

**SECOND FIVE-YEAR REVIEW REPORT
POWAL TANNERY SUPERFUND SITE
BENNINGTON COUNTY, VERMONT**



Prepared by

**U.S. Environmental Protection Agency
Region I
Boston, Massachusetts**

A handwritten signature in blue ink, appearing to read "James T. Owens, III", is written over a horizontal dashed line.

**James T. Owens, III, Director
Office of Site Remediation and Restoration**

A handwritten date "9/29/14" in blue ink is written above a horizontal dashed line.

Date

**SECOND FIVE-YEAR REVIEW
POWNAI TANNERY SUPERFUND SITE**

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LIST OF ACRONYMS & ABBREVIATIONS

ACRONYM	DEFINITION
AAL	Ambient Air Level
ARAR	Applicable or Relevant and Appropriate Requirement
AUL	Activity and Use Limitation
AWQC	Ambient Water Quality Criteria
BOH	Board of Health
CAA	Clean Air Act 42 U.S.C. § 7401 <i>et seq.</i>
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC § 9601 <i>et seq.</i>
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CWA	Clean Water Act 33 U.S.C. § 1251 <i>et seq.</i>
DOT	Department of Transportation
EO	Executive Order
EPA	Environmental Protection Agency (U.S. EPA - Region 1)
ERA	Ecological Risk Assessment
ERED	Environmental Residue Effects Database
ESD	Explanation of Significant Differences
EW	Extraction Well
FDA	U.S. Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act of 1947 7 U.S.C. §136 <i>et seq.</i>
FS	Feasibility Study
GWTF	Groundwater Treatment Facility
HQ	Hazard Quotient
ICs	Institutional Controls
IS	Incineration and Stabilization
LNAPL	Light Non-Aqueous Phase Liquid
LOAEL	Lowest Observed Adverse Effects Level
LTRA	Long-term Response Action
M&E	Metcalf & Eddy
MCLs	Maximum Contaminant Levels
MGD	Million Gallons Per Day
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan, 40 CFR Part 300
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Adverse Effects Levels
NPL	National Priority List
O&M	Operation and Maintenance
OMEE	Ontario Ministry of Environment and Energy
OU-1	Operable Unit 1

ACRONYM	DEFINITION
PRP	potentially responsible party
RA	Remedial Action
RAC	Response Action Contract
	Resource Conservation and Recovery Act, 42 U.S.C. § 6901 <i>et seq.</i>
RCRA	
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RSE	Remedial System Evaluation
SDWA	Safe Drinking Water Act, 42 U.S.C. § 201 <i>et seq.</i>
SF	Slope Factor
SQC	Sediment Quality Criteria
SVOCs	Semi-volatile Organic Compounds
TBC	To Be Considered
TLV	Threshold Limit Value
TRV	Toxicity Reference Value
UCL	Upper Concentration Limit
VGES	Vermont Groundwater Enforcement Standard
VOCs	Volatile Organic Compounds
VTDEC	Vermont Department of Environmental Conservation

EXECUTIVE SUMMARY

This second five-year review report (FYR), as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), was prepared for the Pownal Tannery Superfund Site (the Site) located between Route 346 and the Hoosic River in Pownal, Bennington County, Vermont. The Site was a former hide tanning and finishing facility owned by the Pownal Tanning Company, Inc. The Site originally consisted of three contamination sources: the former tannery building complex, a capped sludge landfill, and a lagoon system. The United States Environmental Protection Agency (EPA) permanently capped the sludge landfill (Dean Road Landfill) and removed the building complex during a Non-Time Critical Removal Action (NTCRA) that was completed in 2001.

In September 2002, EPA issued a Record of Decision (ROD) that defined one operable unit for the entire Site. The ROD specified 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, groundwater, residential wells and institutional controls (ICs) to protect the cap from disturbance and to prevent groundwater consumption and excavation of waste in the Former Lagoon Area.

The selected remedy for the Site was a comprehensive approach for the tannery Site that addressed all current and potential future risks caused by site wastes. At the former tannery lagoons, the cleanup prevented direct contact risks with contaminated lagoon waste and significantly decreased further off-site migration that the lagoon sludge could cause through erosion to the adjacent river through flooding events. At the time the ROD was signed it was found that, as a result of the previous removal actions, the soil and sludge contamination in the lagoon area was the only remaining area needing further remediation. Cleanup activities began in July of 2003 and were completed in September 2004. All preliminary construction completion requirements for the Site were met. Specifically, all construction activities that constitute substantial completion identified in the ROD were implemented and a final inspection by EPA and the Vermont Department of Environmental Conservation (VTDEC) was conducted on September 17, 2004.

On September 28, 2007, EPA signed an Explanation of Significant Differences (ESD) to document a modification to the 2002 ROD to expand the IC requirement to include all parcels at the Site where waste has been left in place (2007 ESD). This specifically included the Dean Road Landfill Area and the entire Former Lagoon Area (the ROD only required ICs for the capped lagoons and not the surrounding portions of those parcels). This requirement was determined to be necessary to protect the integrity of the caps, the lagoon berm, the Dean Road Leachate system and other engineered components of the remedy. The 2007 ESD further detailed the determination that the protective lagoon area berm adjacent to the Hoosic River and cap is an integral component of the remedy. The State of Vermont concurred with this determination.

On September 28, 2010, a second ESD (2010 ESD) was signed which further added an IC groundwater compliance zone at the Former Mill Building Area to include all locations with known slight exceedences of groundwater standards. In addition, the IC boundary around the Dean Road Landfill was expanded to include adjacent property within the groundwater compliance zone for the landfill and federal and state groundwater standards were added to the Applicable or Relevant and Appropriate (ARAR) regulatory and statutory requirements for the Site remedy. There were also some modifications made to some of the previously identified ARARs in the ROD. This determination included the requirement that further monitoring and

evaluation of groundwater conditions are warranted to determine if additional remedial measures may be required.

A review of the groundwater data collected over the past five years indicate there has been no significant increase in groundwater contamination at any of the monitored locations or in monitored residential tap water adjacent to the Site. However, there continue to be elevated concentrations of some contaminants in groundwater that exceed state and federal drinking water standards at all three locations at the Site. Other than in the Mill Building Area, these identified exceedances are either located within the groundwater compliance boundaries for the Dean Road Landfill Area and Former Lagoon Area, or are in an area upgradient of the Site that is not believed to be attributed to any Site-related sources. As specified in the ROD and the 2007 ESD, groundwater data will continue to be evaluated in all areas of the Site to determine if any additional investigation and/or remedial response measures are required to make a long-term protectiveness determination prior to Site deletion.

Select residential wells have been periodically monitored during this review period, however, due to lack of access, this monitoring has not occurred annually as anticipated. All data indicate that there are no Site related detections that exceed state or Federal drinking water standards.

Other Site monitoring has shown that: 1) a review of the sediment data collected in the Hoosic River over the past five years indicates the remedy continues to be protective with respect to ecological exposure to contaminants, 2) residential well data from wells adjacent to the Site indicate that there are no detections of Site-related contaminants that exceed either state or Federal drinking water standards, and 3) there have been no unacceptable releases of landfill gas at either the Dean Road Landfill or the Former Lagoon Area landfill.

This FYR concluded that the remedy is functioning as designed and continues to be protective of human health and the environment in the short-term. However, continued monitoring and evaluation of groundwater, residential water, sediment and landfill gas data must be done to ensure that the remedy remains protective of human health and the environment and to determine whether additional investigation and/or response measures are warranted prior to site deletion.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Pownal Tannery Superfund Site		
EPA ID: VTD069910354		
Region: 1	State: VT	City/County: Bennington County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: State		
Author name (Federal or State Project Manager): Leslie McVickar		
Author affiliation: Remedial Project Manager		
Review period: 1/8/2014-9/30/2014		
Date of site inspection: 6/7/2014		
Type of review: Statutory		
Review number: 2		
Triggering action date: 9/30/2009		
Due date (five years after triggering action date): 9/30/2014		

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Monitoring			
	Issue: Sporadic groundwater exceedences of metals at the Site.			
	Recommendation: Continued groundwater monitoring and data evaluation.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	State	EPA	9/30/2019

Sitewide Protectiveness Statement

Protectiveness Determination:
Short-term Protective

Protectiveness Statement:

The remedy is protective in the short-term because there are currently no uncontrolled or unacceptable exposure risks to Site contaminants. However, in order for the remedy to be protective in the long-term the following actions need to be taken to ensure protectiveness: a determination will be made as to whether exceedences of groundwater standards for metals detected outside of the established groundwater IC compliance area at the Former Lagoon Area are Site-related, and if so, what investigation and/or remedial response measures may be required to attain cleanup goals; and, pursuant to the 2010 ESD an assessment of the Mill Building Area is needed to determine whether groundwater exceedences at this location are Site related or if they represent background conditions. Should it be determined that the contamination is Site related, an evaluation will be necessary to determine whether the contaminants will sufficiently attenuate to concentrations that will attain groundwater standards within a reasonable period of time or if a remedial response measure will be necessary prior to Site deletion

1.0 INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

EPA Region I prepared this FYR pursuant to the CERCLA and the National Contingency Plan (NCP), 40 C.F.R. Part 300. Section 121(c) of CERCLA, 42 USC § 9621(c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR § 300.430(f)(4)(ii) states:

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

This is the second FYR for the Pownal Tannery Superfund Site (Site). This review is required by statute because the selected remedy will, upon completion, leave hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure. The first FYR was completed on September 30, 2009 as a post-SARA statutory review in accordance with the 2002 ROD. There is one operable unit (OU-1) at the Site, which addresses all remedial measures taken at the Site. Therefore, this FYR addresses the status of the Site remedial actions in their entirety. The triggering action for this statutory review is the signature date of the last FYR Report, as noted above.

2.0 PROGRESS SINCE THE LAST REVIEW

The First Five-Year Review Report was signed on September 30, 2009. The 2009 review found that the remedy was currently protective because the final remedy at this Site addressed the principal threat remaining by stabilizing the contaminated sludge and by consolidating the stabilized sludge under an engineered cap. The engineered cap protects current and future use receptors from direct contact with the contaminants of concern and was designed to resist flood events. The previous NTCRA established an engineered cap over the Dean Road Landfill which protects current and future receptors from direct contact with contaminants of concern within the landfill. It was determined that the remedy was functioning as intended by the ROD. However, in order for the remedy to be protective in the long-term, the 2009 review found that

institutional controls (ICs) must be implemented at the property to restrict use of those parcels where engineered controls were put into place.

Tables 1 and 2 below present the protectiveness determinations and recommendations from the 2009 FYR.

