future Adult Utility Worker	RME CT	1E-06 9E-08	5E-02 1E-02		NA
Lagoon 5	No	Current Adolescent Trespasser	RME CT	2E-05 2E-06	**2E+00** 1E-01		(NC) - Cr
	No	Future Park Visitor Young Child / Adult	RME CT	**2E-04** 2E-05	**1E+01** **3E+00**	soil/sludge	(C) - Dioxins, As, N-nitroso-di-n-propylamine, benzo(a)pyrene (NC) - Cr
		Future Adult Commercial Worker	RME CT	1E-04 2E-05	**3E+00** 1E+00		(NC) - Cr
		Future Adult Utility Worker	RME CT	2E-06 8E-07	**2E+00** 5E-01		(NC) - Cr
Warehouse Area	No	Current Adolescent Trespasser	RME CT	2E-06 2E-07	3E-02 7E-03		NA

Location	High Lead	Scenario/Receptor	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Major contributors to risk (> 1E-06, HI > 1)
	No	Future Park Visitor Young Child / Adult	RME CT	1E-05 9E-07	5E-01 1E-01		NA
		Future Resident Young Child / Adult	RME CT	1E-05 2E-06	7E-01 3E-01		NA
Hoosic River	No	Current Adolescent Recreational Visitor	RME CT	3E-05 7E-06	3E-02 6E-03		NA
	No	Future Park Visitor Young Child / Adult	RME CT	**2E-04** 2E-05	2E-01 3E-02	Sediment	(C) - PCBs, Dioxins, As
Tap Water RW-001	No	Current Resident Young Child / Adult	RME CT	N/A N/A	4E-01 1E-01		NA
Tap Water RW-002	No	Current Resident Young Child / Adult	RME CT	8E-05 1E-05	1E+00 4E-01		NA
Tap Water RW-003	No	Current Resident Young Child / Adult	RME CT	1E-04 3E-05	**3E+00** **2E+00**	Ground-water	(NC) - As
Tap Water RW-004	No	Current Resident Young Child / Adult	RME CT	N/A N/A	9E-01 5E-01		NA
Tap Water RW-006	No	Current Resident Young Child / Adult	RME CT	9E-06 9E-07	**2E+00** 1E+00	Ground-water	(NC) - Tl
Tap Water RW-007	No	Current Resident Young Child / Adult	RME CT	1E-05 2E-06	6E-01 2E-01		NA
Tap Water RW-008	No	Current Resident Young Child / Adult	RME CT	8E-05 1E-05	**3E+00** 1E+00	Ground-water	(NC) - As, Mn
Tap Water RW-010	No	Current Resident Young Child / Adult	RME CT	4E-05 8E-06	**3E+00** **2E+00**	Ground-water	(NC) - Mn
All On-Site Monit. Wells	No	Future Resident Young Child / Adult	RME CT	**4E-03** 3E-05	**1E+02** **4E+00**	Ground-water	(C) - 1,4-Dichlorobenzene, carbon tetrachloride, methylene chloride, tetrachloroethylene, atrazine, pentachlorophenol, heptachlor epoxide, dioxins, As (NC) - Methylene chloride, As, Mn, Tl

2. Ecological Risk Assessment

a. Identification of Chemicals of Concern

Tables 5 and 6 show the detected contaminants at the site and those that were selected as Contaminants of Concern, for both surface water and sediment, for each of the exposure areas.

Table 5. Occurrence, Distribution, and Selection of Chemicals of Concern (COC) in Surface Water

Chemical of Potential Concern	Minimum Concentration	Maximum Concentration	Mean Concentration	Background Concentration	Screening Toxicity Value	Screening Toxicity Value Source	HQ Value
Hoosic River							
Dioxins (pg/l)							
1,2,3,4,6,7,8-HpCDF	1.4	1.4	0.9	N/A	N/A	N/A	N/A
1,2,3,4,7,8-HxCDF	0.3	1.9	0.8	N/A	N/A	N/A	N/A
1,2,3,6,7,8-HxCDF	1.675	1.675	0.725	N/A	N/A	N/A	N/A
1,2,3,7,8-PeCDD	2.75	2.75	0.96	N/A	N/A	N/A	N/A
2,3,7,8-TCDF	2.65	2.65	1.04	N/A	N/A	N/A	N/A
Total HpCDFs	1.9	1.9	1.1	N/A	N/A	N/A	N/A
Total HxCDFs	1	3.325	1.255	N/A	N/A	N/A	N/A
Total TCDFs	0.7	2.65	1.12	N/A	N/A	N/A	N/A
Dioxins (pg/l)							
1,2,3,4,6,7,8-HpCDD	37	37	10.3	N/A	N/A	N/A	N/A
1,2,3,4,6,7,8-HpCDF	3.4	5.1	2.2	N/A	N/A	N/A	N/A
2,3,7,8-TCDF	5	5	1.6	N/A	N/A	N/A	N/A
OCDF	9.4	9.4	4.2	N/A	N/A	N/A	N/A
Total HpCDFs	2	9.8	3.2	N/A	N/A	N/A	N/A
Total HxCDDs	24	24	5.1	N/A	N/A	N/A	N/A
Total HxCDFs	2.2	3	1.4	N/A	N/A	N/A	N/A
Total TCDFs	17	17	3.6	N/A	N/A	N/A	N/A
Landfill Pond/Seeps							
Dioxins (pg/l)							
1,2,3,4,6,7,8-HpCDF	1	1	1.33	N/A	N/A	N/A	N/A
OCDF	4.1	4.1	6.72	N/A	N/A	N/A	N/A
Total HpCDFs	2.9	3.1	2.23	N/A	N/A	N/A	N/A
Metals (ug/l)							
Aluminum	110	1230	449.11	189	87	AWQC Chronic	14.14
Halifax Hollow							
Dioxins (pg/l)							
OCDD	13	13	13	N/A	N/A	N/A	N/A

Table 6. Occurrence, Distribution, and Selection of Chemicals of Concern (COC) in Sediment										
		Chemical of Potential Concern	Minimum Concentration	Maximum Concentration	Mean Concentration	Background Concentration	Screening Toxicity Value	Screening Toxicity Value Source	HQ Value
Hoosic River									
	Dioxin (ng/kg)								
		1,2,3,4,6,7,8-HpCDD	3.34	2520	193.0614	1410	N/A	N/A	N/A
		1,2,3,4,6,7,8-HpCDF	1.18	388	31.7743	215	N/A	N/A	N/A
		1,2,3,4,7,8,9-HpCDF	0.041	18.3	1.6119	13.4	N/A	N/A	N/A
		1,2,3,4,7,8-HxCDD	0.0725	19.3	1.4501	7.1	N/A	N/A	N/A
		1,2,3,4,7,8-HxCDF	0.362	20.7	1.9770	25.8	N/A	N/A	N/A
		1,2,3,6,7,8-HxCDD	0.188	67.3	5.6734	43.4	N/A	N/A	N/A
		1,2,3,6,7,8-HxCDF	0.2125	12.2	1.2411	10.7	N/A	N/A	N/A
		1,2,3,7,8,9-HxCDD	0.295	35.8	2.9094	20.6	N/A	N/A	N/A
		1,2,3,7,8,9-HxCDF	1.5	4.6	0.3836	4.04	N/A	N/A	N/A
		1,2,3,7,8-PeCDD	2.24	7.68	0.6066	3.49	N/A	N/A	N/A
		1,2,3,7,8-PeCDF	0.423	4.55	0.5886	6.6	N/A	N/A	N/A
		2,3,4,6,7,8-HxCDF	0.23725	18.1	1.7354	10.5	N/A	N/A	N/A
		2,3,4,7,8-PeCDF	0.27925	6.14	1.0689	10.9	N/A	N/A	N/A
		2,3,7,8-TCDD	0.0604	4.61	0.3779	1.42	102	U.S. EPA	0.05
		2,3,7,8-TCDF	0.59725	18.9	2.2845	13	N/A	N/A	N/A
		OCDD	23.8	12200	1041.2050	11500	N/A	N/A	N/A
		OCDF	2.07	1100	91.4276	686	N/A	N/A	N/A
		Total HpCDDs	5.85	4110	323.9308	2460	N/A	N/A	N/A
		Total HpCDFs	3.23	1260	102.9237	675	N/A	N/A	N/A
		Total HxCDDs	2.23	497	41.2093	264	N/A	N/A	N/A
		Total HxCDFs	5.05	373	33.3299	218	N/A	N/A	N/A
		Total PeCDDs	1.022	67.7	6.4981	32.5	N/A	N/A	N/A
		Total PeCDFs	2	176	19.0763	123	N/A	N/A	N/A
		Total TCDDs	1.0305	77.8	7.3217	17	N/A	N/A	N/A
		Total TCDFs	7.47	226	28.5795	152	N/A	N/A	N/A
	Metals (ug/kg)								
		Cadmium	0.19	1.5	0.25	1.3	0.6	NOAA, ER-L	2.50
		Chromium	7.3	81.9	17.27	62.1	37.3	NOAA, ER-L	2.20
		Copper	8	174	24.93	38.3	35.7	NOAA, ER-L	4.87
		Cyanide	0.022	0.66	0.159	N/A	N/A	N/A	N/A
		Lead	8.5	94.8	23.33	43.8	35	NOAA, ER-L	2.71
		Manganese	128	708	314	533	460	ONT., LEL	1.54
		Mercury	0.024	2.3	0.272	0.27	0.174	NOAA, ER-L	13.22
		Nickel	4.6	20.5	11.51	17.2	18	NOAA, ER-L	1.14
		Thallium	0.034	0.15	0.41	N/A	N/A	N/A	N/A
		Zinc	43.75	178	67.85	115	123	NOAA, ER-L	1.45
	Pesticide/PCBs (ug/kg)								
		4,4'-DDD	4.2	34	3.78	N/A	3.54	NOAA, ER-L	9.60
		4,4'-DDE	2.4	48	4.97	13	1.42	NOAA, ER-L	33.80
		alpha-Chlordane	1.2	7.5	1.37	N/A	4.5	NOAA, ER-L	1.67
		Aroclor 1242	13	180	36.75	75	170	Eq-Part.	1.06
		Aroclor 1254	66	840	94.13	390	810	Eq-Part.	1.04
		Endosulfan sulfate	4.1	5.9	2.54	N/A	5.5	Eq-Part.	1.07
		Endrin ketone	1.3	8.2	2.32	N/A	2.67	NOAA, ER-L	3.07
		gamma-BHC (Lindane)	2.2	3.9	1.24	N/A	0.94	NOAA, ER-L	4.15
		gamma-Chlordane	0.86	5	1.37	17	4.5	NOAA, ER-L	1.11
	PCB-Homologues (ug/kg)								
		Heptachlorobiphenyls	14.477	16.944	3.534	7.246	N/A	N/A	N/A
		Hexachlorobiphenyls	2.838	137.154	10.613	54.33	N/A	N/A	N/A
		Pentachlorobiphenyls	3.993	397.853	34.194	155.58	N/A	N/A	N/A
		Tetrachlorobiphenyls	5.523	129.25	15.908	120.82	N/A	N/A	N/A
		Trichlorobiphenyls	18.436	35.356	3.433	11.321	N/A	N/A	N/A

	SVOCs (ug/kg)								
		Acenaphthylene	27	770	172.7	N/A	N/A	N/A	N/A
		Anthracene	43	2700	283.2	140	290	Consensus-Based	9.31
		Benzaldehyde	28	210	295.2	81	N/A	N/A	N/A
		Benzo(a)anthracene	45	5400	591.3	440	290	Consensus-Based	18.62
		Benzo(a)pyrene	43	6500	609.8	450	290	Consensus-Based	22.41
		Benzo(b)fluoranthene	37	3800	480.6	570	290	Consensus-Based	13.10
		Benzo(g,h,i)perylene	29	1200	205.5	280	290	Consensus-Based	4.14
		Benzo(k)fluoranthene	36	3400	441.1	350	290	Consensus-Based	11.72
		Carbazole	31	220	267.7	67	N/A	N/A	N/A
		Chrysene	46	5300	615.8	480	290	Consensus-Based	18.28
		Dibenzo(a,h)anthracene	37	860	140.0	63	290	Consensus-Based	2.97
		Fluoranthene	74	8500	1020.0	880	2900	EPA - SQC	2.93
		Fluorene	66	800	173.2	N/A	290	Consensus-Based	2.76
		Indeno(1,2,3-cd)pyrene	26	2500	288.2	260	290	Consensus-Based	8.62
		Naphthalene	38	130	300.9	N/A	290	Consensus-Based	0.45
		Phenanthrene	26	10000	946.6	560	850	EPA - SQC	11.76
		Pyrene	65	14000	1325.4	800	290	Consensus-Based	48.28
	VOCs (ug/kg)								
		Toluene	2	340	20.9	3	50	Eq-Part.	6.80
Lagoons									
	Dioxin (ng/kg)								
		1,2,3,4,6,7,8-HpCDD	2140	48200	14922.0	225	N/A	N/A	N/A
		1,2,3,4,6,7,8-HpCDF	151	2135	737.3	50.5	N/A	N/A	N/A
		1,2,3,4,7,8,9-HpCDF	8.25	70.4	26.9	3.55	N/A	N/A	N/A
		1,2,3,4,7,8-HxCDD	18	462.5	135.7	1.37	N/A	N/A	N/A
		1,2,3,4,7,8-HxCDF	4.37	67.15	25.2	4.755	N/A	N/A	N/A
		1,2,3,6,7,8-HxCDD	0.478	3895	1088.4	7.47	N/A	N/A	N/A
		1,2,3,6,7,8-HxCDF	4.67	80.2	27.6	3.15	N/A	N/A	N/A
		1,2,3,7,8,9-HxCDD	56.4	1575	438.7	2.77	N/A	N/A	N/A
		1,2,3,7,8,9-HxCDF	1.15	8.8	4.2	N/A	N/A	N/A	N/A
		1,2,3,7,8-PeCDD	15.2	646	165.5	0.833	N/A	N/A	N/A
		1,2,3,7,8-PeCDF	1.11	16.6	6.0	2.32	N/A	N/A	N/A
		2,3,4,6,7,8-HxCDF	8.62	125	45.2	3.97	N/A	N/A	N/A
		2,3,4,7,8-PeCDF	1.6	24.2	8.7	4.47	N/A	N/A	N/A
		2,3,7,8-TCDD	3.15	135.5	38.0	0.534	102	U.S. EPA	1.33
		2,3,7,8-TCDF	1.59	11.65	3.9	5.37	N/A	N/A	N/A
		OCDD	24100	293000	106278.6	2010	N/A	N/A	N/A
		OCDF	515	3990	1148.3	190	N/A	N/A	N/A
		Total HpCDDs	3230	157000	43751.4	405	N/A	N/A	N/A
		Total HpCDFs	460	6435	2221.1	137	N/A	N/A	N/A
		Total HxCDDs	3.27	29850	8029.8	49.3	N/A	N/A	N/A
		Total HxCDFs	136	2380	778.3	52.9	N/A	N/A	N/A
		Total PeCDDs	194	8045	2071.3	11.6	N/A	N/A	N/A
		Total PeCDFs	42	1050	311.0	44.5	N/A	N/A	N/A
		Total TCDDs	73.8	2520	687.0	5.13	N/A	N/A	N/A
		Total TCDFs	26.1	1045	283.0	66.3	N/A	N/A	N/A
	Metals (ug/kg)								
		Barium	24.7	104	60.12	77.9	N/A	N/A	N/A
		Cadmium	1.1	12.35	5.89	1	0.6	NOAA, ER-L	20.58
		Chromium	390	10100	4242	66.7	37.3	NOAA, ER-L	270.78
		Copper	11.4	39.1	24.61	44.4	35.7	NOAA, ER-L	1.10
		Cyanide	0.36	0.37	0.18	N/A	N/A	N/A	N/A
		Lead	28.7	352	156.77	59.6	35	NOAA, ER-L	10.06
		Manganese	390	1085	663	649.5	460	ONT., LEL	2.36
		Mercury	0.37	3.65	1.53	0.24	0.174	NOAA, ER-L	20.98
		Nickel	10.2	22.5	14.57	27.8	18	NOAA, ER-L	1.25
		Selenium	0.2	0.44	0.36	N/A	0.1	WA, DE	4.40
		Thallium	0.11	0.13	0.27	N/A	N/A	N/A	N/A
		Zinc	42	180	100	158	123	NOAA, ER-L	1.46

Pesticide/PCBs (ug/kg)							
4,4'-DDD	0.43	33.5	8.70	N/A	3.54	NOAA, ER-L	9.46
4,4'-DDE	0.2	15.75	7.20	N/A	1.42	NOAA, ER-L	11.09
Aldrin	0.3	3.1	1.41	N/A	2	ONT., LEL	1.55
beta-BHC	1.8	7.5	2.22	N/A	5	ONT., LEL	1.50
Endosulfan sulfate	0.45	6.8	2.29	N/A	5.5	Eq-Part.	1.24
Endrin ketone	0.41	5.8	2.52	N/A	2.67	NOAA, ER-L	2.17
gamma-BHC (Lindane)	1.5	1.5	1.04	N/A	0.94	NOAA, ER-L	1.60
gamma-Chlordane	2.7	5.8	2.25	N/A	4.5	NOAA, ER-L	1.29
Heptachlor epoxide	0.29	2.1	1.19	N/A	0.6	NOAA, ER-L	3.50
SVOCs (ug/kg)							
2,2-oxybis(1-Chloropropane)	340	340	173.9	N/A	N/A	N/A	N/A
2,4-Dichlorophenol	1400	1400	291.7	N/A	N/A	N/A	N/A
2,4-Dimethylphenol	1500	1500	302.8	N/A	29	Eq-Part.	51.72
2-Nitroaniline	190	190	361.1	N/A	N/A	N/A	N/A
2-Nitrophenol	400	400	180.6	N/A	N/A	N/A	N/A
4-Chloro-3-methylphenol	260	260	165.0	N/A	N/A	N/A	N/A
4-Chloroaniline	940	940	240.6	N/A	N/A	N/A	N/A
4-Nitrophenol	190	190	361.1	N/A	N/A	N/A	N/A
Anthracene	22	22	308.6	84	290	Consensus-Based	0.08
Benzaldehyde	140	150	337.2	N/A	N/A	N/A	N/A
Benzo(a)anthracene	68	280	133.7	275	290	Consensus-Based	0.97
Benzo(a)pyrene	64	270	133.2	310	290	Consensus-Based	0.93
Benzo(b)fluoranthene	72	120	298.6	400	290	Consensus-Based	0.41
Benzo(k)fluoranthene	48	270	130.3	155	290	Consensus-Based	0.93
Bis(2-chloroethoxy)methane	1000	1000	247.2	N/A	N/A	N/A	N/A
Bis(2-chloroethyl)ether	320	320	171.7	N/A	N/A	N/A	N/A
Caprolactam	1000	1000	247.2	N/A	N/A	N/A	N/A
Chrysene	67	130	299.1	320	290	Consensus-Based	0.45
Diethylphthalate	130	1700	501.7	N/A	600	Eq-Part.	2.83
Indeno(1,2,3-cd)pyrene	73	73	309.8	190	290	Consensus-Based	0.25
Isophorone	1300	1300	280.6	N/A	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	490	490	190.6	N/A	N/A	N/A	N/A
Naphthalene	420	420	182.8	N/A	290	Consensus-Based	1.45
Nitrobenzene	3300	3300	502.8	N/A	321	U.S. EPA	10.28
Pyrene	130	360	158.3	480	290	Consensus-Based	1.24
VOCs (ug/kg)							
1,2-Dichlorobenzene	8.5	370	52.2	N/A	330	Eq-Part.	1.12
Acetone	130	190	103.3	N/A	14.3	U.S. EPA	13.29
Carbon disulfide	4	1250	149.2	N/A	0.85	Eq-Part.	1470.59
Dioxin (ng/kg)							
1,2,3,4,6,7,8-HpCDD	188	860	440.3	225	N/A	N/A	N/A
1,2,3,4,6,7,8-HpCDF	42.9	124	71.17	50.5	N/A	N/A	N/A
1,2,3,4,7,8,9-HpCDF	3.3	8.3	5.133	3.55	N/A	N/A	N/A
1,2,3,4,7,8-HxCDD	1.91	8.43	3.884	1.37	N/A	N/A	N/A
1,2,3,4,7,8-HxCDF	5.24	10.1	6.667	4.755	N/A	N/A	N/A
1,2,3,6,7,8-HxCDD	9.03	33.9	17.506	7.47	N/A	N/A	N/A
1,2,3,6,7,8-HxCDF	4.36	8.71	6.182	3.15	N/A	N/A	N/A
1,2,3,7,8,9-HxCDD	3.9125	18.7	8.5805	2.77	N/A	N/A	N/A
1,2,3,7,8,9-HxCDF	1.27	2.08	1.594	N/A	N/A	N/A	N/A
1,2,3,7,8-PeCDD	1.06	3.45	1.739	0.833	N/A	N/A	N/A
1,2,3,7,8-PeCDF	3.045	5.15	3.849	2.32	N/A	N/A	N/A
2,3,4,6,7,8-HxCDF	4.77	9.27	6.204	3.97	N/A	N/A	N/A
2,3,4,7,8-PeCDF	4.9	9.2	6.521	4.47	N/A	N/A	N/A
2,3,7,8-TCDD	0.486	1.04	0.6295	0.534	102	U.S. EPA	0.01

		2,3,7,8-TCDF	8.07	19.7	12.541	5.37	N/A	N/A	N/A
		OCDD	1570	6780	3585	2010	N/A	N/A	N/A
		OCDF	101	409	200.9	190	N/A	N/A	N/A
		Total HpCDDs	499	2520	1057.6	405	N/A	N/A	N/A
		Total HpCDFs	114	387	204.2	137	N/A	N/A	N/A
		Total HxCDDs	74.5	204	128.03	49.3	N/A	N/A	N/A
		Total HxCDFs	68.3	159	96.37	52.9	N/A	N/A	N/A
		Total PeCDDs	14.5	49.8	27.23	11.6	N/A	N/A	N/A
		Total PeCDFs	61	122	79.93	44.5	N/A	N/A	N/A
		Total TCDDs	6.54	25.1	14.598	5.13	N/A	N/A	N/A
		Total TCDFs	99.6	276	163.62	66.3	N/A	N/A	N/A
	Metals (ug/kg)								
		Cadmium	1.4	3.2	2.34	1	0.6	NOAA, ER-L	5.33
		Chromium	76.1	108	90.63	66.7	37.3	NOAA, ER-L	2.90
		Copper	44.4	52.6	42.61	44.4	35.7	NOAA, ER-L	1.47
		Cyanide	0.054	0.45	0.3168	N/A	N/A	N/A	N/A
		Iron	17800	29200	23240	27700	20000	ONT., LEL	1.46
		Lead	44.6	63.5	55.57	59.6	35	NOAA, ER-L	1.81
		Manganese	564	719	607.6	649.5	460	ONT., LEL	1.56
		Mercury	0.27	0.515	0.356	0.24	0.174	NOAA, ER-L	2.96
		Nickel	13.8	26.8	21.42	27.8	18	NOAA, ER-L	1.49
		Silver	1.7	5.8	3.4	1.3	4.5	WA, DE	1.29
		Thallium	0.12	0.155	0.263	N/A	N/A	N/A	N/A
		Zinc	108	197	152.1	158	123	NOAA, ER-L	1.60
	Pesticide/PCBs (ug/kg)								
		4,4'-DDD	5.5	8.4	4.42	N/A	3.54	NOAA, ER-L	2.37
		4,4'-DDE	6.7	11	7.68	N/A	1.42	NOAA, ER-L	7.75
		Aldrin	3.2	5.1	2.14	N/A	2	ONT., LEL	2.55
		Endrin aldehyde	3.9	3.9	2.75	N/A	2.67	NOAA, ER-L	1.46
		Heptachlor	1.7	2.15	1.81	N/A	0.6	NOAA, ER-L	3.58
	PCB-Homologues (ug/kg)								
		Dichlorobiphenyls	7.953	13.882	6.5572	N/A	N/A	N/A	N/A
		Hexachlorobiphenyls	3.376	27.56	15.2904	8.316	N/A	N/A	N/A
		Pentachlorobiphenyls	5.618	224.329	87.7694	13.2895	N/A	N/A	N/A
		Tetrachlorobiphenyls	9.603	166.164	94.7716	12.6785	N/A	N/A	N/A
		Trichlorobiphenyls	54.8655	116.857	58.9124	N/A	N/A	N/A	N/A
		4-Methylphenol	640	680	426	N/A	670	Eq-Part.	1.01
	SVOCs (ug/kg)								
		Acenaphthylene	100	100	165	N/A	N/A	N/A	N/A
		Anthracene	90	90	163	84	290	Consensus-Based	0.31
		Benzaldehyde	150	670	333	N/A	N/A	N/A	N/A
		Benzo(a)anthracene	130	410	221	275	290	Consensus-Based	1.41
		Benzo(a)pyrene	150	500	243	310	290	Consensus-Based	1.72
		Benzo(b)fluoranthene	140	370	220	400	290	Consensus-Based	1.28
		Benzo(k)fluoranthene	150	540	264	155	290	Consensus-Based	1.86
		Chrysene	160	480	262	320	290	Consensus-Based	1.66
		Dibenzo(a,h)anthracene	86	86	162.2	N/A	290	Consensus-Based	0.30
		Indeno(1,2,3-cd)pyrene	100	350	163	190	290	Consensus-Based	1.21
		Pyrene	240	720	434	480	290	Consensus-Based	2.48
	VOCs (ug/kg)								
		2-Butanone	322.75	322.75	83.55	N/A	270	Eq-Part.	1.20
		Acetone	190	240	108.9	N/A	14.3	U.S. EPA	16.78
		Toluene	14	116.5	29	N/A	50	Eq-Part.	2.33
Landfill Seeps/Wetlands									
	Dioxin (ng/kg)								
		1,2,3,4,6,7,8-HpCDD	15.9	280	58.243	92.4	N/A	N/A	N/A
		1,2,3,4,6,7,8-HpCDF	4.03	34.6	11.723	26.8	N/A	N/A	N/A
		1,2,3,4,7,8,9-HpCDF	0.382	2.59	0.937	1.94	N/A	N/A	N/A
		1,2,3,4,7,8-HxCDD	0.423	2.27	0.715	1.11	N/A	N/A	N/A
		1,2,3,4,7,8-HxCDF	0.964	4.25	1.601	3.58	N/A	N/A	N/A