Table 1: Protectiveness Determinations/Statements from the 2009 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Short-term Protective	<p>The final remedy at this Site addressed the principal threat remaining by stabilizing the contaminated sludge and by consolidating the stabilized sludge under an engineered cap. The engineered cap protects current and future use receptors from direct contact with the contaminants of concern and was designed to resist flood events. The previous NTCRA established an engineered cap over the Dean Road Landfill which protects current and future receptors from direct contact with contaminants of concern within the landfill. The remedy is functioning as intended by the ROD, as modified by the ESD document, except for the following matters: 1) Because the Lagoon 2 area displayed detectable VOC concentrations in soil when sampled as part of the Remedial Investigation and in groundwater monitoring wells in the vicinity of the Pownal Waste Water Treatment Plant (WWTP) (MW-L-11 & MW-201), future groundwater data will be screened against appropriate federal and state vapor intrusion guidance and criteria to ensure protection of human health. (2) There are presently no monitoring wells downgradient of the existing monitoring well network at the Dean Road Landfill. All of the existing monitoring wells downgradient of the edge of the landfill indicate contaminant exceedences. Therefore, it is not possible to determine whether groundwater is migrating beyond this area. This issue needs to be assessed and addressed in a future decision document; 3) Groundwater exceedences in the Former Mill Area/Woods Road Area, outside of the areas where wastes are being managed in place (Lagoon Area and Dean Road Landfill), need to be assessed and potentially addressed in a future decision.</p>

Table 2: Status of Recommendations from the 2009 FYR

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Over- sight Party	Original Milestone Date	Current Status	Completion Date (if applicable)
1	Potential for a vapor intrusion pathway at the WWTP	Conduct a screening of future groundwater data against appropriate federal and state vapor intrusion guidance and criteria.	EPA	VT DEC/ EPA	September 2010	No exceedances of vapor intrusion screening criteria have been identified to date. All ground-water data is evaluated against protective criteria.	N/A
1	Institutional controls are not complete.	Complete the implementation of comprehensive institutional controls.	EPA	EPA/ VT DEC	September 2011	Completed	December 2013
1	Groundwater in MWs at edge of the Dean Road landfill (on the edge of the landfill compliance boundary) exceed standards	Evaluate annual monitoring data and potential risks to determine need for additional monitoring wells and remedial action measures.	EPA	EPA/ VT DEC	September 2012	No groundwater exceedances outside of the compliance boundary have been identified to date. Annual data and potential risks continue to be monitored and evaluated for changing conditions.	N/A
1	Groundwater exceeds standards in Former Mill Area	Evaluate risk in this area and need for additional remedial action measures.	EPA	EPA/ T DEC	September 2013	Annual data and potential risks continue to be monitored and evaluated.	TBD

2.1 Status of Recommendations from the 2009 FYR

Recommendation 1

Since the last FYR all groundwater data at the Former Lagoon Area and Pownal WWTP have been routinely reviewed and evaluated against state and federal vapor intrusion screening criteria. During this review period there were only two VOC detections in one well (MW-201) for 1,2-dichlorobenzene (7.8 ppb/ EPA vapor intrusion screening level 2.7E+3 ppb) and 1,4-dichlorobenzene (2.3 ppb/ vapor intrusion screening level 2.6E+00 ppb). Both detections are below these screening criteria. They additionally are below acceptable drinking water criteria. MW-201 is located well south of the occupied building of concern (the WWTP) along the southern Hoosic River berm. Therefore it was determined that no vapor intrusion study is warranted at this location under current conditions.

Recommendation 2

All required ICs and land use restrictions were completed for the Former Lagoon Area, Mill Building area and at the Dean Road Landfill by December 2013. These controls were put into place for the combined primary purpose of preventing groundwater use and to protect the engineered components of the Site Remedial Action (RA). Annual compliance monitoring confirms that the ICs remain in place and are enforced. ICs are a requirement of the 2002 ROD, as modified by a 2007 and 2010 ESDs.

Recommendation 3

Groundwater monitoring data collected through the Operation and Maintenance (O&M) activities have historically identified sporadic exceedences of Federal drinking water standards and Vermont drinking water standards (VGES) at select wells close to the downgradient edge of the Dean Road Landfill. Additional wells beyond the compliance boundary may be required to fully assess groundwater contaminant movement. However the area between the compliance boundary and the River is a steep slope, so there are few if any areas to install additional monitoring wells. Monitoring of Dean Road Landfill groundwater will continue as a permanent component of the remedy and will continue to be evaluated to determine if any additional response measures are warranted.

Recommendation 4

Since the 2009 Five-Year Review EPA issued the 2010 ESD that addressed exceedences of metals in groundwater at the Mill Building Area. Under the 2010 ESD it was determined that an assessment is needed to determine whether or not the exceedences at this location are Site related or represent naturally occurring background conditions. Should the contaminants be identified as Site related, it will also be necessary to determine whether the contaminants will sufficiently attenuate to concentrations below groundwater cleanup standards over time or if a remedial response measure will be necessary prior to Site deletion.

2.2 Remedy Implementation Activities

Annual Site inspections and O&M sampling and analysis continued in accordance with the requirements of the March 2006 O&M Plan. In addition to the requirements of the O&M Plan, additional soil samples were collected in 2013 in a portion of the western lagoon area berm that had been compromised during a 2010 flooding event and subsequently re-established with local fill. This sampling was performed to document the nature of the fill. There were no detections of any contaminant of concern above acceptable federal or state soil cleanup criteria. The results of these analyses are located in the 2013 Annual O&M Report prepared by the VT DEC. Finally, as noted above, all required ICs and land use restrictions for the Site were recorded in December 2013. Compliance with the restrictions established by the ICs will be periodically monitored for any violations and be documented.

2.3 System Operation/Operation and Maintenance Activities

Long-term monitoring of groundwater, tap water at several adjacent residences, Hoosic River sediments and landfill gas has continued during the period covered by this review (Fall 2009 thru 2013). Requirements for operation and maintenance of the remedy are consistent with those of a typical closed landfill. Operation activities are not required, except at the Dean Road Landfill where leachate is collected and periodically disposed of off-site at a licensed facility. Maintenance of the two landfills includes regular mowing of the covers, removal of woody plants, repair of erosion, and repair of storm water controls and gas vents. Additional soil amendments and seeding may be necessary to sustain full grass coverage on both landfills. In addition, the State also maintains the section of river berm under which waste was left in place.

Operation and Maintenance activities are being performed by the VT DEC under the terms of a July 2003 State Superfund Contract with the EPA.

3.0 FIVE-YEAR REVIEW PROCESS

3.1 Administrative Components

The Pownal Second Five-Year Review was led by Leslie McVickar of the U.S EPA, Remedial Project Manager for the Site. Ashley Desmond assisted in the review as the VT DEC representative.

The review, which began on January 8, 2014, consisted of the following components:

- Community Notification and Involvement;
- Document Review;
- Data Review;
- Site Inspection; and
- Interviews.

3.2 Community Notification and Involvement

Activities to involve the community in the five-year review process were initiated with a discussion in January 2014 between the Remedial Project Manager and the Community Involvement Coordinator for the Site, Sarah White. Per Region 1 policy, a region-wide press release announcing all upcoming five-year reviews in New England was sent to all regional

newspapers including the Rutland Herald. The press release was sent on February 13, 2014 (see Appendix C). The results of the review and the report will be made available at the Site information repository located at:

US Environmental Protection Agency
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Soloman Wright Public Library
97 Main Street
Pownal, Vermont 05261

3.3 Document Review

This five-year review consisted of a review of relevant documents including O&M records, monitoring data and inspection reports. Applicable groundwater, residential well water and sediment data, as listed in the September 30, 2002 ROD and subsequent ESDs, were also reviewed.

3.4 Data Review

Data collection and monitoring have been done on an annual basis at the Site (with the exception of 2012) by VTDEC since the completion of the ROD in 2002. The Long-Term Monitoring Program (LTMP) consists of the collection of groundwater samples from the Dean Road Landfill Area, the Former Mill Building/Woods Road Area, and at the Former Lagoon Area. Sediment samples have been collected along the Hoosic River. Landfill gas and leachate samples are also collected at the two capped areas. In 2013, additional soil samples were collected in a portion of the protective river berm at the Former Lagoon Area, which the Town of Pownal had previously repaired following a flood event. Below is a brief summary of these activities which are further detailed in Appendix A.

3.4.1 Dean Road Landfill (and Leachate Tank)

Of the nine (9) groundwater monitoring wells sampled at the Dean Road Landfill (see Figure 2), only one has not been sampled due to an insufficient water column in the well. Samples were also collected from the on-Site leachate tank. All groundwater monitoring well samples were analyzed for target analyte list metals (antimony, barium, chromium, manganese, zinc, arsenic and lead) through the year 2014. Leachate tank samples also included analysis for volatile organic compounds (VOCs) and semi-VOCs (SVOCs). Table 1 in Appendix D presents a summary of maximum concentrations of detected compounds for the Dean Road Landfill monitoring wells.

Since 2009 there have been detections above either VGES or Federal groundwater protection standards for arsenic, barium, manganese, lead and zinc in select monitoring wells and in the leachate collection tank. All sampling locations at the Dean Road Landfill Area are located within the landfill property boundary, which is within the groundwater compliance and institutional control boundary for the landfill. Manganese and arsenic were detected most frequently and at concentrations exceeding drinking water standards. There were exceedences of standards at seven well locations (MW-101U, MW-102 U, MW-103R, MW-103U, MW-B-7,

MW-B-8, and MW-B-10). Table 1 shows abnormally high concentrations of all metals in unfiltered samples collected at MW-102U and MW-B-10. At MW-B-10, all but one reported detection are from a 2011 unfiltered sample (the result for barium is from a 2010 unfiltered sample). In a filtered sample collected in 2011 the same metals are reported as ND, with the exception of manganese which was detected at 15.5 ppb (unfiltered result was 182,000 ppb). At MW-102 all metal detections were also found to be ND in the 2009 filtered sample but at elevated concentrations in the unfiltered sample, with manganese being reported at 618 ppb, zinc at 6.1 ppb and chromium at 13.3 ppb. The VGES drinking water standard and federal drinking water health advisory for manganese is 300 ppb. This type of anomaly was also revealed in select samples collected at the other areas of the Site (discussed below separately).

The maximum concentration of arsenic detected at the Dean Road Landfill was 340 ppb in the 2011 unfiltered sample collected from MW-B-10 (ND in the 2011 filtered sample). Otherwise, the highest detection of arsenic in this area was 34 ppb at MW-103R (also ND in the 2011 unfiltered sample). The Federal drinking water standard for arsenic and the VGES are both 10 ppb.

Based on a review of all data collected between 2009 and 2013 (in consideration of the above noted anomalies), there is no apparent increase in groundwater concentrations over time. Leachate accumulation rate has been steadily decreasing with time indicating that the cap is providing an adequate barrier to infiltration. All leachate is being collected and transported to an off-Site licensed facility by VTDEC as part of their O&M obligations.

3.4.2 Former Mill Building/Woods Road Area

Groundwater samples were collected at the Former Mill Building and Woods Road Area from five monitoring well locations (see Figure 3). Three wells are located within the footprint of the Former Mill Building and the IC control area (MW-110R, MW-110U and MW-113R). Two wells are located in the Woods Road area (MW-106U, MW-112U) where there are no established IC's. All wells were sampled for target metals (antimony, barium, chromium, manganese, zinc, lead and arsenic). MW-110R, MW-110U and OF-1 at the Mill Building Area were additionally sampled for VOCs and SVOCs. Table 2 in Appendix D presents a summary of maximum concentrations of detected contaminants.

No VOCs or SVOCs were detected in samples collected at outfall OF-1. However, at MW-110R/MW-110U (located adjacent to OF-1), a number of VOCs were detected in a 2011 unfiltered sample, including: isopropylbenzene (25 ppb), n-Propylbenzene (20 ppb), n-Butylbenzene (6 ppb), tert-Butylbenzene (7.2 ppb), toluene (7 ppb) and sec-Butylbenzene (16 ppb). There were no detections of any of these compounds in the 2010 sample at this location and only n-Propylbenzene and n-Butylbenzene had detections of 20 ppb and 6 ppb in the unfiltered sample collected in 2013 (this was not sampled in 2012). No SVOCs were detected and there were no exceedences of VOC VGES or Federal drinking water standards for any of the compounds listed above.

Manganese was detected above VGES drinking water standard and Federal drinking water health advisory (300 ppb) at four locations: MW-113R (7,690 ppb unfiltered and 892 ppb filtered), MW-110R (1,700 ppb unfiltered and 1,760 ppb filtered), MW-112U (568 ppb unfiltered) and OF-1 (1,570 ppb unfiltered). Arsenic was also detected in unfiltered samples above both VGES and Federal drinking water standards (10 ppb) at MW-113R (33 ppb), MW-110R (13 ppb)

and OF-1 (15 ppb) located at the Mill Building Area. There were no exceedences of any drinking water standard at MW-106U located in the footprint of the Woods Road disposal area.