		1,2,3,6,7,8-HxCDD	1.12	12	2.770	4.03	N/A	N/A	N/A
		1,2,3,6,7,8-HxCDF	0.0768	2.91	1.143	2.66	N/A	N/A	N/A
		1,2,3,7,8,9-HxCDD	0.766	3.97	1.382	1.99	N/A	N/A	N/A
		1,2,3,7,8,9-HxCDF	0.429	0.841	0.268	N/A	N/A	N/A	N/A
		1,2,3,7,8-PeCDD	0.373	1.02	0.470	0.756	N/A	N/A	N/A
		1,2,3,7,8-PeCDF	0.833	2.15	1.039	2	N/A	N/A	N/A
		2,3,4,6,7,8-HxCDF	0.054	4.04	1.514	3.95	N/A	N/A	N/A
		2,3,4,7,8-PeCDF	1.17	3.86	1.550	3.82	N/A	N/A	N/A
		2,3,7,8-TCDF	2.26	4.65	2.483	4.1	N/A	N/A	N/A
		OCDD	271	3480	582.448	732	N/A	N/A	N/A
		OCDF	8.32	137	33.325	61.2	N/A	N/A	N/A
		Total HpCDDs	50.2	536	108.631	168	N/A	N/A	N/A
		Total HpCDFs	9.01	110	30.227	59.6	N/A	N/A	N/A
		Total HxCDDs	1.39	67.2	20.742	31.7	N/A	N/A	N/A
		Total HxCDFs	8.34	37.7	16.859	35.8	N/A	N/A	N/A
		Total PeCDDs	6.22	13	7.087	13.2	N/A	N/A	N/A
		Total PeCDFs	0.203	40.8	16.485	41.3	N/A	N/A	N/A
		Total TCDDs	2.7	7.13	3.701	6.67	N/A	N/A	N/A
		Total TCDFs	22	54.9	26.372	58.6	N/A	N/A	N/A
	Metals (ug/kg)								
		Arsenic	1.7	14.2	5.08	6.1	5.9	NOAA, ER-L	2.41
		Barium	30.4	109	63.58	68.6	N/A	N/A	N/A
		Beryllium	0.22	0.61	0.37	0.54	N/A	N/A	N/A
		Cadmium	0.35	0.74	0.34	0.49	0.6	NOAA, ER-L	1.23
		Chromium	13.6	47.7	21.52	22.5	37.3	NOAA, ER-L	1.28
		Cobalt	7.9	18.1	12.12	12.9	N/A	N/A	N/A
		Copper	12	45.4	30.63	33.8	35.7	NOAA, ER-L	1.27
		Cyanide	0.24	1	0.36	N/A	N/A	N/A	N/A
		Iron	13800	40900	24,578	25300	20000	ONT., LEL	2.05
		Manganese	352	2790	1,064	756	460	ONT., LEL	6.07
		Mercury	0.11	1.1	0.27	0.19	0.174	NOAA, ER-L	6.32
		Nickel	13.3	31.3	21.39	22.6	18	NOAA, ER-L	1.74
		Selenium	0.78	2.3	0.83	1.4	0.1	WA, DE	23.00
		Thallium	0.072	0.11	0.290	N/A	N/A	N/A	N/A
		Vanadium	9	16.2	11.76	13.3	N/A	N/A	N/A
		Zinc	43.3	140	89.84	132	123	NOAA, ER-L	1.14
	Pesticide/PCBs (ug/kg)								
		4,4'-DDE	2.9	5.8	3.25	N/A	1.42	NOAA, ER-L	4.08
	PCB-Homologues (ug/kg)								
		Hexachlorobiphenyls	3.384	33.347	8.361	9.585	N/A	N/A	N/A
		Pentachlorobiphenyls	8.51	80.301	17.822	24.848	N/A	N/A	N/A
		Tetrachlorobiphenyls	9.666	82.168	20.862	19.493	N/A	N/A	N/A
	SVOCs (ug/kg)								
		4-Methylphenol	130	1200	389.4	N/A	670	Eq-Part.	1.79
		Benzaldehyde	190	630	361.3	N/A	N/A	N/A	N/A
Halifax Hollow									
	Metals (ug/kg)								
	SVOCs (ug/kg)								
		4-Chloroaniline	460	460	460	N/A	N/A	N/A	N/A
		Benzo(g,h,i)perylene	500	500	500	N/A	290	Consensus-Based	1.72

b. Exposure Assessment

Five separate exposure areas up stream, adjacent to the landfill and lagoons, as well as down stream of the Site were evaluated in the Ecological Risk Assessment:

Exposure to contaminants via the food chain was evaluated by modeling exposure to the selected indicator species or measurement receptors (kingfisher, mink, Canada goose, muskrat, meadow vole, spotted sandpiper, little brown bat, green frog, woodcock, short-tailed shrew, mallard, raccoon, deer mouse and robin). The exposure scenarios place measurement receptors within exposure pathways that are most likely to contribute to contaminant intake.

The belted kingfisher and mink may be exposed to contaminants that have bioaccumulated within fish and large macro-invertebrates. The Canada goose, muskrat and meadow vole may be exposed to soil contaminants through direct ingestion and through consumption of vegetation that have accumulated contaminants through plant uptake. The spotted sandpiper, little brown bat, short-tailed shrew and American woodcock may consume contaminants directly through soil ingestion or indirectly via the consumption of invertebrates that are in direct contact with contaminated soil. The mallard, raccoon, deer mouse and American robin would be exposed to site contaminants through the ingestion of both vegetation and invertebrates that are in direct contact with contaminated soil. The purpose of the exposure assessment is to formulate these exposure pathways into algorithms that can predict an estimate of total exposure.

Concentrations of COCs in vegetation were determined by multiplying the mean and maximum soil/sediment concentrations by an appropriated plant uptake factor.

The transfer of soil and sediment non-ionic organic COCs into the tissues of terrestrial and aquatic invertebrates was based on a model in which these constituents are partitioned between soil/sediment organic carbon and tissue. COC uptake into invertebrate tissue for organic constituents is directly related to the ratio of insect lipid content (four percent; Roeder, 1953) and the fraction of organic carbon in soil/sediment as well as the octanol-water partitioning coefficient of each COC.

The concentrations of inorganic COCs within invertebrate tissues were determined from previously reported bioaccumulation factors for earthworm's (soil) and benthic invertebrates (sediment). Uptake factors (90th percentile) were used to determine terrestrial invertebrate concentrations of inorganic COCs while biota-sediment accumulation factors reported in were used to calculate benthic invertebrate concentrations. Similar to the dry weight:wet weight conversion conducted for plants, invertebrate COC concentrations for both organic and inorganic constituents were converted from a dry weight to a wet weight basis since the food ingestion rates are based on wet weight.

Biota-sediment accumulation factors represent transfer coefficients that describe the relationship between contaminants in biota and sediment. Fish biota-sediment accumulation factors represent the contaminant concentration in fish (normalized by lipid content of the fish) to the concentration of the contaminant in the sediment (normalized by organic carbon content of the sediment). The biota-sediment accumulation factors are only applicable to nonionic organic contaminants.

Fish tissue concentrations for inorganic COCs were derived by applying a fish bioconcentration factor to filtered (i.e., dissolved) surface water inorganic concentrations.

Exposure doses to each of the indicator species were estimated using the mean and maximum contaminant for media of concern.

c. Ecological Effects Assessment

Assessment Endpoints and Measures of Effect

The selection of the assessment endpoints considered the following:

- Existing habitats and species potentially present at the site;
- Contaminants present and their concentrations;
- Modes of toxicity to various receptors by contaminants;
- Ecologically relevant receptors that are potentially sensitive or likely to be highly exposed to life history attributes; and
- Potentially complete exposure pathways.

Table B4 presents the assessment endpoints that were selected for important components of the aquatic, wetland, and terrestrial communities identified within the Pownal Tannery Study Area. The selected assessment endpoints represent both community level endpoints (e.g., benthic macroinvertebrate diversity and productivity) and population level endpoints (e.g., survival, growth and reproduction of particular guilds such as fish-eating birds).

Measures of effect are measures used to evaluate responses of each assessment endpoint exposed to a stressor such as mercury. The measures of effect proposed for the ERA are also presented in Table B4. The selected parameters represent both community and population level measures. A brief discussion of the proposed measures of effect for each assessment endpoint is presented below.

Community-based measures of effect were selected for community level assessment endpoints and evaluated via community toxicity values (e.g., ambient water quality criteria, sediment quality benchmarks). For population level endpoints that assess receptor guilds present within the Pownal Tannery Study Area (as detailed in the site conceptual model), specific indicator species were selected as measures of effect.

The selection of indicator species is based on several factors including:

- Potential for contact with COCs;
- Sensitivity to COCs present at the site;
- Natural history information readily available to assess exposure and toxicity;
- Ecological relevance; and
- Social or economic importance.

Based on these considerations, a variety of indicator species were selected as measures of effect for the diverse habitats present within the Pownal Tannery Study Area. Specific indicator species selected include: belted kingfisher (*Ceryle alcyon*), mink (*Mustela vision*), Canada goose (*Branta canadensis*), muskrat (*Ondatra zibethicus*), spotted sandpiper (*Actitis macularia*), little brown bat (*Myotis lucifugus*), mallard (*Anas platyrhynchos*), raccoon (*Procyon lotor*), meadow vole (*Microtus pennsylvanica*), deer mouse (*Peromyscus maniculatus*), short-tailed shrew (*Blarina brevicauda*), American robin (*Turdus migratorius*), and American woodcock (*Scolopax minor*). A brief discussion of the proposed measures of effect for each assessment endpoint is presented in Appendix J of the FS.

Toxicity Assessment

Toxicity of COCs was assessed by the selection of appropriate toxicity reference values (TRVs) for each of the measurement receptors. Community-level TRVs are media specific (i.e., concentration in surface water or sediment) while TRVs for measurement receptor species are provided in terms of dose ingested (Appendix J of the Feasibility Study). The selected TRVs for each measurement receptor are identified and discussed below.

d. Ecological Risk Characterization

The ecological risk assessment for the Pownal Tannery Study Area was designed to identify COCs for the area's ecological communities and to estimate potential risk to organisms using the area. Study Area habitats include palustrine and riverine wetlands as well as uplands associated with the Hoosic River and adjacent floodplain. Exposure doses were determined for receptors noted or expected to utilize the aquatic, wetland, and terrestrial habitats present within the Study Area.

Risks to fish, amphibian larvae, and aquatic invertebrates (both benthic and water column communities) were evaluated by measured surface water and/or sediment concentrations in the aquatic habitats with applicable toxicity reference values. Comparisons were made from samples collected from the Hoosic River, lagoons, landfill ponds, seeps, and in the landfill stream.

Risks to wildlife receptors including belted kingfisher, mink, Canada goose, muskrat, spotted sandpiper, little brown bat, mallard, raccoon, meadow vole, American woodcock, short-tailed shrew, American robin, and deer mouse were estimated by bioaccumulation modeling and comparing the estimated exposure doses with chronic NOAEL and LOAEL toxicity reference values. Wildlife receptors were evaluated with five communities: Hoosic River, lagoons (both aquatic and upland habitats), landfill pond, and landfill wet meadow/seepage areas.

Potential risks for aquatic invertebrates, fish and amphibian larvae are based on surface water or sediment concentrations exceeding their respective chronic or acute TRVs. Potential risks to wildlife receptors are based on estimated exposure doses that exceed their respective LOAEL TRV.

Fish and aquatic invertebrates may potentially be impacted by detected concentrations of aluminum and iron within the landfill pond and seeps (invertebrates only). Risks to fish and aquatic invertebrates within the Hoosic River, lagoons, and Halifax Hollow are not expected to be elevated above background levels. Amphibian larvae may be at an acute risk from mercury concentrations present within important amphibian breeding areas (landfill pond and lagoons). Benthic invertebrates may potentially be at risk from detected concentrations of COCs within sediments of the Hoosic River, lagoons, and landfill pond. Primary COCs with sediment include PAHs, pesticides, and several metals including chromium, lead, cadmium, and mercury.

Wildlife receptors potentially at risk (above background risk levels) within the Hoosic River community include the little brown bat from elevated concentrations of high molecular weight PAHs within the sediments. Sediments and surface soils associated with the lagoons provide elevated risk above background risk levels to a variety of wildlife receptors including aquatic mammalian herbivores (muskrat), insectivorous birds (spotted sandpiper and American woodcock), and mammals (little brown bat and short-tailed shrew), as well as omnivorous birds (American robin) and mammals (raccoon and deer mouse). Primary risk drivers within the lagoon sediment and surface soils are dioxin/furans, chromium, cadmium, and lead.

While moderate risks to the local ecology were identified, EPA determined from its evaluation of the pattern of contamination identified that the contaminants are related to years of discharge from up stream sources and cannot be specifically attributed to releases from the Pownal Tannery site. Therefore no action to mitigate the potential risks identified will be taken. However, future operation and maintenance activities to be performed will include long-term monitoring of sediments in the Hoosic River to assess the need for further studies.

Table 7: COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors.

Habitat	Exposure	COC	Protective	Units	Basis	Assessment
Hoosic River	Sediment	PAHs	3.63-22.5	mg/kg	TEL and PEL	Benthic invertebrate community diversity and abundance
		Lead	35-91.3	mg/kg	TEL and PEL	
		Mercury	0.17-0.49	mg/kg	TEL and PEL	
	Sediment	PAHs (High MW)	0.7	mg/kg	Bioaccumulation modeling based on LOAEL	Mammalian aquatic insectivore survival, reproduction, or growth effects
Lagoon Area	Surface Water	Mercury	0.16	ug/L	LOAEL	Amphibian larvae survival, reproduction, or growth effects
	Sediment	Cadmium	0.6-3.5	mg/kg	TEL and PEL	Benthic invertebrate community diversity and abundance
		Chromium	37.3-90	mg/kg	TEL and PEL	
		Lead	35-91.3	mg/kg	TEL and PEL	
		Mercury	0.17-0.49	mg/kg	TEL and PEL	
	Sediment	Dioxin	0.046	ug/kg	Bioaccumulation modeling based on LOAEL	Mammalian aquatic omnivore survival, reproduction, or growth effects
	Sediment	Dioxin	0.036	ug/kg	Bioaccumulation modeling based on LOAEL	Avian aquatic insectivore survival, reproduction, or growth effects
		Chromium	15.7	mg/kg		

		Lead	27.4	mg/kg		
	Sediment	Dioxin	0.008	ug/kg	Bioaccumulation modeling based on LOAEL	Mammalian aquatic insectivore survival, reproduction, or growth effects
	Surface Soil	Dioxin	0.016	ug/kg	Bioaccumulation modeling based on LOAEL	Avian terrestrial omnivore survival, reproduction, or growth effects
		Cadmium	1.2	mg/kg		
		Chromium	7	mg/kg		
		Lead	12.2	mg/kg		
	Surface Soil	Dioxin	0.0039	ug/kg	Bioaccumulation modeling based on LOAEL	Mammalian terrestrial omnivore
	Surface Soil	Cadmium	2.4	mg/kg	Bioaccumulation modeling based on LOAEL	Avian terrestrial insectivore survival, reproduction, or growth effects
		Chromium	13.8	mg/kg		
		Lead	24.1	mg/kg		
	Surface Soil	Dioxin	0.0028	ug/kg	Bioaccumulation modeling based on LOAEL	Mammalian terrestrial insectivore survival, reproduction, or growth effects
		Cadmium	2	mg/kg		
Landfill Pond/ Seeps	Surface Water	Aluminum	87	ug/L	AWQC - Chronic	Aquatic invertebrate community diversity and abundance
		Iron	1000	ug/L		
	Surface Water	Mercury	0.16	ug/L	LOAEL	Amphibian larvae survival,
	Sediment	Chromium	37.3-90	mg/kg	TEL and PEL	Benthic invertebrate community diversity and abundance
		Iron	20,000-40,000	mg/kg	LEL and SEL	
		Manganese	460-1,100	mg/kg	LEL and SEL	
	Sediment	Chromium	15.7	mg/kg	Bioaccumulation modeling based on LOAEL	Avian aquatic insectivore survival, reproduction, or growth effects

	Sediment	Dioxin	0.004	ug/kg	Bioaccumulation modeling based on LOAEL	Mammalian aquatic insectivore survival, reproduction, or growth effects
		Silver	5.5	mg/kg		

Basis for Response Action

Because the baseline human health assessment revealed that a future park child and adult visitors and future adult commercial workers could potentially be exposed to dioxins, mercury, chromium, benzo(a) anthracene, benzo(a)pyrene, pentachlorophenol, arsenic, and N-nitroso-di-n-propylamine in lagoon soil and sludge (lagoons 1,3 and 5) via a direct contact and ingestion exposure. These exposures may present a human health risk is excess of EPA guidelines (e.g., carcinogenic risk = $1x10^{-3}$, HI = 4).