No other target metals were detected at concentrations above VGES or Federal drinking water standards in any samples collected from monitoring wells in the Mill Building or Woods Road Area. In general, metal concentrations were either declining or are consistent in magnitude over time, with one exception. The 2013 unfiltered sample collected at (Mill Building Area) MW-113R, showed elevated concentrations of barium, manganese, zinc and arsenic. Concentrations exceeded the previous year's detections for manganese by three (times higher). Both zinc and arsenic concentrations doubled, and barium was detected for the first time since 2011. Only manganese (7,690 ppb) and arsenic (33 ppb) exceeded the VGES drinking water standards and the Federal drinking water health advisory in the unfiltered sample. However the 2009 filtered results from MW-113R showed a manganese detection of 892 ppb and an arsenic detection of 6.1 ppb (arsenic being below the standards).

While there is no established IC at the Woods Road Area, the well located in the vicinity of the waste removal area (MW-106U) has no exceedence of any standards. The other monitoring well (MW-112U) located west of the Hoosic River on Woods Road is located well north and up gradient to the former Woods Road waste disposal area. Only manganese exceeded state and federal standards at MW-112U. At this well it has been determined that MW-112U represents background conditions that have not been impacted by Site contamination.

3.4.3 Former Lagoon Area

Sampling and analyses of groundwater at the Former Lagoon Area was collected from nine well locations for select metals (arsenic, chromium (total), manganese and zinc) and a subset of three of those wells were additionally sampled for VOCs and SVOCs (MW-201, MW-202, MW-203). See Figure 1. Another three monitoring wells were sampled in an upgradient location east of the railroad tracks and outside of the IC control area (MW-L-7, MW-L-8 and MW-L-9). These wells were also sampled for metals, VOCs and SVOCs (see Table 3 in Appendix D).

Data collected from wells that are located within the boundary of the Former Lagoon Area (where there are established ICs) show that only two VOCs were detected in unfiltered samples at MW-201; 1,2-dichlorobenzene (7.8 ppb) and 1,4-dichlorobenzene (2.3 ppb). Both detections are well below the MCL and VGES of 600 ppb and 75 ppb, respectively. MW-201 is located well south of the WWTP along the lower Hoosic River berm. No SVOCs were detected at any well location. Manganese was detected at concentrations above the VGES drinking water standard and federal drinking water health advisory (300 ppb) in unfiltered samples at four monitoring well locations; MW-201 (3,810 µg/L), MW-202 (3,960 µg/L), MW-107R (1,260 µg/L), and MW-L-10 (879 µg/L). Arsenic was detected at concentrations above standards (10 ppb) in unfiltered samples at four wells: MW-201 (15 ppb), MW-202 (21 ppb), and MW-107R (47 ppb). The only other detection of metals was zinc at five well locations (MW-202, MW-203, L-4, MW-107R, L-10), all below the secondary VGES of 5,000 ppb.

There are three wells located outside of the groundwater IC compliance area which are upgradient of the Site (MW-L-7, MW-L-8, and MW-L-9). At these three locations maximum detections of manganese were found at concentrations above the VGES drinking water standard and Federal drinking water health advisory in both unfiltered (781 µg/L) and filtered (821 µg/L) samples at MW-L-8. While there were manganese detections at all three wells, MW-

L-8 was the only location with this exceedence of standards. Maximum detections of arsenic were found in both unfiltered (9.7 µg/L) and filtered (8.5 µg/L) samples; also at MW-L-8. Arsenic was not detected in either MW-L-7 or MW-L 9. No VOC or SVOC were detected in these upgradient monitoring wells. During this review period, the number of metals detected in the upgradient area declined significantly from the previous FYR period. Based on the data collected in this upgradient area, it is likely that these detections are naturally occurring in the groundwater throughout the local area. Additional data and evaluation are needed to make the determination that these are not Site related contaminants.

Over the past four years of data collection, the concentrations of contaminants did not appreciably fluctuate at the western boundary adjacent to the Hoosic River. Sediment sampling in the river indicates that groundwater contamination in the Lagoon Area is not discharging to the river and causing an adverse effect.

3.4.4 Residential Well Sampling

During this period samples could only intermittently be collected from two homes located to the east of the Former Lagoon Area (see Figure 1). As shown on Table 4 in Appendix D, target VOCs, SVOCs or metals were not detected above State or Federal drinking water standards. Only zinc was detected at a maximum concentration of 176 ppb at one property (Snake Hill Road; east of the Site). The VGES for zinc is 5,000 ppb. Zinc is not an identified Site-related contaminant.

3.4.5 Sediment (Hoosic River)

A comprehensive ecological risk evaluation was developed for the Site during the previous September 2009 FYR. During this review period only a qualitative review was performed to identify whether an additional ecological risk assessment is warranted at this time. Below is a summary of maximum detections for all contaminant groups analyzed for.

Sediment samples were collected at five designated locations in the Hoosic River (SD-30, SD-31, SD-34, SD-36, and SD-37) along the Hoosic River (see Figure 1 and 3). During this review period, sediment analytical results were compared to the Vermont Sediment Quality Guidelines (SQGs), as Threshold Effects Concentrations (TEC) and Probable Effects Concentrations (PEC). Samples were analyzed for target PAHs, metals and PCBs. The sediment analytical results were compared to the TECs and PECs as reported in Table 5 in Appendix D.

Several PAHs and metals were detected above the sediment SQGs (TEC and PEC). The following are the maximum detections for each PAH detected above the SQG's during this review period; anthracene (270 ppb), benzo(a)pyrene (1,100 ppb), chrysene (1,000 ppb), dibenzo(a,h)anthracene (230 ppb), fluoranthene (1,600 ppb), and pyrene (2,300 ppb). All maximum detections were found at location SD-34 (SD-30 had a similar concentration of anthracene). The most recent data set showed that PCBs were not detected above any laboratory reporting limit in any sediment samples. All PAH and PCB detections are currently below the historical maximum detections used to calculate the ecological risks in the 2002 ROD. The ROD determined that elevated ecological risks were the result of non-Site related releases upstream in the Hoosic River.

While Table 5 in Appendix D identifies the maximum concentrations of six metals in unfiltered samples, due to a sample anomaly (discussed below), only filtered sampling results were considered in the overall evaluation of sediments. The following (filtered) maximum detection of metals above SGQs include: cadmium (1.24 ppm), chromium (112 ppm), lead (50 ppm), mercury (0.5 ppm), and zinc (119 ppm). With the exception of chromium, all results are below the maximum historical detections from upstream non-Site related sediment results. Chromium was detected just slightly above the maximum historical detection (106 ppm) at the concentration of 112 ppm, and is considered to be in the same range that was used in the 2003 ecological risk calculation. Elevated SD-34 sediment data dating back to 2005 have consistently been reported at detections far lower than the 2013 results. The remaining target metals were reported at concentrations below SQGs in all sediment samples.

While the evaluation of this data only included a qualitative comparison of data collected in the past five years to the results of the previous review period and historical data (located in Table 8 of the 2009 FYR), metal concentrations have largely decreased since the 2002 Ecological Risk Assessment, thereby resulting in an ecological risk reduction. This qualitative review of the recent data supports the protectiveness determination that was made in 2009, which is the remedy continues to be protective with respect to ecological exposure to sediment contaminants. However sediment sampling and analysis will continue as part of the LTMP to assess whether there are any changing conditions which would warrant a revised quantitative risk assessment. .

3.4.6 Landfill Gas

In order to ensure that harmful gases/conditions (carbon monoxide, carbon dioxide and hydrogen sulfide, Lower Explosive Levels) are not being released to the atmosphere or exist at unacceptable levels gas discharge rate measurements and contaminant levels are periodically measured at each point of discharge on the Dean Road Landfill and the Former Lagoon Area landfill. The Former Lagoon Area landfill has five surface gas vents, GV-1 through GV-5, and three gas probes (GP-1, GP-2 and GP-3) around the perimeter (see Figure 1). The Dean Road Landfill has three gas vents identified as North, Mid, and South (see Figure 2).

Gas discharge rate measurements were collected using a bubble meter connected to the gas vent. Atmospheric pressure was measured at an offsite location, the Bennington Morse State Airport. Gas characteristics were determined using a photoionization detector and multi-gas meter configured for methane and hydrogen sulfide.

At the Dean Road Landfill, the maximum percentage of carbon dioxide detected (9.0%) was elevated above the background percentage (0.3 %). The percentage of methane detected in gas vent Mid (39.2 %) was elevated above the background of 0.5 %. Carbon monoxide was detected at an elevated concentration in gas vent South (9.0 ppm) which is above the background level of 0.1 ppm. Combustible gases were detected at gas vents Mid (784% LEL/Lower Explosive Level) above the background percentage of 0.0. Despite the elevations, no measureable air flows in the vent were detected. This lack of air flow from these vents and the detections do not pose an unacceptable inhalation risk.

At the Lagoon Landfill, elevated percentages of methane (7.5 % at GV-2) and carbon dioxide (21.3 % in GV-1) were detected above the background percentage of 0.5% and 0.1% respectively. In the three gas probes there were elevated percentages of only carbon dioxide

(3.44 in GP-1) above the background percentage of 2.4%. Combustible gases were only detected above the lower explosive limit (LEL) at all gas vents by GV-3 at a maximum percentage of 250% at GV-4. As with the elevated detections at the Dean Road Landfill, there was no measureable flow in any of the gas vents or probes at the Former Lagoon Area landfill. Again, this lack of air flow and detections at all gas vent and gas probes do not pose an unacceptable inhalation risk. At both landfills the screening results suggest that waste decomposition is occurring.

While hydrogen sulfide was not sampled for during this review period, any unacceptable inhalation exposure from this gas would similarly be prevented by the lack of flow in the gas vents.

Overall, data supports the lack of unacceptable landfill gas emissions at the Site that warrant a response measure.

Landfill gas monitoring results are provided as Table 6.

3.4.7 Lagoon Berm Soils

On September 25, 2013 three grab samples of soil were collected from a berm constructed by the Town of Pownal along the east bank of the Hoosic River; at the southwest corner of the Former Lagoon Area. The three soil samples were designated Berm-1, Berm-2, and Berm-3. Soil samples were collected from the upper six inches of soil at the surface of the berm. The soil samples were analyzed for VOCs, and metals.

As shown on Table 7 of Appendix D, methylene chloride was the only VOC detected in soil sample Berm-1 at a concentration of 0.047 ppm. This is below the USEPA Regional Screening Level (RSL) for residential soils (57 ppm). This detection may be attributed to contamination from the laboratory, where methylene chloride is a common solvent. Additionally six target metals were detected at concentrations above laboratory reporting limits, including arsenic, barium, cadmium, chromium, lead, and mercury. Arsenic was the only target analyte detected at concentrations in excess of federal screening levels for residential soils (0.67 ppm). Reported arsenic concentrations in soil samples ranged from 6.95 ppm to 8.56 ppm. These RSLs were developed based on target cancer risk level of 1E-06 for residential scenario.

While arsenic was detected in the new Former Lagoon Area berm soils at concentrations above federal soil screening levels, this berm is not considered part of the Site. This portion of the berm has been determined to be unnecessary for the protection of the landfill. The soil used to make the berm repair by the town of Pownal was brought in from an off-Site clean source, and arsenic is additionally known to be naturally occurring in Vermont soils at elevated levels.

A summary of analytes detected in soil samples is provided in Table 7.