All elevated concentrations of contaminants detected in Hoosic River sediments that resulted in a human health risk exceedence, were detected at higher concentrations upstream of the Site. Therefore, the exceedences of EPA standards for sediments can be linked to non-site related discharges or background levels and are, therefore, not a basis for a response action. However, as a result of EPA's concern that future potential town reuse plans may include recreational use of the Hoosic River adjacent to the Site, EPA completed supplemental calculations, using the same methods and assumptions as the baseline risk assessment, to identify the risks to public health from only those sediments downstream of the dam at the Site. The baseline risk calculations included data collected upstream of the dam and Site, which indicated much higher concentrations. The supplemental risk calculations, as discussed in Appendix F, indicated that the cumulative receptor carcinogenic risks are within the EPA risk management cancer risk range of 10^{-6} to 10^{-4}, and non-carcinogenic risks are below EPA's target risk of HI 1.

The ecological risk assessment revealed there is an unacceptable ecological risk to benthic invertebrates and a variety of wildlife. The affected wildlife include the; muskrat; spotted sandpiper, little brown bat, raccoon, American woodcock, short tailed shrew, American robin and the deer mouse. There are unacceptable exposures to these wildlife caused by dioxins, cadmium, chromium, lead, and mercury in the surface water, sediments, and soil/sludge. Therefore, 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. In order to mitigate these unacceptable risks, the remedy will address the contaminated soil, sludge, sediments and surface water in the lagoons through excavation, consolidation and capping. Long-term operation and maintenance activities, to include ground water and river sediment sampling, as well as continued operation and maintenance of the lagoon and tannery landfill caps, will ensure that the remedy remains protective of human health and the environment into the future.

I. REMEDIATION OBJECTIVES

The overall Feasibility Study objective was to develop cost-effective remedial alternatives that would be protective of public health and the environment. To be in compliance with CERCLA and the NCP, the developed alternatives must achieve compliance with the applicable or relevant and appropriate requirements (ARARs) and remain protective of human health and the environment. The remedial goals established in this section for the site would be accomplished through (1) reduction in source volume, (2) reduction in off-site migration potential, and/or (3) reduction in potential exposures.

All major sources of risk and exposure pathways identified in the Human Health and Ecological Risk Assessments (Appendix J, FS) were reviewed to develop remedial alternatives. The target residual risk at the site boundary, 10^{-4} to 10^{-6} in accordance with the NCP framework, would be achieved through a combination of initiatives: source reduction, and engineering and institutional controls, as well as monitoring with ground water wells that would provide advance information about potential off-site migration.

Based on preliminary information relating to 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. Again, 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 Pownal Tannery Site are:

- Prevent direct contact with, ingestion of, and inhalation of contaminants in lagoon soil and sludge.
- Prevent direct contact with and ingestion of contaminated sediment in the Hoosic River.
- Prevent continued ecological impacts from the release of contaminants in the lagoons into the Hoosic River and associated wetlands.
- Prevent the further release of lagoon contaminants into the ground water, surface water, and sediments.
- Prevent the discharge of the ground water beneath the lagoons to the Hoosic River
- Provide long-term monitoring of groundwater and river sediments .

To reduce the potential exposure of a current and future park child and adult visitors and future adult commercial workers to dioxins, benzo(a) anthracene, benzo(a)pyrene, pentachlorophenol, arsenic, chromium, mercury and N-nitroso-di-n-propylamine in lagoon soil and sludge (lagoons 1,3 and 5) via a direct contact and ingestion exposure, that may present a human health risk in excess of EPA guidelines (e.g., carcinogenic risk = 1x10-3 , HI = 4E+00) the selected response action is necessary. Furthermore, the response action shall mitigate the unacceptable ecological risk to benthic invertebrates and a variety of wildlife including the muskrat, spotted sandpiper, little brown bat, raccoon, American woodcock, short tailed shrew, American robin and the deer mouse to dioxins, cadmium, chromium, lead, and mercury in the surface water, sediments, and soil/sludge in the lagoons. By eliminating direct contact and ingestion exposure from the lagoon contaminates to these human and ecological receptors by consolidating and capping the unacceptably affected media, the direct contact and ingestion RAO will be met. This measure will satisfy the remaining RAOs because it involves the excavation of approximately 85% of the saturated sludge that could act as a ground water migration pathway for contaminants to the surface water and sediments of the Hoosic River, and through consolidation and capping in a location a further distance away from the more vulnerable floodway, this will reduce the chance for continued migration of contaminants through infiltration and precipitation to the surrounding exposed media (e.g., ground water, surface water and sediments).

J. 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, to the extent possible, with these Congressional mandates.

2. Technology and Alternative Development and Screening

CERCLA and the 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 source control, the RI/FS developed a range of alternatives. However, only one of the alternatives, which was found to be sufficiently implementable, effective and cost effective to be retained for detailed evaluation, included any treatment of the contamination. It is noted though that a number of the alternatives did include consolidation of the contamination in a manner, although not constituting treatment, would greatly reduce contaminant mobility. Only the alternative that includes *in-situ* solidification qualifies as a treatment alternative.

With respect to a ground water response action, the RI/FS did not develop any remedial alternatives as EPA determined that there is no cohesive plume of ground water contamination that can be attributed to the tannery source. While there are sporadic detections of a small number of contaminants that have exceeded state and federal drinking water standards, the geologic and hydrogeologic investigation and the results of five rounds of ground water sampling support the determination that there is no significant risk to human health or the environment and that there is no basis to support the need for ground water treatment. However, the selected remedy does include long-term ground water sampling and analysis, five-year site reviews to ensure that conditions do not change and that contaminant levels to not increase, and institutional controls to restrict future ingestion of the ground water beneath the 16 acre lagoon parcel and to prevent the disturbance of the capped soil and sludge.

As discussed in Section 3 of the FS, soil treatment technology options were identified, assessed and screened based on implementability, effectiveness, and cost. Section 4 of the FS 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 4 of the FS.

In summary, of the ten source control remedial alternatives screened in Section 4.4 of the FS, six were retained as possible options for the cleanup of the Site to be retained for detailed analysis.

K. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each source control alternatives evaluated.

1. Source Control Alternatives Analyzed

The source control alternatives analyzed for the Site include:

- **No Action**
- **Limited Action (Perimeter fencing and Institutional Controls)**
- **Capping in place and institutional controls**
- **Excavation, consolidation, capping and institutional controls**
- **Excavation, disposal in off-site landfill and institutional controls**
- **In-situ solidification/stabilization and institutional controls**

Under all of the alternatives, the State of Vermont would continue to carry out operation and maintenance of the tannery landfill cap constructed under the NTCRA. Each of the six source control alternatives is summarized below. A more complete, detailed presentation of each alternative is found in Section 5 of the FS.

Alternative 1: No action

Leave the Site as it is. No monitoring or other activities would take place beyond the previous removal actions at the Site. Site use restrictions would be left to the local officials and/or the State of Vermont. Implementation of this alternative would eliminate all of the Town's future site reuse plans.

No costs are associated with this alternative, although the relatively minor cost of conducting five-year reviews would be incurred.

Alternative 2: Limited action/ Institutional controls

- Repair existing covers over contamination
- Restrict site access
- Monitor for at least 30 years to detect any change that would require intervention.

This alternative requires only minor repairs to the existing soil covers. Fencing repairs and posting warning signs would be the only physical activities. Institutional controls (commonly enacted through deed restrictions) would be enacted at the property to mitigate risks due to dermal contact and incidental ingestion. Land use restrictions may include health and safety requirements for any future subsurface work, as well as restrictions on future use and redevelopment of the site. This alternative would take approximately 6-8 months to complete.

Implementation of this alternative would likely eliminate all of the town's future site reuse plans.

Capital Costs: $0.4 Million

Operation and Maintenance Costs: $1.0 Million
Total Net Present Value: $1.4 Million

Alternative 3: Capping in Place and Institutional Controls

- Contamination would remain in place with a cap made of natural and/or man-made material that would form a barrier called a cap that would meet all applicable federal and state protectiveness standards.
- Restrict future site use to prevent cap damage that could release contamination.
- Institutional controls, such as deed restrictions, to prevent excavation in the lagoons and the use of groundwater at the lagoon area.
- Long-term monitoring of groundwater and river sediments.

Impacted material would generally be left in place, with a soil cap constructed above the material in order to limit direct contact exposures. Lagoons 1, 3 and 5 would be cleared, grubbed and re-graded. A solid waste cover system, including a gas vent layer and low permeability layer would be constructed. Approximately 2.8 million gallons of standing water would need to be pumped out and treated in two activation carbon treatment units, which would operated continuously for 24 hours during the first week of operation. The clean water would be discharged to the river. A small staging area would be created at Lagoon 2. Approximately 11,500 cubic yards of berm material would need to be excavated between lagoons 1 and 5 and the Hoosic River to ground elevation, and would be transported to a location within the cap footprint. In order to prevent the cap construction from increasing any upstream flood levels during the base flood, a pre-design flood mitigation study would be performed to determine the impact to the affected area. The berms would be replaced with clean fill. Continuous air monitoring would be conducted to ensure no adverse release contaminants is occurring during excavation with this alternative, as well as alternatives 4, 5 and 6.

Long-term monitoring of ground water and river sediments would be implemented to ensure that concentrations of site related contaminants has not increased. The Site would be inspected at least every five years to ensure protection of human health and the environment. Deed restrictions and/or easements would be sought to eliminate the potential for ingestion of ground water or excavation activities on the cap. This alternative would take approximately 6-12 months to complete. With this alternative, as well as alternatives 4, 5, 6, the State of Vermont Agency for Natural Resources (ANR) would accept all operation and maintenance duties.

Implementation of this alternative would limit the Town’s future site reuse option to construct their waste water treatment plant, as they need a portion of lagoon 1 to construct it. It would also reduce the space for a skating rink and potential wetlands re-development, which the Town indicated were preferences in their Site Reuse Plan.

Capital Costs: $7.6 Million
Operation and Maintenance Costs: $1.1 Million
Total Net Present Value: $8.7 Million

Alternative 4: Excavation, Consolidation, Capping and Institutional Controls

- Excavate contaminated sludge/soil from lagoons 1 and 5.
- De-water sludge/soil and consolidate over lagoon 3 and a portion of lagoon 4.
- Construct a low permeability cap over consolidated sludge/soil.
- Restoration of lagoons 1 and 5 to grades that promote drainage of the area and that are consistent with the Town's reuse plans and maintain flood storage capabilities.
- Long-term environmental monitoring of site ground water, and sediments.
- Institutional controls to prevent soil/sludge excavation and the use of ground water as a drinking water supply.

Figure 3 shows a conceptual layout of this alternative. This alternative involves the clearing, grubbing and excavation of impacted soil and sludge above identified threshold concentrations. Excavation would be performed using conventional earth removal equipment, and would likely be performed without de-watering because the permeability of the site soil are generally low. This condition would hamper traditional de-watering activities. In addition, a significant treatment process train would need to be developed for treating approximately 2,841,000 gallons of extracted ground water prior to treatment on-site and discharge to the Hoosic River. Under this excavation approach, de-watering pads would be required, where excavated soils/sludge could drain prior to further remediation processes. Two carbon adsorption treatment vessels would be required to treat the water.

Approximately 25,300 cubic yards of saturated sludge from lagoons 1 and 5, 8,700 cubic yards of unsaturated sludge from lagoon 1, 10,648 cubic yards of cover soils from lagoon 1 and 11,587 cubic yards of berm material would be excavated and loaded onto trucks to the de-watering pad. Confirmatory soil sampling would be completed to ensure that the cleanup goals have been met and that there is no more sludge left in lagoons 1 and 5. Following excavation and sufficient de-watering, impacted soil would be consolidated in lagoons 3 and 4, and a soil cap would be constructed to limit exposure to the contaminated material and to prevent erosion. The solid waste cover would be made of a combination of geo-textile layers and low permeable clay materials, with a vegetative support layer and topsoil. The approximate area of the cap is 4 acres. The maximum side slopes would be of 3:1.

Consolidation provides the benefit of reducing cap size (and associated costs) as well as leaving more of the site open and available for future site reuses that the Town of Pownal has indicated. This alternative would allow the Town to build their planned waste water treatment plant in the area of lagoons 1 and 2, would allow for a soccer field to be built on the cap, would remove a great deal of the saturated sludge out of the floodway, and would allow for walking paths along the perimeter and a possible boat launch. This remedy would take between 9 and 12 months to complete.