3.5 Site Inspection

On June 9, 2014, Leslie McVickar, EPA Project Manager, visited the Pownal Tannery Superfund Site to conduct the scheduled inspection of the Site. The purpose of the inspection was to assess the current condition and protectiveness remedy. The following facilities were inspected:

- Former Lagoon Area
- Dean Road Landfill
- Former Tannery Building Area
- Woods Road Disposal Area

Former Lagoon Area

In general, the landfill was found to be in very good condition. There is no excessive vegetation at either landfill and there appears to be no visible signs of structural damage or instability. Perimeter ditches and culverts were unobstructed. The five gas vents were in good working condition with no evidence of damage. The groundwater monitoring wells were all capped and locked. The fence along the perimeter access road and along the boundary with the wastewater treatment plant was in excellent condition. The landfill had been mowed.

One area of concern is the lagoon area access road. There is evidence of very limited erosion and exposed geotextile fabric. The access road should be maintained by adding gravel fill and regrading as necessary by the VTDEC.

There is evidence of recreational visitors throughout the Former Lagoon Area and along the river bank, which is permitted under the ICs for the area. There is no ATV or other motorized activity to damage the landfill and Site visitors are using the area for walks and for acceptable catch-and-release fishing.

Dean Road Landfill

Except for routine maintenance issues, the landfill appeared to be in good condition. The entrance was gated and locked. The electrical panel, pole and lines appeared undamaged. No signs of settlement, erosion or slope instability were noted. Except for limited vegetation growth, perimeter ditches were unobstructed and there was no evidence of sedimentation. The gabion wall was stable and aligned. The gas vents showed no evidence of damage. Groundwater monitoring wells were all capped and locked. The leachate collection pad looked undamaged.

Mill Building Area

This area was found to be in excellent condition. There were no signs of erosion or settlement. The grass is well kept and mowed. The retaining wall appears structurally sound and stable. All of the monitoring wells were intact, capped and locked.

Woods Road Sloped and Riprap Protected Streambank

This area was found to be in excellent condition. There were no signs of erosion. All of the monitoring wells were intact, capped and locked.

3.6 Interviews

In accordance with the EPA guidance for five-year reviews (EPA, 2001), several personnel involved with the operation and maintenance of the Site were interviewed, including the Project

Manager for the VTDEC, the operator of the on-site POTW, and a Pownal town official. These interviews generally revealed an overall satisfaction with the performance of the remedy and operation and maintenance activities. There were no notable concerns pertaining to the Site.

4.0 TECHNICAL ASSESSMENT

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

Yes. The remedy is functioning as intended. The review of documents, ARARs, and risk assumptions indicates that the remedy was constructed in accordance with the ROD and ESDs and is currently protective. Future groundwater data will be further evaluated at all Site locations; especially where there are exceedences of state and Federal groundwater cleanup standards outside of established IC compliance areas. A determination will be made as to whether contaminant exceedences are Site-related or represent background conditions and if remedial response measures are warranted to attain Site cleanup goals and to ensure protection of human health and the environment.

Remedial Action Performance

Overall, the remedy is functioning as designed and continues to be protective of human health and the environment. Both landfill caps are being properly maintained and continue to prevent direct contact with contaminated soil. Similarly the portion of the berm where waste has been left in place is in good condition and prevents direct contact. The landfill gas system at both landfills are also fully operational and are well maintained with no unacceptable inhalation exposures. Landfill leachate is regularly transported off-Site for treatment at a licensed facility.

System Operations O&M

Long-term monitoring of groundwater and river sediments has continued during the period covered by this review (Fall 2009 thru 2013). Requirements for operation and maintenance of the remedy are consistent with those of a typical closed landfill. Operational activities are not required, except at the Dean Road Landfill where leachate is collected and periodically disposed of off-site at a licensed facility. Maintenance of the two landfills includes regular mowing of the covers, removal of woody plants, repair of erosion, and repair of storm water controls and gas vents. Additional soil amendments and seeding may be necessary to sustain full grass coverage. In addition, the State also maintains the section of river berm under which waste was left in place.

Regularly scheduled inspections have been performed to confirm that the Remedial Action (RA) elements remain protective of human health and the environment. Environmental monitoring of the RA includes sampling and chemical analyses of Site groundwater at all areas of the Site, landfill gas at both caps, and sediment samples from the Hoosic River. Select adjacent residential properties are being sampled annually for tap water quality, subject to the owners providing access. Operation and Maintenance activities are being performed by the VTDEC under the terms of a July 2003 State Superfund Contract with the EPA.

Opportunities for Optimization

EPA and VTDEC continue to evaluate and adjust the LTMP to assess opportunities to improve Site O&M. It is recommended that the current O&M Plan be re-evaluated to update monitoring frequency, sampling protocol, and other more current and pertinent information that may be applicable at the Site and LTMP.

Early Indicators of Potential Issues

The only indicators of potential concern pertain to the sporadic detections above groundwater protective standards in upgradient monitoring wells outside of the IC protected Former Lagoon Area and potentially at the Mill Building Area. Groundwater sampling data at all locations of the Site, as well as tap water at off-Site residential properties, will continue to be used to evaluate Site protectiveness and to evaluate what additional investigations and/or response measures may be warranted.

Implementation of Institutional Controls and Other Measures

In December 2013 all ICs to prohibit groundwater use and disturbance of the engineered remedy components were recorded. Environmental Land Use Restrictions were established at the Former Lagoon Area which is currently owned by the Town of North Pownal. Restrictive covenants were also obtained for the Dean Road Landfill and Former Mill Building Area. No violations of the IC restrictions have been identified during this Five-Year Review.

4.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of remedy selection still valid?

No. The toxicity factors have changed since the time of the ROD. However, these changes do not appear to affect the protectiveness of the remedy. The exposure assumptions, cleanup levels and remedial action objectives used at the time of the ROD, as modified by the ESDs are still valid.

Changes in Standards and TBCs

Review of Applicable or Relevant and Appropriate Requirements was performed to check the impact on the remedy due to changes in standards that were identified as ARARs in the ROD, newly promulgated standards for contaminants of concern, and TBCs (to be considered) that may affect the protectiveness of the remedy. The detailed revision of ROD ARARs that was made in the 2010 ESD (Attachment C) continue to apply. There have not been any newly promulgated standards applicable to the Pownal Site that calls into question the protectiveness of the remedy.

Changes in Exposure Pathways

Federal and state drinking water standards have been identified as monitoring standards for groundwater to assess the protectiveness of the landfill caps and ICs, and risk based cleanup levels for soil were established at the Site to be protective of future recreational Site use outside of the capped landfills. Limited exceedances of groundwater standards that were identified just outside of the groundwater compliance boundary for the Former Lagoon Area will continue to be evaluated to assess the potential need for additional investigation and/or response measures.

There have been no changes in exposure pathways at the Site.

Changes in Toxicity

In this FYR Report, the toxicity values that served as the basis for the soil cleanup levels, as contained in the ROD, have been re-evaluated to determine whether any changes in toxicity impact the protectiveness of the remedy. In addition, environmental data, available since the last five year review, have been qualitatively evaluated to determine whether exposure levels existing at the Site present a risk to current human receptors.

Pentachlorophenol:

On September 30, 2010, EPA finalized the toxicity assessment for pentachlorophenol (PCP), indicating a decrease in reference dose (RfD) and an increase in cancer slope factor (CSF) from toxicity values available in 2009. This would result in an estimated increase in both non-cancer hazard and cancer risks from exposure to PCP in Lagoon Area Soils.

Dioxin:

On February 17, 2012, EPA finalized the non-cancer toxicity assessment for 2,3,7,8-TCDD, indicating that non-cancer health effects from exposure to dioxin can now be quantified. EPA's dioxin reassessment has been developed and undergone review for many years, with the participation of scientific experts in EPA and other federal agencies, as well as scientific experts in the private sector and academia. The Agency followed current guidelines and incorporated the latest data and physiological/biochemical research into the reassessment. With the release of the final human health non-cancer dioxin reassessment, EPA also published an oral non-cancer toxicity value, or reference dose (RfD), of 7×10^{-10} mg/kg-day for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in EPA's Integrated Risk Information System (IRIS). The dioxin cancer reassessment will follow thereafter. The dioxin RfD was approved for immediate use at Superfund sites to ensure protection of human health.

Carbon Tetrachloride:

On March 31, 2010, EPA finalized the toxicity assessment for carbon tetrachloride, indicating an increase in reference dose (RfD) and a decrease in cancer slope factor (CSF) from toxicity values available in 2009. This would result in an estimated decrease in both non-cancer hazard and cancer risks from exposure to carbon tetrachloride.

TCE:

On September 28, 2011, EPA finalized the toxicity assessment for trichloroethylene (TCE), indicating a decrease in reference dose (RfD) and an increase in cancer slope factor (CSF) from toxicity values available in 2009. This would result in an estimated increase in both non-cancer hazard and cancer risks from exposure to TCE.

PCE:

On February 10, 2012, EPA finalized the toxicity assessment for tetrachloroethylene (PCE), indicating a decrease in reference dose (RfD) and a decrease in cancer slope factor (CSF) from toxicity values available in 2009. This would result in an estimated increase in non-cancer hazard and an estimated decrease in cancer risks from exposure to PCE.

Methylene Chloride:

On November 18, 2011, EPA finalized the toxicity assessment for methylene chloride, indicating a decrease in reference dose (RfD) and a decrease in cancer slope factor (CSF) from toxicity values available in 2009. This would result in an estimated increase in non-cancer hazard and an estimated decrease in cancer risks from exposure to methylene chloride.

A review of EPA's Integrated Risk Information System indicate that other than the changes for the contaminants mentioned above, there is no other change in toxicity values since 2009 for the rest of the other COCs identified in the 2002 ROD and the 2009 FYR.

Changes in Risk Assessment Methods

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. Refer to <http://www.epa.gov/oswer/riskassessment/superfund/hh/exposure.htm> (items # 22 and #23 of this web link). Many of these exposure factors differ from those used in the risk assessment for the 2002 ROD. These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

Based on a compilation and review of data on relative bioavailability of arsenic in soil in 2012, arsenic was found to be less bioavailable via soil ingestion relative to other analytes. A default value of relative bioavailability (RBA) of 60% is now applied during soil/sediment ingestion calculations of risk/cleanup levels. This default RBA value reduces arsenic contribution to risk and/or increases arsenic cleanup levels. The remedy remains protective with respect to arsenic exposures. (Reference: USEPA. 2012. Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil and Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil Documents. OSWER Directive 9200.1-113. December 31, 2012.)

Although calculated risks from potential exposure pathways at the Site may differ from those previously estimated in the ROD due to changes in chemical toxicity and risk assessment methods, higher for some contaminants and lower for a few others, the revised methodologies themselves are not expected to affect the protectiveness of the remedy (EPA, 2005, 2009, 2011, 2013, 2014a, 2014b). Based on a review of all data collected in the past five years, the current exposure assumptions, the recent changes in toxicity and the 2013 establishment ICs the remedy remains protective of human health and the environment.

Expected Progress Towards Meeting RAOs

Overall, the remedy is functioning as designed and continues to be protective of human health and the environment. However, in order to make a long-term protectiveness determination, exceedances of groundwater protection criteria outside of established IC control areas needs to be further evaluated and additional investigations and/or response measures may be required.

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

No. There is no additional information that calls into question the protectiveness of the remedy.

TECHNICAL ASSESSMENT SUMMARY

Based on the data reviewed and evaluated, the Site inspection and interviews, the remedy is functioning as intended by the ROD, as modified by the 2007 and 2010 ESDs. There are currently no exposures to any Site-related contaminant at the Site. However groundwater contaminant exceedences of VGES and Federal drinking water standards, upgradient of the IC compliance area established for the Former Lagoon Area, will continue to be further monitored and evaluated for migration and changing groundwater conditions. Pursuant to the 2010 ESD, an assessment of the Mill Building Area is needed to determine whether groundwater exceedences at this location are Site related or if they represent background conditions. Should it be determined that the contamination is Site related, an evaluation will be necessary to determine whether the contaminants will sufficiently attenuate to concentrations that will attain groundwater standards within a reasonable period of time or if a remedial response measure will be necessary.

5.0 ISSUE/RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 3: Issues and Recommendations/Follow-up Actions

OU	Issue	Recommendations/ Follow-up Actions	Party Responsible	Over- sight Party	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
1	Sporadic groundwater exceedences of metals at the Site.	Continued groundwater monitoring and data evaluation.	VTDEC	EPA	9/30/2019	No	Yes

In addition, it is recommended that the LTMP be revised to update and adjust the monitoring programs to better correspond with current Site conditions and sampling procedures. This update may include changes to the frequency of monitoring, sampling and analysis methods and protocols, as well as the schedule.

It is anticipated that this revision will be completed in 2015.

6.0 PROTECTIVENESS STATEMENT

The remedy is protective in the short-term because there are currently no uncontrolled or unacceptable exposure risks to Site contaminants. However, in order for the remedy to be protective in the long-term the following actions need to be taken to ensure protectiveness: a determination will be made as to whether exceedences of groundwater standards for metals detected outside of the established groundwater IC compliance area at the Former Lagoon Area are Site-related, and if so, what investigation and/or remedial response measures may be required to attain cleanup goals; and, pursuant to the 2010 ESD an assessment of the Mill

Building Area is needed to determine whether groundwater exceedances at this location are Site related or if they represent background conditions. Should it be determined that the contamination is Site related, an evaluation will be necessary to determine whether the contaminants will sufficiently attenuate to concentrations that will attain groundwater standards within a reasonable period of time or if a remedial response measure will be necessary prior to Site deletion.

7.0 NEXT REVIEW

The next FYR for the Pownal Tannery Site will be conducted in 2019.

APPENDIX A – EXISTING INFORMATION

A. SITE CHRONOLOGY

Date	Event
December 30, 1981	Pownal Tannery applies for a permit to construct and operate a lined landfill.
January 21, 1982	The Vermont Agency of Natural Resources (VT ANR) determined that the sludge in the lagoons should not be regulated as hazardous waste.
June 09, 1982	A disposal facility certification was issued to permit construction and operation of a lined landfill.
1985	The VT ANR issued a letter to the Pownal Tannery alleging deficiencies and maintenance problems at the site.
1987	Two thirds of the Dean Road Landfill was closed and covered by the Pownal Tanning Company.
April 06, 1988	The Vermont Agency of Environmental Conservation issued an Administrative Order to Pownal Tannery requiring odor control, excavation of sludge from Lagoon 2, preparation of a cleanup plan for Lagoons 4 and 5, further testing of groundwater, and a complete risk assessment.
1993	A time-critical removal action was conducted by EPA to remove and disposed of off-site compressed gas cylinders, asbestos-containing materials, and various containers of hazardous materials.
1995	The hazard Ranking System Package was completed as part of the CERCLA site listing process.
September 29, 1998	The site was proposed for the National Priorities List (NPL).
January 11, 1999	The site was added to the NPL.
August 1999	The Town of Pownal was awarded a Superfund Redevelopment Initiative Grant from EPA to study reuse options for the site after remediation is complete.
1999-2001	EPA conducted a non-time critical removal action (NTCRA) to decontaminate and demolish the tannery buildings, remove contaminated soils along the Hoosic River, and permanently cap the Dean Road landfill.
February 2001	The Town completed the reuse study. The plan included construction of a sewage treatment plant, a skating rink, recreational open areas and nature trails through the Lagoon Area.
September 30, 2002	EPA Record of Decision completed, indicating plans for excavation and capping of Lagoons 1, 3 and 5.
May 2003	Remedial design completed.
September 2003	Phase I construction activities begin
November 30, 2003	Phase I site construction activities completed.
September 30, 2004	Phase II site lagoon area remediation completed.
September 27, 2005	Final Inspection
October 2005	A significant flood event occurred, which altered a portion of the former facility's natural earthen berm. There was no damage to the landfill as a result of the flood.

Date	Event
September 28, 2007	EPA issued an Explanation of Significant Differences which specifies 1) what actions are required to ensure that Institutional Controls are implemented at the site, 2) addresses issues related to the 2005 flood event, 3) identifies a section of the berm along the river under which wastes were left in place as included as part of the Site and subject to long-term O&M by the State.
September 2009	EPA completes first Five Year Review
2010	Second Explanation of Significant Differences which specifies an expansion of institutional controls to include additional parcels that were determined to be integral components of the remedy
December 3, 2013	Recorded Environmental Land Use Restrictions and property notices
May 7, 2014	EPA Five-Year Review Site Inspection

B. BACKGROUND

Physical Characteristics

Figure 1 shows the location of the Site. The Pownal Tannery Superfund Site consists of a 28 acre set of parcels located between Route 346 and the Hoosic River in Pownal Vermont, which is in the south-western corner of the State. The Site was a former hide tanning and finishing facility located approximately 20 miles southwest of the City of Bennington. The area surrounding the Site is a rural and residential community with approximately 3,500 residents. The nearest residences are approximately 200 feet from the Former Lagoon Area. These residences rely upon groundwater from private wells for their water supply.

Figure 2 presents a map showing the site boundary and the areas of concern. The Site consists of four properties, three of which are owned by the town of Pownal and the fourth (the Dean Road landfill), is owned by the former Pownal Tanning Company. The largest of the three Town properties is the northern property which occupies approximately 30 acres. This larger parcel encompasses the Former Tannery Building Area and the Lagoon Area. This property extends south of the hydroelectric dam several hundred feet, is bordered to the east by the Boston and Maine railroad tracks, and is bounded to the west by the Hoosic River. The property extends north a short distance beyond the lagoons and is bordered to the north and east by farmland.

The Lagoon Area consists of the consolidated stabilized sludge lagoons, backfilled former lagoons, wetland areas, a berm along the Hoosic River, a small gravel parking area, and a wastewater treatment plant. A gravel road leads into the area.

The Former Tannery Building Area is currently a park, covered with grass, pavement and crushed stone. The area slopes down to the river and contains guard railings and remnants of the former tannery building foundation. A small building exists adjacent to the river to shelter the former hydroelectric works that are no longer operational.

Two smaller properties are located to the east and west of the larger property separated, respectively, by the Hoosic River and the railroad tracks. The small western property containing the Woods Road Disposal Area is located on the west bank of the Hoosic River. A pump house and two original Tannery water supply wells are located here, but neither is functional. This

property slopes gradually to the river and is overgrown with a layer of riprap placed along the river edge.

The other small property containing the Warehouse Area is located east of the railroad tracks and is bounded to the west by State Route 346. Reportedly, hides were stored in this warehouse and on tables outside of the warehouse. A portion of this property is paved and is used for parking and for truck loading and unloading at the warehouse.

The fourth, privately owned parcel, which is the southernmost property, contains the Dean Road Landfill that was used by the tannery to receive sludge from the clarifier and lagoons. This southern property is rectangular and includes some wetlands and a portion of a pond located downhill (east) of the landfill. The pond and wetland extend further east to the Hoosic River. Residential properties border the landfill property to the north and south, and Dean Road forms the western property boundary. A gravel pit is located across Dean Road to the west.

Technical Description

A detailed technical summary of all Site and contaminant conditions is provided in the main text of this FYR.

Land and Resource Use

The former tannery building area was demolished by EPA under a non-time critical removal action that was completed in 2001 and the area is now used by the public for recreation. In the warm weather months, the adjacent Hoosic River is used for recreation as well. EPA and the VT DEC have worked with the town of Pownal to identify future site reuse that would be protective under the site restrictions required by the CERCLA cleanup (as described in the ROD and ESDs). This coordination has helped to facilitate potential reuse planning and will help ensure that the cleanup is fully protective of current and reasonably-anticipated future land uses. To



To assist the Town in evaluating reuse options for the Site, the EPA provided the Town with a \$97,250 grant in September 1999 to conduct a community-based reuse planning process. The Town summarized the results of that process in a February 2001 report entitled, "Pownal Tannery Superfund Reuse Assessment Report" (Reuse Plan). Since that time, significant progress has been made towards the goal of returning the Site to productive use. As an important step in achieving those goals, the Town acquired the former tannery building complex and Former Lagoon Area in 2002. For the Former Lagoon Area, the reuse plan recommended both active recreational uses (e.g., playing fields, seasonal skating rink) and passive recreational uses (e.g., trails, canoe/kayak launch, picnic/lawn area). In addition, lagoon #2 was identified as the preferred location for the town's new wastewater treatment plant (WWTP), which was completed in 2007.

During the Design Phase of the remedy EPA used this location for a staging area to process soils/sludge from the former lagoons. EPA and the Town's engineers collaborated to make the area suitable for the WWTP once the staging area was no longer needed, and to ensure that construction activities could be done as efficiently and cost-effectively as possible. Funds towards the construction of the WWTP were provided by EPA (\$7.4 million), United States Department of Agriculture (\$5.1 million), and VTDEC (\$5.3 million).

EPA constructed a low-permeability cap on the former Dean Road landfill in 2001 as part of the NTCRA. The property is currently under private ownership and the Town of Pownal has no plans to acquire it. The reuse plan did not address the reuse of the Dean Road landfill. Operation and maintenance and long-term monitoring of the landfill are currently being undertaken by the VTDEC through an access agreement with the landowner.

History of Contamination

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 consisted 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, the state permitted, Dean Road lined landfill was constructed which received sludge dredged from a portion of the lagoons.

Initial Response

In 1985, the Vermont Agency of Natural Resources notified the company that they were in violation of state environmental requirements, which resulted in the partial closure of the Dean Road Landfill. The VTDEC issued an Administrative Order in April 1988 requiring additional actions, but by the end of the year, the company declared Chapter 11 bankruptcy and ceased operations.

EPA took a number of cleanup actions in 1993-1994 and again in 1999-2001 to address site contamination involving the building complex and landfill. These actions included the removal of over 13,000 pounds of contaminated materials from the tannery buildings, decontamination of the warehouse, demolition of remaining buildings, removal of underground storage tanks and contents, and capping of the Dean Road Landfill.

The Site was placed on the Superfund National Priority List (NPL) in January 1999. EPA subsequently conducted a Remedial Investigation/Feasibility Study (RI/FS) to determine if additional cleanup was necessary for the lagoon area, surface water/sediment of the Hoosic

River and groundwater. In September 2002, EPA selected a final remedy for the Site that entailed the excavation and consolidation of lagoon wastes; construction of a low-permeability cap over the consolidated wastes; long-term monitoring of river sediments and groundwater to assess the protectiveness of the capped lagoons; and institutional controls.

On September 28, 2007, EPA signed an Explanation of Significant Differences (ESD) to document a modification to the 2002 ROD. Specifically, 1) the extent of the Institutional Controls required for the Site were further characterized and defined, 2) the monitoring requirements for the Operation and Maintenance component of the remedy were detailed, and 3) a determination was made that a limited portion of a protective earthen berm adjacent to the Hoosic River and the new capped lagoon landfill was an integral component of the remedy. The State of Vermont concurred with this determination.

Basis for Taking Action

Table 2 shows the Soil Cleanup levels. Action was taken since the baseline human health assessment revealed that 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 in excess of EPA guidelines (e.g., carcinogenic risk = 1×10^{-3} , HI = 4).