Capital Costs: $7.6 Million
Operation and Maintenance Costs: $1.2 Million
Total Net Present Value: $8.8 Million

Alternative 5: Off -site disposal at a chemical waste landfill

- Excavate and remove soil in lagoons 1, 3, and 5 and dispose of at an off-site facility.
- Restoration of lagoons 1 and 5 to current grade and physical or vegetative stabilization.
- Institutional controls to prevent the consumption of ground water on-site.
- Long-term monitoring of site ground water, surface water and sediments

This scenario is similar to alternative 4, with the exception that the impacted soil would be disposed of in an existing off-site solid waste landfill, providing increased containment. Approximately 31,100 cubic yards of saturated soil and 42,500 cubic yards of unsaturated sludge from the lagoons would need to be excavated and de-watered. The cover soil from lagoon 1 would be stockpiled for use as backfill material. An ongoing program of confirmatory soil sampling would be conducted until all sludge has been removed. The entire lagoon pit would be backfilled with clean material from a local borrow source, and the area would be re-vegetated.

Assuming a solid waste facility could be located to accept this material, this alternative would take 8-12 months to complete. However, during the FS process EPA could not identify a facility that would commit to accepting the waste, primarily because it contained dioxin, and there are capacity issues with solid waste facilities in the State of Vermont. There was also significant community concern with the number of truckloads it would take to remove the material from the Site. There were also transportation safety and public acceptance issues as the Pownal site is located in a valley surrounded by residential/agricultural properties. However, if it were feasible, this alternative would act most beneficially for future reuse options. The Town of Pownal could reuse the property without restriction, other than institutional controls to prevent the ingestion of ground water.

Capital Costs: $23.0 Million
Operation and Maintenance Costs: $1.0 Million
Total Net Present Value: $24.0 Million

Alternative 6: Excavation, Solidification/Stabilization, Consolidation, and Institutional Controls

- Excavate contaminated sludge/soil from lagoons 1 and 5.
- De-water sludge/soil and solidify/stabilize the material
- Consolidate over lagoon 3 and a portion of lagoon 4 and construct a low permeability cap over solidified/stabilized sludge/soil.
- Restoration of lagoons 1 and 5 to grades that promote drainage of the area and that are consistent with the Town's reuse plans and maintain flood storage capabilities.
- Long-term environmental monitoring of site ground water, and sediments.
- Institutional controls to prevent solidified soil/sludge excavation and the use of ground water as a drinking water supply.

This alternative involves the same level of excavation, and de-watering methods as described above in alternative 4. Following excavation and de-watering, the contaminated material would undergo an on-site Solidification/Stabilization process. The Solidification/Stabilization reagents that may effectively solidify and encapsulate site constituents were evaluated in a treatability study which indicated that this treatment technology would effectively encapsulate the on-site material. The de-watered soil/sludge mixture would be mixed with approximately 5% cement and 15% fly ash above ground and would be spread on a sub-grade of compacted sand and gravel. The solidified material would be capped with geo-textile, fill and top soil, followed by re-vegetation. The area would encompass 4 acres.

The treated material would be less susceptible to leaching and erosion, and would limit exposure risks for humans and the environment. The stabilized material may also provide an effective foundation material for construction of future buildings at the site, specifically the proposed wastewater treatment facility. The difficulties involved with solidification are the proper de-watering of the material to obtain the optimal mixture for permanent encapsulation. There is significantly more above-ground material handling that would be required to complete the remediation. This alternative would take 13-15 months to complete. However, there are more uncertainties with the success of preparing a mixture that will meet site specifications, which could lead to increased costs and could delay the schedule.

In terms of future use, like alternatives 4, the Town of Pownal could implement all of the future site reuse options that they developed as described above.

Capital Costs: $9.7 Million
Operation and Maintenance Costs: $1.0 Million

Total Net Present Value: $10.7 Million

L. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section l2l(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 strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

1. 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:

a. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

b. 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.

2. 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:

a. 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.

b. 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.

c. 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.

d. Implementability addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

e. Cost includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

3. 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:

a. 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.

b. Community acceptance addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

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 B1.

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 which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

M. Focused Comparison of Alternatives

Overall Protection of Human Health and the Environment: This criterion, according to CERCLA, must be met for a remedial alternative to be chosen as a final site remedy. At the Lagoon Area, the human-health risk assessment identified risks in excess of the Superfund risk range and target Hazard Index from exposure to surface and subsurface soils and sludges.

Numerous contaminants of concern (COCs) exceed risk-based cleanup goals in soils. These soil risk exceedances are based only upon possible future-use (construction worker and trespasser exposure to soil) and unrestricted-use (residential exposure to soil) scenarios. The risk assessment for assumed current site use (maintenance worker and recreational child) revealed that human-health risk was within the EPA's Superfund risk range and below the target hazard index.

Alternative 1 was developed as a baseline with which to compare the other alternatives and proposes no action and would not provide protection to human health or the environment.

All of the remedial alternatives except 1 include deed restrictions that would limit human invasive activities within the Lagoon Area for protection of the possible future-use receptor. Zoning or deed restriction would also prohibit residential development of the Lagoon Area for protection of the unrestricted-use receptor.

Alternative 2 relies on security fencing and institutional controls to protect humans from exposure to soils and sludges. However, because the integrity of the perimeter security fence can not be ensured, trespassers would be at risk and therefore, this alternative is less protective of human health.

The alternatives 3, 4, 5, and 6 are all protective of human health and the environment. These alternatives all utilize containment or immobilization, institutional controls and environmental monitoring to protect the unrestricted-use receptor from exposure to contaminated soil and sludge, as well as reduce potential migration of contaminants to the ground water and surface water and sediments at the Site.

Alternative 3 involves in-place capping of the lagoon wastes. The wastes would not be treated and but the engineered cap would meet the cleanup goals for soil and sludge. However, under this alternative, all of the saturated wastes would remain in-place. Additionally, these wastes would be more susceptible to flooding events given that the cap would be constructed within the higher energy floodway and thus there is higher likelihood of cap failure which could cause a future release to media in the Hoosic River. Therefore, 3 is not as protective of environmental media as 4, 5 and 6.

Alternative 4 is more protective of ground water because the majority of saturated wastes (all but those in lagoon 3) would be excavated and consolidated under a cap meeting the standards of the Vermont Solid Waste Rules.

Alternative 5 is the most protective of human health and the environment than 6, 4, and 3 since lagoon wastes would be removed from the Hoosic River floodplain to an off-site facility, if an off-site facility could be secured. Alternative 5 would present a short term transportation hazard to human health by trucking a large quantity of dioxin containing waste through residential, agricultural and urban areas.

Alternative 6 would be protective of human health and the environment because the majority of the lagoon wastes (all but lagoon 3) would be treated with stabilization/solidification processes to significantly reduce the leachability of the contaminants from the residuals. Alternative 6 also provides additional protection to human health and the environment because the stabilization/solidification treated residuals would be much more resistant to flood damage. The stabilization/solidification residuals offer increased shear and compressive strengths as compared to untreated soils of the alternatives 2, 3, and 4. However, the alternative would still involve landfilling the treated contaminated material in the Hoosic River floodplain.

Compliance with ARARs: CERCLA requires that the selected alternatives also meet a second threshold criterion of compliance with ARARS, or obtain a waiver if the criterion cannot be met. This criterion, according to CERCLA, must be met for a remedial alternative to be chosen as a final site remedy.

Numerous federal or state regulatory requirements that have been identified as ARARS due to remedial actions proposed at the Site. Many of these ARARs can be addressed through engineering or other controls to be taken at the Site during remediation. Of the alternatives analyzed, only alternatives 1 and 2 do not attain ARARS.

Chemical Specific ARARS: A summary of chemical-specific To Be Considered guidelines (TBCs) for the Site includes the following.

- **Federal Criteria and Advisories To Be Considered**. There are important issues and advisories that will require attention prior to and during remedial activities. Health Advisories provide estimates of carcinogenic and non-carcinogenic risk due to consumption of contaminated drinking water. These Health Advisories will be met for all alternatives, except alternative 1, through the implementation of ground water use restrictions.

  All of the alternatives except 1 would include environmental monitoring to evaluate long-term effectiveness of the remedy and the potential for contamination migration off-site. Alternative 1 would not implement environmental monitoring to measure changes in the contaminant concentrations, or migration; therefore attainment of chemical-specific ARARs would not be established.

Action-Specific ARARs: A summary of the action-specific ARARS and TBCs for the Site includes the following (there are no action-specific ARARS for alternative 1, No Action):

- **Federal Clean Water Act, National Pollutant Discharge Elimination System (NPDES)** These standards establish the specifications for discharging pollutants from any point source into the waters of the United States, including the Hoosic River, and are applicable to any discharges on the Site. Alternatives 3, 4, 5 and 6 may include discharge of wastewater from de-watering activities into the Hoosic River. Treatment of this wastewater may be included with each of these alternatives, if required by this standard. Alternative 2 would not include any discharges.

- **Vermont's Solid Waste Rules** for closure and post-closure standards, including monitoring, will be followed during remedial design and construction under Alternatives 3, 4, 5, and 6, and long-term measures will be maintained, except for alternative 5, where all of the waste will be removed and taken off-site. Alternative 2, which would just monitor the wastes, does not meet these standards. Alternative 3 would involve capping the waste in place within the Hoosic River 100-year floodplain. Consolidation and capping of the contaminated soils from the lagoons within the 100-year floodplain is planned as part of Alternatives 4, and 6. EPA has invoked several regulatory waivers under the Rules that permit the landfilling of the waste within the 100-year floodplain since the Agency has made the finding that the lagoons can be capped in a manner which is protective of public health, safety and the environment.

- **Vermont’s Water Quality Standards** establish water quality criteria for the maintenance of water quality and rules for determining acceptable point and non-point discharges to state surface waters. Alternatives 3, 4, 5 and 6 may include discharge of de-watered wastewater from the soil/sludge into the Hoosic River. Treatment of this wastewater may be included with each of these alternatives, if required by this standard. Alternative 2 would not include any discharges. Alternatives 2, 3, 4, and 6 may also use these standards as part of monitoring.

- **Vermont’s Ground water Protection Rule and Strategy** set standards which consist of ground water classifications and criteria necessary to achieve the designated uses or to maintain existing ground water quality. This rule establishes standards for ground water monitoring for alternative 2, 3, 4, and 6. This Rule would be met through all alternatives except for alternative 1, through long-term ground water monitoring.

C **Vermont Air Pollution Control Regulations.** Dust or other potential emissions that may result from excavation of waste materials for alternatives 2, 3, 4, 5 and 6 would all be controlled under these standards.

C **Vermont Water Quality Standards.** As part of the Hoosic River Basin, site surface waters are classified as a Class B2 habitat for fish, aquatic life and wildlife, and source of treated public water supplies. Surface water quality standards need to be maintained in the River during all remedial actions and are also applicable to site monitoring for surface waters under alternatives 2, 3, 4, and 6.

C **Vermont Department of Health Drinking Water Guidance**. This guidance identifies the Vermont Action Levels (VALs) and Vermont Health Advisories (VHAs) for chemicals of concern in drinking water. Alternatives 2, 3, 4, and 6 will use these criteria to monitor ground water and to assess whether additional actions are warranted.

Location-Specific ARARs: A summary of the location-specific ARARS and TBCs for the Site includes the following (there are no location-specific ARARS for Alternative 1, No Action):

- **Federal Executive Order No.11988** regulate flood plain protection regarding any federal project within the 100-year floodplain on the Site (see page 9 for a detailed discussion). Under alternatives 3, 4 and 6 a new solid waste facility would be developed within the flood plain and would be subject to the requirements of the Order. Through this ROD EPA has made a determination under this Executive Order that there is no other practicable alternative and that the alternative minimizes the impacts to the extent possible. While alternative 5 would remove all contamination from the floodplain EPA has determined that there are no practicable off-site disposal facilities that can take the dioxin-contaminated waste. Therefore the most practicable alternative is alternative 4 which consolidates the waste in the upper edge of the 100 year floodplain, outside of the higher energy floodway zone.

- **Vermont Wetland Rules and Vermont Act 250** regulate action which involve the destruction of State-regulated wetlands. Vermont has classified the wetlands within the lagoons as Class Three as they developed within a man-made lagoon. Therefore, Vermont determined that no mitigation measures are needed at the Site. All alternatives meet this requirement. Vermont Act 250 also sets standards for other site-related remedial actions including protection of streams, wetlands, floodways, and shorelines, air and water pollution prevention, and erosion control.

Long-Term Effectiveness and Permanence: This criterion evaluates the magnitude of residual risk and the reliability of controls after response objectives have been met. Alternatives 1 and 2 do not provide long-term effectiveness and permanence for protecting human health from exposure to soil at the Lagoon Area. Alternative 2 relies on institutional controls and a security fence to restrict human receptor exposure to soils and ground water containing contaminants of concern that exceed remediation goals. Long-term maintenance of these controls would be essential to ensure long-term effectiveness. Alternative 2 does not address potential releases of contaminated material from flooding events within the Hoosic River floodplain, which encompasses the entire area of the lagoons.

Alternatives 3, 4, and 6 entail different degrees of capping to effectively and permanently minimize risk to human receptors and the environment. The capping components in 3, 4 and 6 involve containment or disposal of untreated soils and sludges under a cap or solidification/stabilization meeting Vermont Solid Waste Rule standards. As long as the caps are maintained through the State's O&M plan, these alternatives would effectively and permanently minimize risk to the human and environmental receptors. Because waste would remain in place institutional controls to restrict residential exposures would be implemented under these alternatives. These controls would be relatively easy to maintain to ensure long-term effectiveness given that the property is not zoned for residential use.

Alternatives 5 would have the greatest long-term protectiveness at the Site through excavation and off-site disposal. However, practicable off-site disposal facilities that will accept dioxin-contaminated waste have not been identified. Alternative 3, 4, and 6 all involve permanent disposing of the waste within the 100-year floodplain of the Hoosic River. Alternative 3 would locate the cap within high energy areas of the River's floodway, where capping may be less effective. Alternative 4 and 6 would consolidate the contamination higher up in the floodplain where flooding forces are less severe and occur more irregularly. The protectiveness of these remedies depend on designing landfill caps that can withstand flooding without releasing contaminants.

Only alternative 6 provides active controls (stabilization/solidification treatment) to reduce concentrations of contaminants in ground water at the Lagoon Area. However, ground water conditions are expected to continue to improve at the Site as a result of all of the alternatives except 1 and 2, due to controls that will minimize leaching of the wastes to ground water. While there were only three detections during ground water sampling that indicated an exceedence of protective ground water goals, it is expected that a concentration reduction will be realized in the future through diffusion and dispersion processes and to a limited bio-degradation processes. All of the alternatives but alternative 1 provide long- term environmental monitoring to assess the effectiveness and permanence of these processes in ground water. Until ground water goals are achieved, institutional controls can be used to restrict residential exposure to ground water containing these sporadic exceedences. Alternative l utilizes the same natural ground water processes as the other alternatives but provides no means for monitoring to assess the effectiveness and permanence of these natural processes. It also does not provide institutional controls to restrict residential exposure to ground water during the period when ground water goals are exceeded.

Reduction of Toxicity, Mobility, or Volume Through Treatment: This criterion evaluates whether the alternatives meet the statutory preference for treatment under CERCLA. The criterion evaluates the reduction of toxicity, mobility, or volume of contaminants, and the type and quantity of treatment residuals.

Only alternative 6 employs treatment to address soil contamination. The remaining 5 would not satisfy CERCLA's statutory preference for treatment as a principal component for soil remedial action. However, alternatives 4 and 5 employ active removal processes, one on-site and covered under a solid waste cap and the other off-site at a licensed solid waste facility, thereby reducing the mobility of the contaminants. Alternative 3 also reduces mobility through capping, but the majority of saturated sludge is in lagoon 1 and 5, which would not be excavated. Alternative 6 would treat the majority of lagoon wastes through stabilization/solidification processes. The stabilization/solidification processes would not necessarily reduce the toxicity of the contaminants but it would significantly reduce the mobility of the contaminants through treatment. Therefore, Alternative 6 provides the greatest degree of reduction of toxicity, mobility, and volume through treatment.

Short-Term Effectiveness: CERCLA requires that potential adverse short-term effects to workers, the surrounding community, and the environment be considered during selection of a remedial action. Alternative 2 provides the least adverse short-term effects of all the alternatives. Alternative 2 includes applying land-use restrictions to minimize human exposure to site soils and construction of a perimeter security fence. Because this alternative does not provide active or intrusive remedial actions, this alternative would not pose a significant risk to the community, site workers, or the environment during implementation. Alternative 1 does not provide any remedial actions; therefore, short-term risks to the community or environment would not result from implementation. However, soil exposure would not be restricted under this alternative and therefore would not provide any short-term protection should construction work or residential development be permitted in the Lagoon Area.

Alternatives 4, 5 and 6 all include excavation of site sludge as a component, which increases the potential risks to remedial workers. Personal protective equipment and engineering controls (dust control) would be required to minimize risk to workers and exposure to downwind receptors. Soils would be disposed of on-site in the Lagoon Area for 4 and 6. However, under 5, lagoon wastes would be transported from the Lagoon Area to an off-site facility, which would represent an increased transportation risk to the public. Alternative 3 has the least short-term impacts to human and environmental receptors of all of the capping remedies because the waste would not be excavated but capped in-place.

All alternatives, except l, include applying land-use restrictions prohibiting ground water use and performing long-term environmental monitoring. When routinely implemented and checked these actions will protect human receptors and the community.

Implementability: This criterion evaluates each alternative's ease of construction and operation, and availability of services, equipment, and materials to construct and operate the alternative. Also evaluated is the ease of undertaking additional remedial actions and administrative feasibility.

The engineering/implementation complexity is highest with alternative 6, as it involves a complicated treatment, that the others don't entail. Alternative 5 is unreliable due to the scarce facilities that are willing to take dioxin containing waste. While it's possible to locate a facility, no current facility would commit to taking the volume of the lagoon sludge.

Engineering and construction services, equipment, and materials are readily available to implement any of the alternatives. Alternative l requires no remedial action. Alternative 2 requires only the installation of a perimeter security fence and implementation of institutional controls, which should be readily enforceable given the Lagoon Area's current use. None of the alternatives would limit or interfere with the ability to perform future remedial actions.

Cost: There are no costs associated with Alternative l, except for continuing five-year reviews. Capital, operations and maintenance, and present worth costs were estimated for Alternatives 2 through 6. Cost estimates for these alternatives included similar expense for long-term environmental monitoring.

Although alternative 6 is considered the second most protective, the incremental benefit (i.e., maximizes reduction in contaminant leachability and flood resistance) does not warrant the incremental cost of stabilization/solidification treatment, because Alternatives 3 and 4 afford nearly the same amount of protection from leaching. Also, because ground water is not the primary concern at this Site, the potential for leaching is not great. Therefore, capping the wastes and preventing direct contact and ingestion of contaminated soils and sludge is the primary risk driver. Because alternatives 3 and 4 provide nearly equivalent protection of human direct contact and ingestion of soil and sludge as alternative 6, the incremental benefit of both excavation and off-site disposal does not merit the increased cost.

Alternative 5 is considered the most overall protective alternative, because it would remove all contamination from the floodplain. However, it's the most expensive alternative at 24 million dollars because there are so few facilities that could potential accept dioxin contaminated waste.

Alternative 4 is considered the most cost-effective, and represents the best balance between risk reduction benefits and costs. Under alternative 4, the most contaminated wastes (lagoons 1 and 5) would be excavated and consolidated over lagoon 3 and 4. This alternative would involve removal of over 85 percent of the saturated wastes and placement of these wastes above the water table. Alternative 4 greatly reduces the leaching potential of the wastes without the significant cost of stabilization/solidification treatment.

N. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

Alternative 4, the selected remedy, is primarily designed to reduce potential human health risks associated with contaminated soil and sludge at the tannery lagoons. This alternative includes excavation of contaminated sludge in lagoons 1 and 5, consolidation over lagoon 3 and the southeast corner of lagoon 4, and capping the impoundment with a Vermont Solid Waste cap (See Figure B3). This cap will be designed to protect current and future use receptors from direct contact with the contaminants of concern and to resist flooding. This remedy has also been selected to reduce further infiltration and precipitation through the contaminated material which could cause additional migration of waste to and through the ground water and into Hoosic River surface water and sediment media. This remedy additionally includes institutional controls to preclude use of the ground water at the lagoons as a drinking water source and to prevent any disturbance of the cap.

The consolidated wastes will be graded and storm water controls will be installed to minimize ground water infiltration into the wastes. A passive landfill gas venting system will also be installed as part of the cap construction. Maintenance of the landfill cap and gas management system by the State will be required for at least 30 years. Environmental monitoring will be performed at the Site to evaluate ground water and river sediment conditions. Five-year Site Reviews will be performed to ensure that the remedial alternative remains protective of human health and the environment. Table B1 provides a summary of the selected response action.

2. Description of Remedial Components

Alternative 4 will consist of the following specific components.

- Pre-Construction Activities
- Erosion and Sedimentation Controls
- Construct Staging Area over Lagoon 2
- Clearing and grubbing of Lagoons 1, 2, 3, 4 (southeast portion only) and 5.
- Excavation of wastes from Lagoons 1 and 5
- Consolidation of wastes from Lagoons 1 and 5 over Lagoon 3A/B and the southeast on Lagoon 4 (See Figure 3?)
- Construction of Solid Waste landfill cap over Lagoons 3A/B and 4 (partial).
- Institutional Controls
- Land-use restrictions that prohibit residential use of Lagoon Area aquifer and disturbance of the cap
- Long-term ground water monitoring
- Long-term river sediment monitoring
- Remedial Action Operations & Maintenance (State to perform)
- Institutional Control Inspections
- Five-year Site Reviews

In addition, the remedy will include the State of Vermont continuing to conduct operation and maintenance of the tannery landfill cap constructed under the NTCRA (as described in Appendix D)

Pre-Construction Activities. Prior to implementation of alternative 4, several pre-construction activities will be required. A pre-design study will be required to expand on existing modeling to evaluate the impacts of the proposed capping activities on the flood plain of the Hoosic River. A more comprehensive flood plain modeling effort will be required to determine the most cost-effective manner to ensure the remedial action will not result in any significant increase in flood levels during the occurrence of the base (100-year) flood. A professional engineer will need to certify that the proposed development will not adversely affect flood levels and that a landfill cap can be designed, constructed, and maintained that will not be compromised by up to a 100 year flooding event. After completing this effort, the comprehensive remedial design will be completed.

Erosion and Sedimentation Controls. Protection of the Hoosic River and the on-site wetlands will be required to avoid potential adverse impacts from the consolidation, capping and flood-plain mitigation activities. Prior to construction activities, erosion control measures such as soil berms, porta-dams, silt curtains, booms, silt fencing and hay bales will be used to protect against erosion and siltation at the Site. These controls will be maintained until construction is complete and an acceptable vegetative cover is established for all disturbed areas of soil and sediment.

Clearing and Grubbing. Alternative 4 will involve clearing and grubbing lagoons 1, 2, 3, 4 (southeast corner only) and 5. These activities are required to create a suitable working surface for the staging area and the areas to be capped. Lagoon 2 will also be used by the Town of Pownal to construct their planned waste water treatment plan. The plant materials removed during these activities will be chipped for on-site use.

Excavation and Consolidation of Lagoon 1 and 5 Wastes. Alternative 4 will involve excavation of 11,587 cubic yards (CY) of berm material between lagoons 1 and 5 and between these lagoons and the Hoosic River to a ground elevation fo 505' (5 vertical feet of material). Additionally, excavation will include 25,300 cubic yards of saturated sludge from lagoons 1 and 5, 8,700 cubic yards of unsaturated sludge from lagoon 1, and 10,648 cubic yards of cover soils from lagoon 1. This soil will be loaded onto trucks and sent to de-watering pads. The sludge will be loaded onto trucks and transported to a location within the cap footprint. The excavation rate is 80 CY/hr using two excavators. The berms will be replaced with clean fill. Rip-rap will be installed along the side of the berm abutting the Hoosic River to add stabilization.

Prior to excavation, the lagoons will be de-watered. Approximately 2,841,000 gallons from lagoons 1,2,4 and 5 will be removed using a 300 gallon per minute pump which will operate 24 hours a day for 1 week to remove the initial volume. During construction, standing water will need to be removed approximately once per month to account for slow ground water recharge and precipitation accumulation. This water will be treated in the lagoons using eight Carbon Adsorption units. Each unit consists of two vessels containing 1,000 pounds of carbon per vessel. It is assumed that 2,000 lbs of carbon will treat 100,000 gallons of standing water. Fractionation tanks (20,000 gal/tank) will be used to store the untreated water. Discharge of treated water from the activated carbon tanks will be run through two on-site infiltration galleries, assumed to be 20'x5'x5' and consisting of geo-textile and rip-rap. The treated water will ultimately be discharge the river under the NPDES guidelines and the State of Vermont's surface water guidelines. Analytical testing of the water will be conducted prior to initial discharge, to ensure proper treatment.

During excavation activities, continuous air monitoring will be done to ensure no unacceptable releases of contaminants of concern. Additionally a water truck will be utilized for the suppression of dust and a foam suppressant will be used to suppress any potential odors. A silt fence with hay bales will be installed along the access road bordering the river, and a sedimentation trap will be installed. A temporary perimeter road will be constructed around the landfill cap to facilitate excavation/consolidation/capping activities - approximately 2,200 linear feet of road. This road will consist of a layer of geo-textile and crushed stone. A similar access road will be created between lagoons 1 and 5. The existing fence will be removed to facilitate excavation activities and a new 7 foot high temporary fence will be erected around the entire perimeter of the lagoon area.

Lagoon 2 will be backfilled to a site grade elevation of 510' to create a staging area for site trailers, decontamination facilities and structures. The final two feet of backfill will be 1.5" of crushed gravel.

It is expected that site mobilization will take approximately 2-3 weeks and that the excavation/consolidation process will take approximately 16 weeks. Site mobilization entails setting up office trailers and field office supplies, storage trailers, decontaminated trailers, sanitary facilities, utilities and site lighting.

Construction of Cap with Passive Gas Venting System. Alternative 4 will require construction of temporary storm water controls to minimize storm water run-on into the Lagoon Area. De-watering of portions of the lagoons may be required to facilitate construction of the base or foundation layer. De-watering will be achieved by pumping out the ponded water and if necessary use of well points and/or temporary sumps. Recovered water will be treated on-site with a mobile treatment unit as described above.

The estimated extent of the in-place cap is shown in Figure B3. Following excavation, confirmatory soil sampling will be completed in lagoon pits 1 and 5, to confirm that the soil cleanup criteria have been met and that lagoons 1 and 5 are free of tannery sludge. After the soil is de-watered it will be placed in lagoons 3 and 4. A soil cap will be constructed to limit exposure of the contaminated material and to prevent infiltration to the ground water, and to prevent erosion. The solid waste cover may be designed to be composed a sub-grade, a sand layer, a low hydraulic conductivity layer, and a vegetative support layer and a layer of topsoil. The approximate area of the cap is 4 acres. The maximum side slopes will be of 3:1. It is estimated that there will be one gas vent per acre, with the total landfill extending out 4 acres.

Prior to the cap construction, lagoon 2 will be backfilled with crushed stone (densely graded) to serve as an area for temporary construction offices, stockpile and staging of construction materials and operation of the de-watering system. Conservatively, it was estimated that the entire lagoon 2 would be backfilled with 24 inches of crushed stone to serve as a foundation layer and wearing surface for the staging area.

Restoration measures, following construction activities, may include reconfiguration or reduction of the height of the streamside berm; reconfiguration and revegetation of the excavated areas to promote drainage, and buffer strip vegetation.