TABLE 2. Soil Recreational Use Cleanup Levels	
Contaminant	Preliminary Remediation Goal (mg/kg)
Benzo(a)anthracene	1.7
Benzo(a)pyrene	0.17
Pentachlorophenol	7.7
N-Nitroso-di-n-propylamine	0.27
Arsenic	1.1
Chromium	733
Mercury	23
Lead	1,000
Dioxin TEQ	0.001

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 were found to be linked to non-site related discharges or background levels and were, 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 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 was 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. Unacceptable exposures to these species of wildlife were caused by dioxins, cadmium, chromium, lead, and mercury in the surface water, sediments, and soil/sludge. To remediate these unacceptable risks, the remedy addressed the contaminated soil, sludge, sediments and surface water in the lagoons through excavation, stabilization, consolidation and capping.

Long-term operation and maintenance activities include groundwater and river sediment sampling to assess the protectiveness of the Lagoon Landfill cap, as well as continued operation and maintenance and long-term monitoring of the Dean Road landfill cap, and a section of river berm under which waste was left in place. These measures will ensure that the remedy remains protective of human health and the environment into the future.

C. REMEDIAL ACTIONS

Remedial Action Objectives

Based on the above described information, the RAOs for the selected remedy for the 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 groundwater beneath the lagoons to the Hoosic River
- Provide long-term monitoring of groundwater and river sediments.

Remedy Selection

The selected remedy for the Site was published in the 2002 ROD, which included the following components:

- Excavation of wastes from Lagoons 1 and 5
- Consolidation of wastes from Lagoons 1 and 5 over Lagoon 3A/B
- 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 groundwater monitoring to assess the protectiveness of the capped lagoon
- Long-term river sediment monitoring to assess the protectiveness of the capped lagoon
- Remedial Action Operation and Maintenance
- Institutional Control Inspections
- Five-Year Reviews.

In addition, the remedy stipulates that the State of Vermont is responsible for operation and maintenance and long-term monitoring of the Former Lagoon Area and the Dean Road Landfill. Under the 2007 ESD the institutional controls were required for the Dean Road Landfill and the State is also responsible for maintaining the section of berm along the river where waste was left in place.

Remedy Implementation

The Site remedy was conducted in two phases and was performed by two separate RA contractors. Phase I included only site preparation activities. Phase II included the activities necessary to complete the remedy. A construction sequence overview and a summary of construction activities and quantities are provided in the Remedial Action Report dated February 2005 (M&E, 2005). The official date of Construction Completion is September 30, 2004.

Phase I of the RA included site preparation activities which were conducted in the fall of 2003, from September through early November. The site preparation activities included the following:

- Site access road and entrance improvements;
- Installation of hay bale and silt fence erosion controls around the work areas at the Site;
- Clearing, grubbing, and chipping of trees and brush located around and within the former lagoons to be excavated;
- Abandonment of several existing monitoring wells in and around the lagoons;
- Backfill placement within Lagoon 2;
- Preparation of the proposed waste processing area and lagoon landfill footprint;
- Consolidation of debris within the proposed lagoon landfill footprint; and
- Fence dismantling and replacement; and
- Disposal of Lagoon Area asbestos pipe debris off-site.

Phase II of the RA commenced with sludge remediation. Stabilization was necessary to prepare the lagoon sludge for consolidation and compaction in the lagoon landfill. The goal of the sludge stabilization was to increase the shear strength (meet unconfined compressive strength of 10 psi within 3 days) such that standard construction equipment could place and compact the sludge within a relatively short period of time to create the on-site, lagoon waste area landfill. Portland cement was mixed with the sludge in-place (*in-situ*). This method was first demonstrated in a bench-scale test, and then further demonstrated during a full scale run prior to full operations.

Stabilization was generally conducted in a similar manner as in the shakedown demonstrations. Cement was added and mixed in-situ using a customized vented, metal hood (to minimize dust), an excavator, and an excavator equipped with an in-situ power mixer ("Allu" Power

Mixer). Water was applied during mixing while continuous air monitoring was conducted. Cement was delivered via tanker truck and pumped through the hood to the surface of the sludge.

The stabilized sludge was excavated and placed in the landfill between May 10, 2004 and July 12, 2004. Excavation was performed in parallel with stabilization, when possible, to accelerate the schedule. The excavated material was placed in all-terrain dump trucks, weighed using onsite scales, and dumped in the landfill. A total of 81,139 tons of stabilized sludge was excavated and transported to the on-site lagoon waste area landfill for consolidation and capping.

The cover system was constructed to permanently cap the stabilized sludge, to control runoff to withstand a river flood event (riprap armoring), and to control migration of potential landfill gas. For the portion of the landfill that faces north and east, the side slopes were constructed with the vegetative support layer and topsoil. For the portion that faces south and west (towards the river), crushed stone and riprap were placed to provide flood protection.

Grass-lined and stone-lined drainages swales and slope-toe drains were constructed as part of the cover system. These components were constructed to control and direct storm water flow away from the landfill.

Along with the demobilization of equipment and materials, key activities included:

- Topsoil and seed placed within the footprint of the former Lagoons 1 and 5, and along the berm separating these lagoons and the river;
- Riparian buffer zone planting along the river berm;
- Establishment of site access road to and around the landfill;
- Placement of gates and fencing; and
- Modification to the downstream river berm for flood control.

On September 28, 2007, EPA signed an Explanation of Significant Differences to document a modification to the 2002 Record of Decision. Specifically, 1) the extent of the Institutional Controls required for the Site were further characterized and defined, 2) the monitoring requirements for the Operation and Maintenance component of the remedy were detailed, and 3) a determination that a limited portion of a protective earthen berm adjacent to the Hoosic River and the new landfill was an integral component of the remedy. The State of Vermont concurred with this determination.

Since the 2009 Five-Year Review EPA issued the 2010 ESD that addressed exceedances of metals in groundwater at the Mill Building Area. Under the 2010 ESD it was determined that an assessment is needed to determine whether or not the exceedances at this location are Site related or represent naturally occurring background conditions. Should the contaminants be identified as Site related, it will also be necessary to determine whether the contaminants will sufficiently attenuate to concentrations below groundwater cleanup standards over time or if a remedial response measure will be necessary prior to Site deletion.

APPENDIX B

Five-Year Review Press Release

**News Release
U.S. Environmental Protection Agency
New England Regional Office
February 13, 2014**

Contact: Emily Zimmerman, 617-918-1037

EPA Will Review 27 Superfund Site Clean Ups This Year

Boston, Mass. – (February 13, 2014) – EPA will review site clean ups and remedies at 27 Superfund Sites across New England this year by doing routine Five-Year Reviews at each site.

EPA conducts evaluations every five years on previously-completed clean up and remediation work performed at Superfund sites and Federal Facilities listed on the “National Priorities List” (aka Superfund sites) to determine whether the implemented remedies at the sites continue to be protective of human health and the environment. Further, five year review evaluations identify any deficiencies to the previous work and, if called for, recommend action(s) necessary to address them.

In addition to a careful evaluation of technical work at the sites, during the Five Year Review process EPA also provides the public with an opportunity to evaluate preliminary findings and to provide input on potential follow up activity that may be required following the review process.

The Superfund Sites at which EPA is performing Five Year Reviews over the following several months include the following sites. Please note, the Web link provided after each site provides detailed information on site status and past assessment and cleanup activity.

Connecticut

Linemaster, Woodstock, CT

<http://www.epa.gov/region1/superfund/sites/linemaster>

Nutmeg Valley, Wolcott, CT

<http://www.epa.gov/region1/superfund/sites/nutmeg>

Maine

Saco Tannery Waste Pits, Saco

<http://www.epa.gov/region1/superfund/sites/sacotannery>

Massachusetts

Nyanza Chemical Waste Dump, Ashland

<http://www.epa.gov/region1/superfund/sites/nyanza>

Baird & McGuire, Holbrook

<http://www.epa.gov/region1/superfund/sites/baird>

Hatheway & Patterson, Mansfield

<http://www.epa.gov/region1/superfund/sites/hatheway>

Hocomonco Pond, Westborough

<http://www.epa.gov/region1/superfund/sites/hocomonco>

Rose Disposal, Lanesborough

<http://www.epa.gov/region1/superfund/sites/ftrose>

Silresim, Lowell

<http://www.epa.gov/region1/superfund/sites/silresim>

W.R. Grace, Acton

<http://www.epa.gov/region1/superfund/sites/graceacton>

Wells G&H, Woburn

<http://www.epa.gov/region1/superfund/sites/wellsgh>

Norwood PCBs, Norwood

<http://www.epa.gov/region1/superfund/sites/norwood>

South Weymouth Naval, Weymouth, MA

<http://www.epa.gov/region1/superfund/sites/sweymouth>

New Hampshire

Ottati & Goss, Kingston

<http://www.epa.gov/region1/superfund/sites/og>

Tinkham Garage, Londonderry

<http://www.epa.gov/region1/superfund/sites/tinkham>

Sylvester, Hillsborough County

<http://www.epa.gov/region1/superfund/sites/sylvester>

Town Garage/Radio Beacon, Rockingham

<http://www.epa.gov/region1/superfund/sites/towngarage>

New Hampshire Plating, Hillsborough County
<http://www.epa.gov/region1/superfund/sites/nhplating>

Pease Air Force Base, Portsmouth, Newington and Greenland, NH
<http://www.epa.gov/region1/superfund/sites/pease>

Rhode Island

Landfill Resource & Recovery, North Smithfield
<http://www.epa.gov/region1/superfund/sites/lrr>

Vermont

Elizabeth Mine, Strafford
<http://www.epa.gov/region1/superfund/sites/elizmine>

Parker Sanitary Landfill, Lyndonville
<http://www.epa.gov/region1/superfund/sites/parker>

Pownal, North Pownal
<http://www.epa.gov/region1/superfund/sites/pownal>

Bennington Municipal Landfill, Bennington
<http://www.epa.gov/region1/superfund/sites/bennington>

BFI Sanitary Landfill, Rockingham
<http://www.epa.gov/region1/superfund/sites/bfi>

Tansitor Electronics, Inc, Bennington County
<http://www.epa.gov/region1/superfund/sites/tansitor>

Pine Street Canal, Burlington
<http://www.epa.gov/region1/superfund/sites/pinestreet>

Learn More about the [Latest EPA News & Events in New England](http://www.epa.gov/region1/newsevents/index.html)
(<http://www.epa.gov/region1/newsevents/index.html>)

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More info on [EPA's Environmental Results in New England](http://www.epa.gov/region1/results/index.html)
(<http://www.epa.gov/region1/results/index.html>)