Floodway Mitigation. Construction of the consolidated cap within the current flood way of the Hoosic River will be avoided under this remedial alternative. A pre-design flood mitigation study was completed to evaluate the impacts to the Hoosic River (Appendix H of the FS). The report shows that the effects would be minimal, and that the flood way would be shifted to beyond the limits of the landfill. In addition, the modeling study showed that the flood storage capacity of the river could be slightly increased over revised baseline conditions. During the pre-design phase, additional modeling will be performed to confirm this understanding.

Floodplain Protection. The cap will be designed, constructed, and maintained to withstand a 100-year flood event without releasing any contaminants into the environment. A cap monitoring plan will be detailed as part of a site long-term monitoring plan and submitted to the regulatory agencies for review prior to implementing the cap monitoring component of the selected remedy. The cap will be maintained and inspected as required by the State of Vermont.

Institutional Controls. Institutional controls in the form of land-use restrictions will limit residential use of the Lagoon Area, particularly the consolidated cap area. Deed restrictions pertaining to invasive construction activities at the cap will be required because the sludge will remain under the cap. However, land-use restrictions, in the form of zoning or deed restrictions will still be imposed to prohibit residential development to prevent residential contact with contaminated soil and residential well installation for potable use (for protection from unrestricted-use soil and ground water exposures).

An Institutional Control Monitoring Plan will be prepared and submitted for regulatory agency review as part of the site long term monitoring plan, to detail the land use restrictions to be incorporated/referenced in zoning ordinances or within instruments of property transfer. The plan will include a checklist of elements to be assessed during regularly scheduled on-site inspections and interviews with the town operators. It is assumed that elements of the on-site inspection will include verification that no wells for potable use have been installed on the premises, that no disturbance of soil within the contaminated soil area is evident, and that there is no evidence of land use change. Interviews with the site operators will include reviewing the operators familiarity with restrictions imposed upon the property and documentation of these restrictions, and knowledge of past excavations that may have been performed within the contaminated soil area and plans for property sale, development for residential use, or construction at the Site.

Environmental Monitoring. Environmental monitoring will consist of performing long-term ground water and sediment sampling. Long-term ground water sampling will be performed to ensure that contaminant concentrations are at or below their currently low concentrations. It is anticipated that concentrations will decrease with time through natural attenuation processes. Sediment sampling will be performed in the Hoosic River to confirm that the contaminants of concern are not increasing in concentrations. Depending upon the concentrations detected in sediments, toxicity testing, to ensure the protection of the environment will be considered.

Sampling frequency, location, analytes, sampling procedures, and action levels for environmental monitoring will be detailed in a site long-term monitoring plan and submitted to the regulatory agencies for review prior to implementing the environmental monitoring component of the selected remedy.

Remedial Action Operations and Maintenance. This remedy will require regular operation and maintenance of the landfill cap, passive gas venting system and storm water controls to ensure the long-term effectiveness of the remedy. Maintenance activities include regular mowing of the landfill cap, removal of woody plants, repair of eroded areas, and keeping storm water controls and gas vents free of debris. Regularly scheduled inspections will be performed to confirm that Remedial Action elements remain protective of human health and the environment. The State of Vermont will have the responsibility for all Operation and Maintenance activities.

Institutional Control Inspections. Regularly scheduled inspections would be performed to confirm that land-use restrictions in the form of deed or zoning restrictions are implemented to minimize potential human exposure to soil and ground water contaminants left at the Site. An Institutional Control Monitoring Plan will be prepared and inspections performed as described above. Because the contaminated soil and sludge will remain on-site the sludge contaminants will never achieve future-use cleanup goals. Deed restrictions, and subsequent inspections/interviews, pertaining to invasive construction activities in the capped area will be required.

Five-Year Site Reviews. Under CERCLA 121c, any remedial action that results in contaminants remaining on-site must be reviewed at least once every five years. During five-year site reviews, an assessment is made of whether the implemented remedy continues to be protective of human health and the environment or whether the implementation of additional remedial action is appropriate.

The Five-year site review for the lagoons will consist of evaluating the ground water and sediment monitoring data and reviewing the ROD and site ARARs. The reports from institutional control inspections will also be reviewed and, if applicable, the Site will be visited and interviews performed to assess whether institutional controls are appropriate. The assumptions of the baseline risk assessment will be reviewed for appropriateness in light of available monitoring data, ARARs review, results of the Site visit and interviews, and a conclusion made concerning the protectiveness of the remedy. The review will identify Site area/media that no longer require monitoring and institutional controls. These areas will be recommended for no further action in the five-year site review report. For areas where ground water or sediment contaminants remain in place, the data and inspection reports will be evaluated to confirm that the implemented land-use restriction continues to be protective of human heath. Emerging technologies that hold potential for remediating contaminants in excess of the remediation goals will also be evaluated.

The Five-year review will also address the ongoing State operation and maintenance of the NTCRA tannery landfill cap.

Public meetings with the town of Pownal may be held coincident with these five-year site reviews to help keep the public informed of site status including its general condition, remaining contaminant levels, and protectiveness of the remedial action. EPA in cooperation with the State of Vermont will be performing the 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.

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.

3. Summary of the Estimated Remedy Costs

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 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.

4. Expected Outcomes of the Selected Remedy

The primary expected outcome of the selected remedy is that the remaining source area at the Site will no longer present an unacceptable risk to current and future visitors and workers via direct contact and ingestion and will be suitable for recreational use. Approximately twelve months are estimated to complete construction of the selected remedy. However, waste will remain under the cap on-site indefinitely and permanent institutional controls are necessary to ensure the protection of human health and the environment. Another expected outcome of the selected remedy is that ground water contaminants under the lagoons will further reduce in time and will not present an unacceptable risk to future environmental receptors in the Hoosic River or to future drinking water receptors. The selected remedy will also provide environmental and ecological benefits such as elimination of any further migration of contaminants from lagoon sludge to the surface water and sediments of Hoosic River. It is anticipated that the selected remedy will also provide socio-economic and community revitalization impacts. EPA's Superfund Reuse grant program afforded the Town of Pownal the means to conduct public outreach and reach consensus on a Site Reuse Plan for the tannery Site. A waste water treatment plant at the site of lagoon 2 has been approved by the Town Pownal to comply with the regulations of the State of Vermont. Potential plans for the lagoon area also include a soccer field, walking paths, boat launch and a seasonal ice skating rink.

Soil Cleanup Levels

The site is currently vacant, abandoned and fenced to restrict access. Trespassers use the site for various recreational purposes including hunting, fishing, hiking and off-road vehicle operation, but none of these uses are currently allowed. The Town of Pownal plans to construct recreational areas at the site, including soccer fields, nature trails, parking and canoe launch with access to the Hoosic River. The Town also plans to construct a waste water treatment plant at Lagoon 2, including an outfall pipe to the Hoosic River.

Soil cleanup levels for compounds of concern in surface and subsurface soil exhibiting an unacceptable cancer risk and/or hazard index have been established such that they are protective of human health. Soil cleanup levels for known and suspect carcinogenic chemicals of concern (Classes A, B, and C compounds) have been set at a 10^{-6} excess cancer risk level considering exposures via dermal contact and ingestion. Cleanup levels for chemicals of concern in soils having non-carcinogenic effects (Classes D and E compounds) were derived for the same exposure pathway and correspond to 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). Exposure parameters for dermal contact and ingestion have been described in the Remedial Investigation (TRC, 2002).

Lead levels in Lagoon 1 under assumed future land use conditions were estimated to result in blood levels in excess of the blood level goal for a young child park visitor.

Table 7 summarizes the cleanup levels for carcinogenic and non-carcinogenic chemicals of concern in soils protective of direct contact with soils. These cleanup levels will have to be both horizontally and vertically at lagoons 1 and 5.

Table 7: Soil Cleanup Levels for the Protection of Future Park Visitor and Construction Worker

Carcinogenic Compounds of Concern	Cancer Classification	Soil Cleanup Level (mg/kg)	Basis	RME Risk
Benzo(a)anthracene	B2	1.7	risk	1 x 10^{-6}
Benzo(a)pyrene	B2	0.17	risk	1 x l0^{-6}
Pentachlorophenol	B2	7.7	risk	1 x l0^{-6}
N-nitroso-di-n-propylamine	B2	0.27	risk	1 x l0^{-6}
Arsenic	A	1.1	Risk	1 x l0^{-6}
Dioxin TEQ	B2	1E-3	policy	8 x 10^{-5}
Sum of Carcinogenic Risk				**8.5 x 10^{-5}**
Non-Carcinogenic Compounds of Concern	**Target Endpoint**	**Soil Cleanup Level (mg/kg)**	**Basis**	**RME Hazard Quotient**
Chromium	No observable adverse effect level	733	Risk	
Mercury	Central Nervous System	23	Risk	1
Lead	Central Nervous System	1,000	IEUBK Model	N/A

O. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Pownal Tannery 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 (see Table B3 for ARARs). In addition, the selected remedy utilizes permanent solutions to the maximum extent practicable. The selected alternative does not satisfy the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element since the added cost of treatment is not practicable at this Site.

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 engineering controls and institutional controls. More specifically, the selected remedy will address the remaining source of tannery contaminants such that the Site will no longer present an unacceptable risk to current and future visitors and workers via direct contact and ingestion and will be suitable for recreational use. As contaminants will remain contained in place institutional controls will ensure the protection of human health and the environment. Furthermore, the selected remedy will reduce infiltration through precipitation of contaminants into the ground water, and reduce further migration of contaminants to Hoosic River receptors. It is anticipated that low concentrations of contaminants under the lagoon will further reduce in time through natural attenuation and will not present an unacceptable risk to future environmental receptors in the Hoosic River or to future drinking water receptors. Long-term ground water and river sediment sampling will be conducted to further ensure the protection of human health and the environment.

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.

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 B3). In particular, this remedy will comply with the following federal ARARS:

Statement of Procedures on Floodplain Management and Wetland Protection: EPA policy for carrying out the provisions of Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) are set forth in 40 CFR Part 6, Appendix A. These policies are discussed below.

Floodplain Management: Executive Order 11988 directs federal agencies to avoid long- and short-term adverse impacts associated with occupancy and modification of flood plains. Agencies responsible for providing federal assistance for construction and improvements and for conducting programs affecting land use must take actions to accomplish the following:

- Reduce risk of flood loss
- Minimize the impacts of floods on human safety, health and welfare
- Restore and preserve the natural and beneficial values served by flood plains

Most of the requirements associated with the order are set forth in the Floodplain Management Guideline, published February 10, 1978, by the Water Resource Council to aid federal agencies in complying with the order. These guidelines include alternative evaluation, impact assessment and mitigation, and public involvement that are already incorporated into the FS process. The only additional substantive requirement contained within these guidelines is that certain projects or portions may be designated as a critical action, which is any activity for which even a slight chance of flooding would be too great. In the case of critical actions, the area requiring consideration is expanded from the 100-year to the 500-year floodplain. EPA indicated in the CERCLA/SARA Environmental Review Manual (January 1988) that all CERCLA/SARA actions are to be considered critical actions and, therefore, the 500-year floodplain is considered potentially applicable. Floodplain management guidelines are considered applicable for those portions of the Site that are in the 100-year floodplain.

The Site is located within the 100-year flood plain of the Hoosic River in Vermont and a determination that no other practical alternative exists and that the selected remedy minimizes impacts to the maximum extent practical has to be made by EPA to meet the requirements of Executive Order 11988. It has been determined that the selected alternative can be designed and implemented to be resistant to flood damage and to minimize the effects on the existing flood plain. The cap will be inspected regularly and maintained by the State of Vermont. Preliminary design calculations indicate that this alternative will increase, rather than decrease, the flood storage capacity of the Hoosic River and will have small localized effects on the 100-year flood water elevation. The consolidated cap will not be constructed within or obstruct the current flood way of the Hoosic River under the selected alternative. Removal of all of the contaminated soil and sludge from the lagoons to an off-site facility, out of the flood plain, was determined to be significantly less practicable alternative as few facilities accept disposal of waste containing dioxin and the disposal costs are extremely expensive. Through this ROD, in compliance with Executive Order 11988, EPA has determined that due to the nature of the Pownal Tannery Superfund Site, full compliance with these requirements will be met.

Vermont Wetlands Protection Rules : Vermont Wetlands Rules (10 VSA, Chapter 37) were promulgated pursuant to the Wetlands Protection Act. The regulations set forth a review and decision-making process to regulate activities in these areas in order to contribute to the interests of drinking water supplies, flood control and storm damage protection, pollution prevention, shellfish, fisheries, and wildlife protection. The regulations apply to wetlands and to perennial rivers and streams. Activities in these areas or their buffer zones (within 100 feet) require filing of a notice of intent, followed by public hearings. The regulations set performance standards for activities occurring in these areas which include banks, bordering vegetated wetlands, open water, land subject to flooding, and streambanks. Wetland functions and values requiring protection include, but are not limited to, the following.

- Protection of life and/or property from flooding or flood flows by retaining, storing, metering, or slowing flood waters from storm events.
- Providing and maintaining surface and/or ground water supplies by acting as a recharge or discharge area.
- Providing and maintaining valuable wildlife habitats.
- Providing and maintaining high value recreation areas.
- Protecting and maintaining water quality.

These rules would apply to any remedial action that would impact open water, wetland areas, and any area within 100 feet of these areas.

The selected remedy involves destruction of Vermont state regulated wetlands in two of the five lagoons located on the Site. EPA has determined the wetlands located on-site are not under federal jurisdiction. Vermont has classified the wetlands on-site as Class Three wetlands, that are of low function since they have developed within man-made waste lagoons. Therefore, Vermont has determined that no mitigation measures are required at the Site for the loss of wetlands through implementation of the selected remedy.

Vermont Act 250(10 VSA 6068). Similar to Vermont's Wetland Protection rules, Act 250 also regulates actions that involve the destruction of wetlands. Vermont has classified the wetlands on-site as Class Three wetlands, that they are of low function since they have developed within man-made waste lagoons. Therefore, Vermont has determined that no mitigation measures are required at the Site for the loss of wetlands through implementation of the selected remedy. Act 250 also regulates several other remedial actions including protection of streams, wetlands, floodways, and shorelines, air and water pollution prevention, and erosion control.