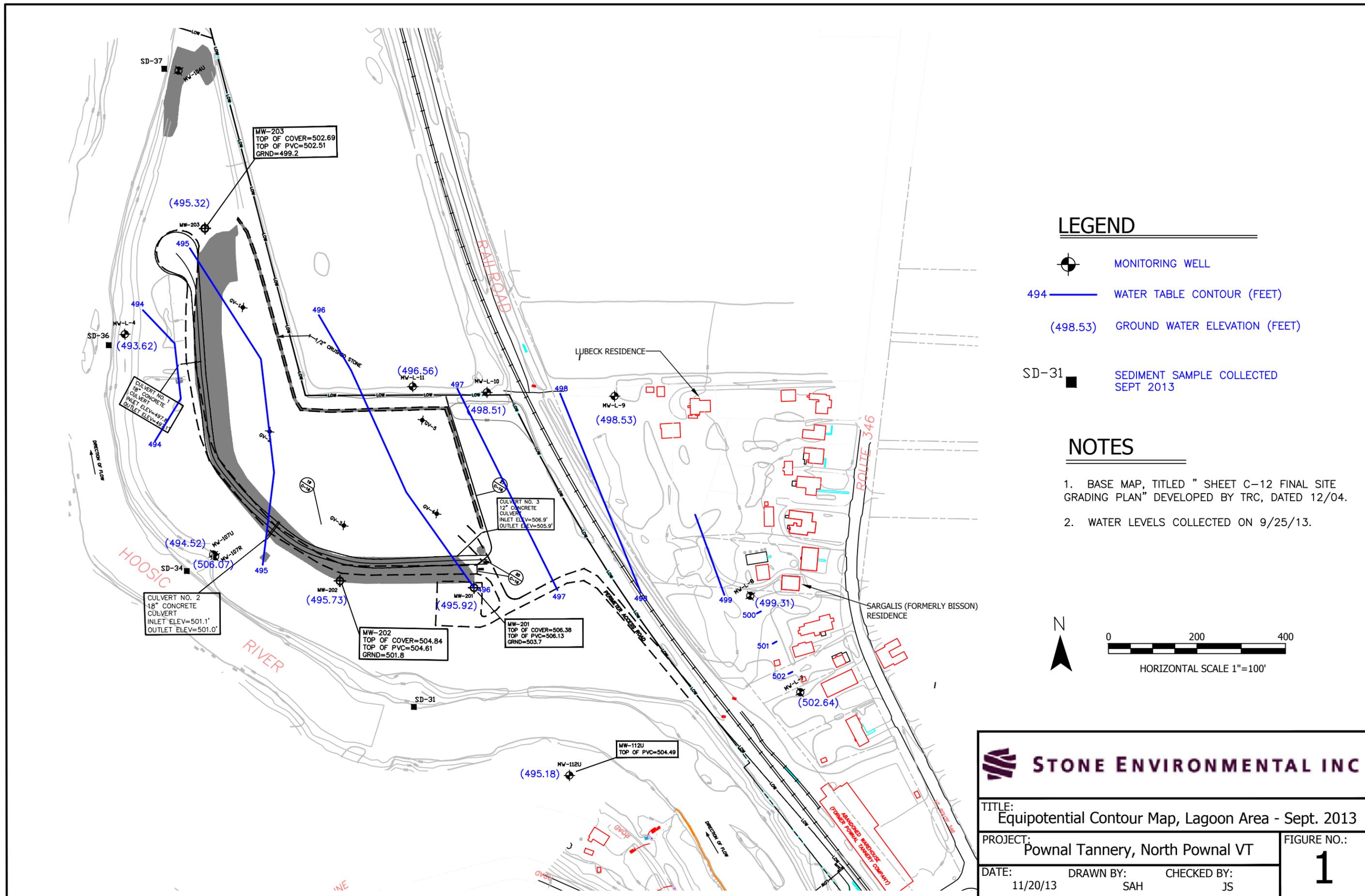
If you would rather not receive future communications from U.S. EPA, Region 1, let us know by clicking [here](#).
U.S. EPA, Region 1, 5 Post Office Square, Suite 100, Boston, MA 02109-3912 United States

APPENDIX C

FIGURES

Pownal Tannery Second Five-Year Review

(PDF attached)



LEGEND

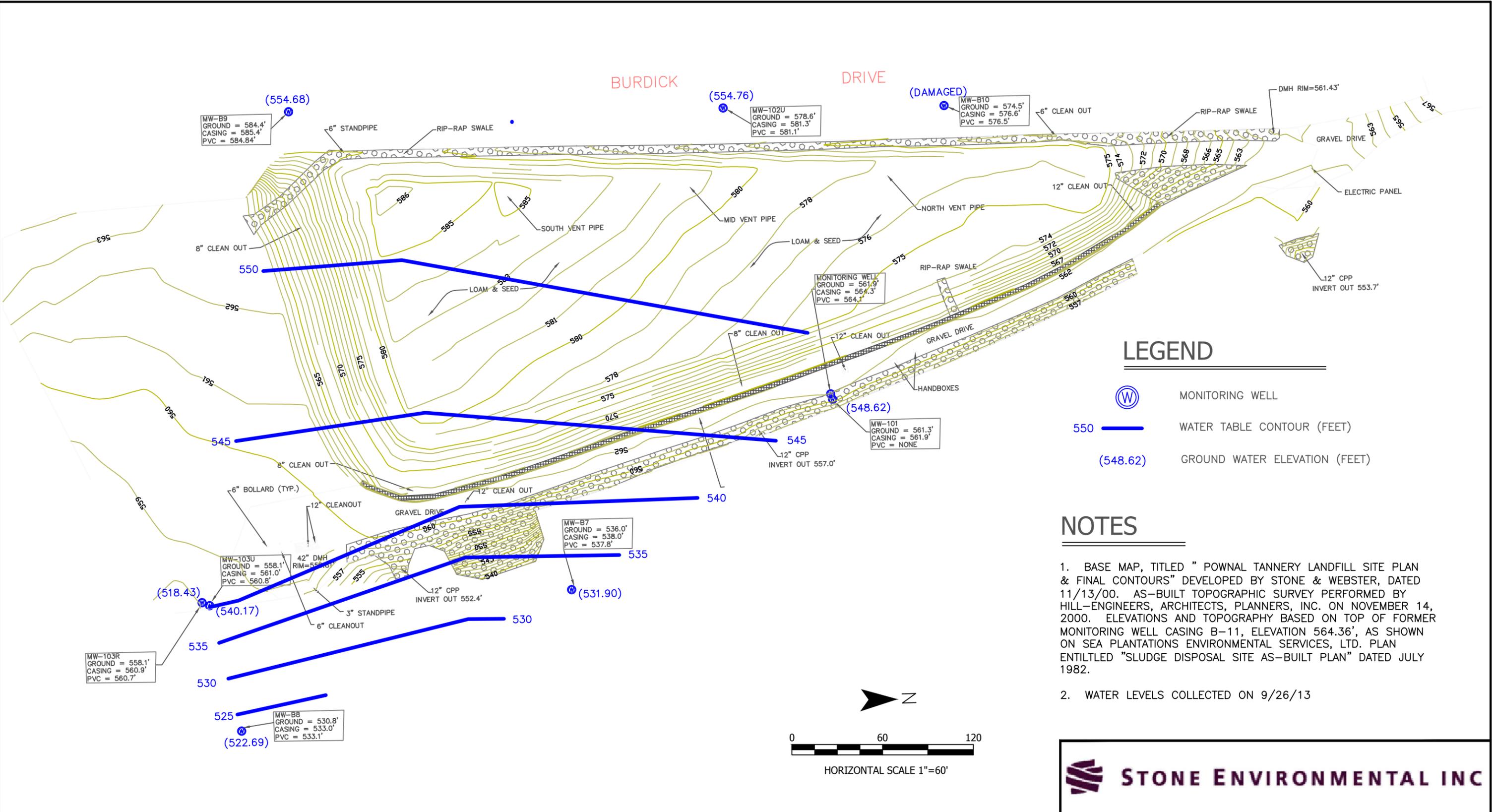
-  MONITORING WELL
-  494 — WATER TABLE CONTOUR (FEET)
-  (498.53) — GROUND WATER ELEVATION (FEET)
-  SD-31 ■ SEDIMENT SAMPLE COLLECTED SEPT 2013

NOTES

1. BASE MAP, TITLED " SHEET C-12 FINAL SITE GRADING PLAN" DEVELOPED BY TRC, DATED 12/04.
2. WATER LEVELS COLLECTED ON 9/25/13.



 STONE ENVIRONMENTAL INC	
TITLE: Equipotential Contour Map, Lagoon Area - Sept. 2013	
PROJECT: Pownal Tannery, North Pownal VT	FIGURE NO.: 1
DATE: 11/20/13	DRAWN BY: SAH CHECKED BY: JS



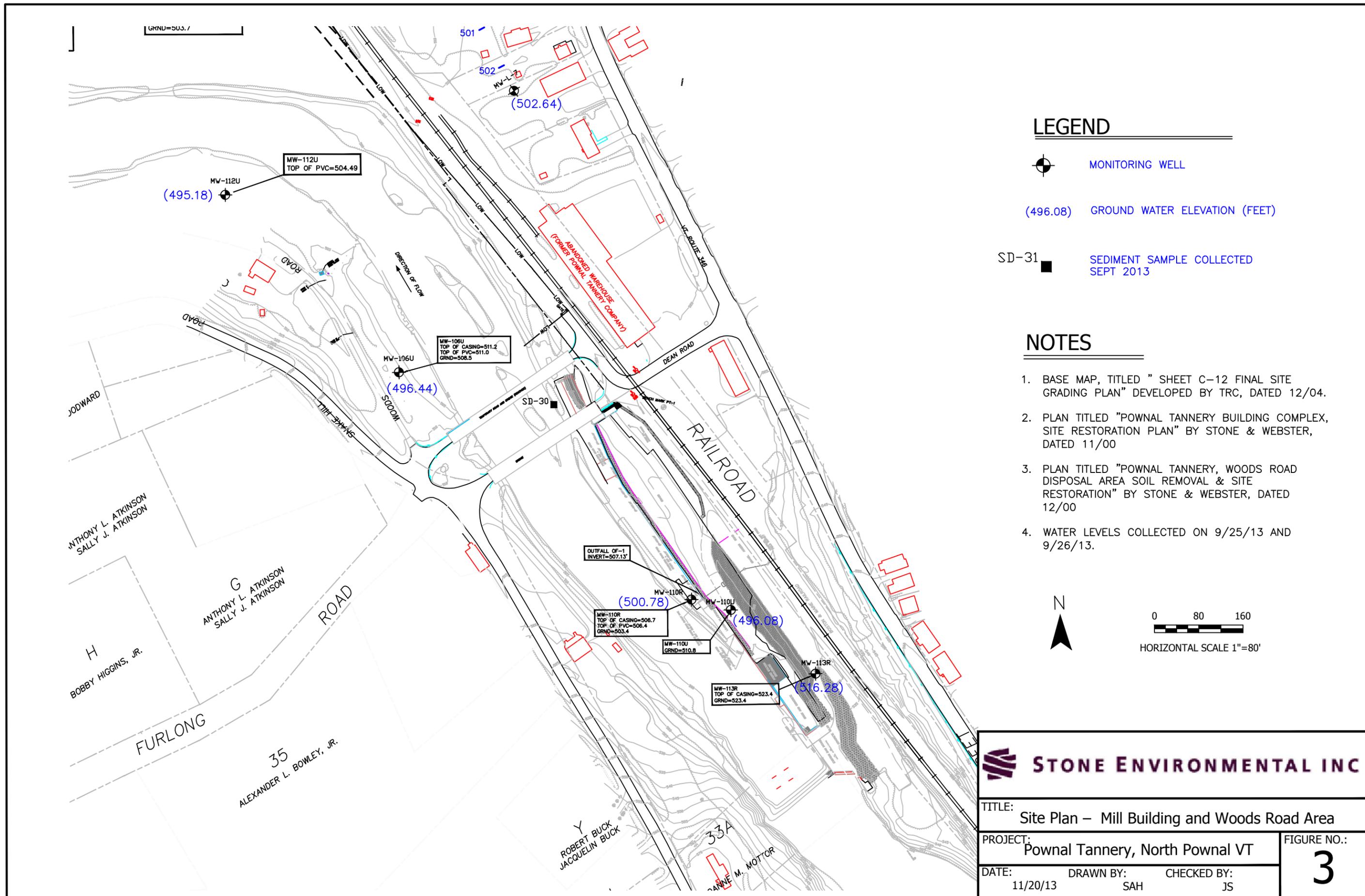
LEGEND

- MONITORING WELL
- WATER TABLE CONTOUR (FEET)
- GROUND WATER ELEVATION (FEET)

NOTES

1. BASE MAP, TITLED " POWNAL TANNERY LANDFILL SITE PLAN & FINAL CONTOURS" DEVELOPED BY STONE & WEBSTER, DATED 11/13/00. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC. ON NOVEMBER 14, 2000. ELEVATIONS AND TOPOGRAPHY BASED ON TOP OF FORMER MONITORING WELL CASING B-11, ELEVATION 564.36', AS SHOWN ON SEA PLANTATIONS ENVIRONMENTAL SERVICES, LTD. PLAN ENTITLED "SLUDGE DISPOSAL SITE AS-BUILT PLAN" DATED JULY 1982.
2. WATER LEVELS COLLECTED ON 9/26/13

STONE ENVIRONMENTAL INC	
TITLE: Equipotential Contour Map, Dean Rd Landfill - Sept. 2013	
PROJECT: Pownal Tannery, North Pownal VT	FIGURE NO.:
DATE: 11/20/13	2
DRAWN BY: SAH	CHECKED BY: JS



LEGEND

-  MONITORING WELL
-  (496.08) GROUND WATER ELEVATION (FEET)
-  SD-31 SEDIMENT SAMPLE COLLECTED SEPT 2013

NOTES

1. BASE MAP, TITLED " SHEET C-12 FINAL SITE GRADING PLAN" DEVELOPED BY TRC, DATED 12/04.
2. PLAN TITLED "POWVAL TANNERY BUILDING COMPLEX, SITE RESTORATION PLAN" BY STONE & WEBSTER, DATED 11/00
3. PLAN TITLED "POWVAL TANNERY, WOODS ROAD DISPOSAL AREA SOIL REMOVAL & SITE RESTORATION" BY STONE & WEBSTER, DATED 12/00
4. WATER LEVELS COLLECTED ON 9/25/13 AND 9/26/13.