Vermont Solid Waste Rules: The location of the solid waste facility to be implemented is regulated under the Vermont Solid Waste Management Rules (EPA Chapter 6 (adopted under 10 VSA, Chapter 159), Closure and Post-Closure, Sub-chapter 10. The proposed location of the solid waste facility does not comply with a number of the numerical siting criteria of the Vermont Solid Waste Management Rules, including the location in the 100 year floodplain, the separation distance from adjacent property boundaries, the separation distance from a surface water body, and the separation distance from groundwater. However, under the Rules specific standards can be waived upon a finding that the CERCLA remedy will not adversely affect public health, safety or the environment; and the technical and siting requirements will be complied with to the extent practical in light of the overall objectives of the response. Based on its evaluation of the remedy, as supported by the administrative record (Appendix C), EPA invokes the waiver, as the selected remedy will be designed to withstand flooding and not release contaminants into the Hoosic River or adjacent properties and therefore will not adversely affect public health, safety and the environment.

National Pollutant Discharge Elimination System (NPDES) (40 CFR Parts 122 and 125). These requirements, which establish the specifications for discharging pollutants from any point source into the waters of the U.S.,are applicable to any discharges on the site. The selected alternative includes discharge of de-watered leachate from the soil/sludge into the Hoosic River. Treatment of this leachate will be included with the alternative, therefore it will meet this ARAR.

Vermont's Water Quality Standards establish water quality criteria for the maintenance of water quality and rules for determining acceptable point and non-point discharges to state surface waters. The selected alternative includes discharge of de-watered leachate from the soil/sludge into the Hoosic River. Treatment of this leachate will be included with this alternative, therefore it will meet this ARAR.

Vermont Ground water Protection Rule and Strategy, EPA Ch. 12 (10 VSA Ch. Sec. 1390-1394). Standards which consist of ground water classifications and criteria necessary to achieve the designated uses or to maintain existing ground water quality. This rule establishes standards for ground water monitoring. The selected alternative includes long-term ground water monitoring, which will satisfy the requirements of this standard.

For a list and description of the To Be Considered regulations that pertain to the selected remedy, please refer to Table B3.

A discussion of why these requirements are applicable or relevant and appropriate may be found in the FS Report in Section 2.

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 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 the selected remedy was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

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 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.

The selected remedy does not provide active reduction of contaminant concentrations in the soil through treatment. However, it effectively eliminates the primary risks posed by the site to human health the environment by preventing any further direct contact and ingestion with tannery waste exceeding the remediation goals, and it will prevents further leaching of contaminants to the ground water and river surface water and sediment. Ground water conditions are expected to continue to improve at the site because consolidation of saturated waste out of the water table and the cap would minimize infiltration and leaching. Contaminants in the ground water will eventually be achieved through diffusion and dispersion processes and by bio-degradation processes. Long term environmental monitoring will assess the effectiveness and permanence of these processes in ground water. The selected remedy provides institutional controls to restrict residential exposure to ground water and which will protect disturbance of the capped sludge.

5. The Selected Remedy Does Not Satisfy the Preference for Treatment As a Principal Element

The selected remedy does not include treatment which permanently and significantly reduces the toxicity, mobility or volume of the hazardous substances as a principal element. However, permanent and significant reductions in toxicity and volume will be achieved through capping which will prevent contaminant leaching into the groundwater and surface waters and through natural attenuation processes in groundwater. Approximately 85% of the lagoon sludge that exceeds the acceptable risk range in the saturated overburden will be excavated, consolidated and capped above the water table, which will greatly reduce the migration of contaminants into the groundwater and to the Hoosic River.

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

Because this remedy will result in hazardous substances remaining on-site above levels that 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.

P. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA presented a Proposed Plan which called for the excavation, consolidation and capping of Site contaminants which exceeded remediation goals. The proposed remedy includes institutional controls to prevent the use of ground water at the lagoons for drinking water and to protect the cap and waste left in place from any future disturbance, and a program of environmental monitoring to track changes in residual contaminants in ground water and river sediments. Five-year site reviews will be done to regularly ensure the protection of human health and the environment. This Proposed Plan is dated July 18, 2002. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the proposed plan, were necessary.

Q. STATE ROLE

The Vermont Agency of Natural Resources 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 to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. The State of Vermont concurs with the selected remedy for the Pownal Tannery Superfund Site. A copy of the declaration of concurrence is attached as Appendix A.

PART III: RESPONSIVENESS SUMMARY

BACKGROUND ON COMMUNITY INVOLVEMENT

Bennington County has had significant community exposure to Superfund Site cleanups over the past several years since there are three other Superfund sites located nearby in the Town of Bennington, Vermont (Bennington Landfill, Tansitor Electronics, and Burgess Brothers).

In 1998 when EPA last conducted formal community interviews, interest and concern over the Pownal Tannery Superfund Site was relatively high. EPA has held a number of public meetings at the site since it was added to the National Priorities List (1998). EPA has also produced four Fact Sheets during this time period to aid in keeping the community informed about site plans and activities.

Since 1998, a number of citizen concerns related to the building and landfill have been addressed, through the Non-Time Critical Removal Action conducted at the Site.

Nevertheless, community interest and concern remains high at the site. In 1999, the Town of Pownal was awarded a $100,000 grant from EPA to evaluate redevelopment opportunities at the site, after cleanup is accomplished. The Town quickly formed a Reuse Committee, comprised of local residents and town officials, to guide the site evaluation. The Town then hired a planning consultant to carry out the details of the evaluation.

Despite the various cleanup activities conducted by EPA to address the contamination in the abandoned building and the landfill, community concern at the Site is still high, as the lagoons, ground water, and the Hoosic River impacts have not yet been addressed.

The major concerns expressed during the remedial planning activities at the Pownal Tannery site focused on site re-use, the selected alternative, and contaminated sediment in the Hoosic River. These concerns, and how EPA addressed them, are described below:

SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

The public comment period on the Proposed Plan for the Pownal Tannery site was held from July 18 to August 19, 2002. On August 7, 2002, EPA held a formal hearing for residents to provide oral comment on the Proposed Plan. Comments received during this time are summarized below. Part I of this section addresses those community concerns and comments that are non-technical in nature. Responses to specific legal and technical questions are provided in Part II. Comments in each Part are categorized by relevant topics.

Part I - Summary and Response to Local Community Concerns

1) Pownal Select Board Chairman Nelson Brownell and Selectman Harry Percey expressed agreement with the EPA's Proposed Plan.

EPA Response: Community support from elected officials is an important component of the remedy for this site since the Town plans to re-use the site after the Remedial Action is completed. EPA has worked closely with the Town throughout the remedy selection process.

2) Vermont Department of Environmental Conservation Commissioner Christopher Recchia indicated concurrence with EPA's Proposed Plan assuming that the remediation and waste water treatment plant construction would begin in 2003 and that all of their technical requirements for a waiver of the Vermont Solid Waste regulations are substantively met.

EPA Response: EPA plans to begin Remedial Action in 2003, and will design the solid waste facility to meet the waiver requirements of the Vermont Solid Waste regulations.

Part II - Comprehensive Response to Specific Legal and Technical Questions

1) Site abutter J. Burden raised questions about the impact and long term risks of the Proposed Plan to his property.

EPA Response: The assessment of human health risks associated with the site evaluated exposure to contaminated lagoon sludge. It was determined that there are no site-related health risks associated with ground water off-site. Institutional controls will ensure the prevention of consumption of groundwater in the lagoon area. The remedial action at the site will include consolidation and capping the contaminated sludge in the lagoons which pose an unacceptable human health risk. This action will protect abutting neighbors and the public which will utilize the lagoon area in the future for recreation purposes. This action should also aid in reducing the potential negative stigma of owning property next to an uncontrolled Superfund site.

2) Site abutter J. Burden asked whether any testing was performed on his property.

EPA Response: No testing was performed on the Burden property. EPA's investigation showed that the contaminated sludge was contained within each of the 5 lagoons.

3) Site abutter J. Burden requested clarification over whether EPA would need access to his property during construction.

EPA Response: EPA does not currently anticipate the need for access to the Burden property to construct the remedy.

4) Pownal resident Ray Shields noted that the proposed remedy does not comply with the Vermont Solid Waste Facility Siting Requirements

EPA Response: The proposed remedy does not meet several published standards within the Vermont Solid Waste Facility Siting Requirements. The only remedial alternative considered by EPA that did meet these requirements was the off-site disposal remedy which was not selected due to concerns over locating an off-site facility that would accept dioxin-contaminated waste, potential risks associated with transportation of large volumes of contaminated sludge and soil, and the excess cost. EPA determined that the selected remedial alternative, which calls for construction of a cap designed to residt flooding events and to protect future uses of the property, was equally protective and was more implementable for a lower cost.

Note that, recent amendments to the Solid Waste Management Rules (Section 301(d)) and Statutes (10 VSA Section 6605(d) and Section 6614) allow certain statutory and rule requirements for solid waste facilities constructed as part of a state or federal environmental response action to be waived. For a federal Superfund remedy, EPA must make a finding prior to issuing a waiver that such a project will not adversely affect public health, safety and/or the environment, and that the technical and siting requirements will be complied with to the extent practical in light of the overall objectives of the response action. This ROD makes this finding and discusses how the selected remedy will be designed to meet the requirements for the waiver.

5) Pownal resident Ray Shields questioned the projected impact of the proposed remedy on flooding of the Hoosic River.

EPA Response: EPA performed a separate technical analysis of the effects of the proposed remedy on the Hoosic River. This analysis was done in consultation with the State of Vermont. The study involved careful and detailed modeling of the river response during a 100 year flood event, to changes in the floodplain topography, such as those that would be made as part of the proposed remedy.

The study found that the proposed remedy will be beneficial in that it will increase the flood storage capacity of the Hoosic River 100 year floodplain, widen the existing floodway (that is currently constricted due to the presence of the Lagoon berms along the bank of the Hoosic river), and reduce flood water elevations upstream of the Lagoon area (between the the dam and the Lagoon Area, along approximately 1800 feet of the Hoosic River) during a 100 year flood. The only negative impact noted by the study was a slight (approximately 1 foot) increase in water level elevations along a short (approximately 800 feet) stretch of the Hoosic River adjacent to the Lagoon Area.

6) Pownal resident Ray Shields expressed concern of the stability of the upstream dam on the Hoosic River and what the potential impact would be on the proposed landfill if the dam failed.

EPA Response: Although a structural analysis of the dam has not been performed, there is no current visual evidence of deterioration of the dam. EPA determined that the dam is located at a natural outcropping of bedrock in the Hoosic River, and at a natural constriction in the bank. A catastrophic failure of the dam would release water downstream, increasing the river elevation temporarily, until the river elevations equilibrated. EPA plans to armor the side slopes of the proposed landfill to protect it against such occurrences and to protect it against other major flood events.

7) Vermont Department of Environmental Conservation Commissioner Christopher Recchia expressed concern over the Town's proposed emphasis on the recreational uses of the site given the PCB contaminated sediments in the Hoosic River. Pownal Resident Ray Shields also expressed concern over the fact that EPA will not be addressing PCB contaminated sediment in the Hoosic River since the contamination appears to be emanating from up stream sources in Vermont and/or Massachusetts and not site related.

EPA Response: A supplemental human health risk evaluation of Hoosic River Sediments was conducted in September 2002 to specifically address the concern regarding PCBs in the river. As upstream samples indicated significantly higher contaminant concentrations, the supplemental risk evaluation focused on potential future human exposures to sediments located only downstream of the dam, adjacent to the portions of the site potential planned for recreational development. The upstream sediment samples have not been included in this evalution since it is recognized that, due to the contaminant levels present, human exposures at these locations would present a risk above regulatory guidelines. Appendix F includes a full discussion of the methods and assumptions used to calculate the risk for this exposure scenario.

This supplemental evaluation demonstrates that potential human recreational exposures to sediments adjacent to the lagoon area, downstream of the dam, do not appear to be associated with risk above EPA's guideline. Exposures to sediments upstream of this area should be prevented as sediment-associated risks in the upstream area exceed EPA's guidelines.

8) Pownal Resident Ray Shield commented that Town's planned reuse of the Site is incompatible because it is unlikely that people would like to spend leisure time next to a waste water treatment plant.

EPA Response: While EPA cannot prescribe to the Town how the site is used in the future, it should be noted that the Town conducted a very thorough study of community needs and desired end uses for the site, using a $100,000 grant from EPA. The mixed use (recreational and sewage treatment plant) plan that the Town developed was based on extensive community input obtained through resident interviews, surveys, and public meetings. Issues regarding Site reuse should be directed to the Town of Pownal officials.

9) Pownal resident Ray Shields prefers that EPA implement Remedial Action Alternative 3, Cap in Place, instead of the consolidation and capping remedy that is being proposed.

EPA Response: While Remedial Action Alternative 3 would be effective and would cost slightly less than EPA's selected remedy, EPA determined that the selected alternative has the following benefits over Alternative 3.

- Reduction of the volume of saturated waste via excavation of the sludge in Lagoons 1 and 5, which will further minimize the potential for contaminants to leach into the ground water.

- Consolidation of the waste from Lagoons 1 and 5 to an area further from the bank of the River will provide additional protection from erosion during a flood.

- Consolidation of the waste into a smaller footprint will reduce long term operations and maintenance costs and provide the Town a better platform to construct recreational facilities, if desired.

Remaining Concerns

10) Pownal resident Ray Shields questioned the availability of Federal funding to pay for the remedial action at the site.

EPA Response: EPA is in the process of securing funding for the proposed action, though funds have not yet been committed to the project.

11) Pownal resident Ray Shields questioned whether long term funding for Operation and Maintenance of the remedy would be available to ensure that the cleanup remains protective.

EPA Response: VTDEC has available funds to perform operations and maintenance of the sludge landfill and former building areas, but will need to seek legislative approval for the balance of funds needed to provide operations and maintenance for the Lagoon Area. The VTDEC intends to fulfill its obligations under CERCLA.