TITLE: Site Plan – Mill Building and Woods Road Area		
PROJECT: Pownal Tannery, North Pownal VT	FIGURE NO.: 3	
DATE: 11/20/13	DRAWN BY: SAH	CHECKED BY: JS

APPENDIX D

TABLES

Pownal Tannery Second Five-Year Review

(PDF Attached)

TABLE 1. MAXIMUM DETECTED CONCENTRATIONS IN GROUNDWATER: 2009-2014

Dean Road Landfill

Pownal Tannery
Pownal, Vermont

Sample ID:				MW-101U	MW-101U	MW-103U	MW-103R	MW-103R	MW-B-8	MW-B-7	MW-102U	MW-B-10	MW-B-10	LEACHATE TANK	LEACHATE TANK	
Sample Unfiltered/Filtered:				(Unfiltered)	(Filtered)	(Unfiltered)	(Unfiltered)	(Filtered) (2009 only)	(Unfiltered)	(Unfiltered)	(Unfiltered)	(Unfiltered)	(Filtered)	(Unfiltered)	(Filtered) (2013 only)	
Parameter	Analytical Method	MCL	Ground Water Quality Standards		Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	
			Primary VGES	Secondary VGES												
VOCs																
Acetone	SW8260B	---	Not Applicable		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15	
SVOCs																
(None Detected)	SW8270C	---	Not Applicable		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	
Metals (Target List)																
Antimony	SW6010B	6.0	6.0	--	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 1,000	ND< 20.0	30.9	ND< 20.0
Barium	SW6010B	2,000	2,000	--	ND< 200	ND< 200	ND< 200	306	ND< 200	ND< 200	ND< 200	ND< 200	2,040	ND< 200	ND< 200	204
Chromium	SW6010B	100	100	--	ND< 10.0	ND< 10.0	ND< 10.0	70.7	ND< 10.0	ND< 10.0	ND< 10.0	13.3	1,850	ND< 10.0	11.4	ND< 10.0
Lead	SW6010B	15	15	--	ND< 5.0	6.3	ND< 5.0	23.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 20	2,020	19.0	120	120
Manganese	SW6010B	---	300	50	10,400	1,740	ND< 15.0	1,340	211	78	2,950	618	182,000	5,640	1,600	1,650
Zinc	SW6010B	---	--	5,000	22.9	70.1	25.9	252	ND< 20.0	23.1	25.0	88.2	12,100	61.7	25,900	195
Arsenic	SW7060A	10	10	--	4.9	ND< 5.0	ND< 4.0	34.0	11.0	ND< 5.0	ND< 4.0	6.1	340	ND< 4.0	ND< 4.0	ND< 4.0

Notes:

All results reported in micrograms per liter, unless otherwise noted.

Only detected analytes reported.

Field parameters analyzed using an Insitu Troll 9000 multi-parameter meter with a flow-through cell.

Ground water samples collected using USEPA Region I low flow purging and sampling protocol.

VOCs = Volatile Organic Compounds

SVOCs = Semi-Volatile Organic Compounds

VGES = Vermont Ground Water Enforcement Standard

MCL = Maximum Contaminant Level; the highest level of a contaminant that is allowed in drinking water (USEPA).

NS = Not Sampled

NA = Not Analyzed

ND = None Detected above detection limits

FT BIOC = Feet below top of casing

Highlighted values exceed one or more Ground Water Quality Standard

Values in bold font indicate that the analyte was detected at a concentration greater than the laboratory reporting limit.

Created by: SAH

Checked by: KML

TABLE 2. MAXIMUM DETECTED CONCENTRATIONS IN GROUNDWATER: 2009-2014

Former Mill Building Area Woods Road

Pownal Tannery
Pownal, Vermont

Sample ID:					OF-1	MW-110U	MW-110U	MW-113R	MW-113R	MW-110R	MW-110R	MW-106U	MW-112U
Sample Unfiltered/Filtered:					(Unfiltered)	(Unfiltered)	(Filtered) (2011 only)	(Unfiltered)	(Filtered) (2009 only)	(Unfiltered)	(Filtered) (2009 only)	(Unfiltered)	(Unfiltered)
Parameter	Analytical Method	MCL	Ground Water Quality Standards										
			Primary VGES	Secondary VGES									
VOCs													
Toluene	SW8260B	1,000	1,000.0	500.0	ND< 2.0	7.0	--	NA	NA	ND< 2.0	NA	NA	NA
Isopropylbenzene	SW8260B	--	--	--	ND< 2.0	ND< 2.0	--	NA	NA	25	NA	NA	NA
n-Propylbenzene	SW8260B	--	--	--	ND< 2.0	ND< 2.0	--	NA	NA	20	NA	NA	NA
n-Butylbenzene	SW8260B	--	--	--	ND< 2.0	ND< 2.0	--	NA	NA	6.0	NA	NA	NA
tert-Butylbenzene	SW8260B	--	--	--	ND< 2.0	ND< 2.0	--	NA	NA	7.2	NA	NA	NA
sec-Butylbenzene	SW8260B	--	--	--	ND< 2.0	ND< 2.0	--	NA	NA	16	NA	NA	NA
SVOCs													
(None Detected)	SW8270C	varies	varies	varies	ND	NA	NA	NA	NA	ND	ND	NA	NA
Metals (Target List)													
Antimony	SW6010B	6.0	6.0	--	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0
Barium	SW6010B	2,000	2,000.0	--	268	ND< 200	ND< 200	296	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200
Manganese	SW6010B	---	300	50	1,570	133	196	7,690	892	1,700	1,760	34.0	568
Zinc	SW6010B	---	--	5,000	519	23.4	ND< 20.0	54.2	ND< 20.0	21.6	21.6	20.9	47.6
Arsenic	SW7060A	10	10.0	--	15.0	ND< 4.0	ND< 4.0	33	6.1	13	8.9	ND< 5.0	4.3
Lead	SW7421	15	15.0	--	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	12

Notes:

- All results reported in micrograms per liter, unless otherwise noted.
- Only detected analytes reported.
- Field parameters analyzed using an Insitu Troll 9000 multi-parameter meter with a flow-through cell.
- Ground water samples collected using USEPA Region I low flow purging and sampling protocol.
- VOCs = Volatile Organic Compounds
- SVOCs = Semi-Volatile Organic Compounds
- VGES = Vermont Ground Water Enforcement Standard
- MCL = Maximum Contaminant Level; the highest level of a contaminant that is allowed in drinking water (USEPA).
- NA = Not Analyzed
- ND = None Detected above detection limits
- EB = Equipment Blank
- FT BTOC = Feet below top of casing
- Highlighted values exceed one or more Ground Water Quality Standard

Created by: SAH
Checked by: KML

TABLE 3. MAXIMUM DETECTED CONCENTRATIONS IN GROUNDWATER: 2009-2014

Lagoon Area and Upgradient

Pownal Tannery
Pownal, Vermont

Sample ID: Sample Unfiltered/Filtered:				UPGRADIENT WELLS					LAGOON AREA WELLS									
				MW-L-7 (Unfiltered)	MW-L-8 (Unfiltered)	MW-L-8 (Filtered) (2011 and 2013)	MW-L-9 (Unfiltered)	MW-201 (Unfiltered)	MW-202 (Unfiltered)	MW-203 (Unfiltered)	MW-104U (Unfiltered) (2009 and 2013)	MW-L-4 (Unfiltered)	MW-107R (Unfiltered)	MW-107U (Unfiltered)	MW-L-10 (Unfiltered)	MW-L-11 (Unfiltered)		
Analyte	Analytical Method	MCL	Ground Water Quality Standards		Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	
			Primary VGES	Secondary VGES														
VOCs																		
Acetone	SW8260B	--	700.0	--	ND< 10	ND< 10	ND< 10	ND< 10	ND< 10	ND< 10	ND< 10	ND< 10.0	NA	NA	NA	NA	NA	NA
Chlorobenzene	SW8260B	100	100.0	--	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	SW8260B	--	350.0	--	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	SW8260B	--	350.0	--	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	SW8260B	600	600.0	300.0	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	7.8	ND< 2.0	ND< 2.0	ND< 2.0	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	SW8260B	75	75.0	37.5	ND< 2.0	ND< 2.0	ND< 2.0	ND< 2.0	2.1	ND< 2.0	ND< 2.0	ND< 2.0	NA	NA	NA	NA	NA	NA
SVOCs																		
Bis(2-ethylhexyl)phthalate	SW8270C	6.0	6.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organochlorine Pesticides																		
(None Detected)	SW8081A	varies	varies	varies	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dioxins																		
Total 2,3,7,8-TCDD Equivalence	SW8290	3.0E-05	3.0E-05	1.1E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
Aluminum	SW6010B	--	--	200.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	SW6010B	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	SW6010B	2,000	2,000	--	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200	ND< 200
Chromium	SW6010B	100	100.0	--	ND< 10.0	ND< 10.0	ND< 10.0	ND< 10.0	ND< 10.0	ND< 10.0	82.6	ND< 10.0	ND< 10.0	ND< 10	22.6	ND< 10.0	ND< 10.0	
Copper	SW6010B	--	1,300.0	650.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	SW6010B	--	--	300.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	SW6010B	--	15.0	--	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0	ND< 5.0
Magnesium	SW6010B	---	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	SW6010B	--	300.0	50.0	25.3	781	821	40.0	3,810	3,960	94.8	296	ND< 15.0	1,260	109	879	29.1	
Nickel	SW6010B	--	100.0	50.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	SW6010B	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	SW6010B	--	--	250,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	SW6010B	--	--	5,000	25.3	ND< 20.0	ND< 20.0	ND< 20.0	ND< 20.0	21.2	29.7	ND< 20.0	23.7	62.5	ND< 20	21.5	22.0	
Arsenic	SW7060A	10	10.0	--	ND< 4.0	9.7	9.7	ND< 4.0	15	21	ND< 4.0	7.4	ND< 4.0	47	ND< 4.0	ND< 4.0	ND< 4.0	
Cyanide	E335.2	--	200.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
 All results reported in micrograms per liter, unless otherwise noted.
 Only detected analytes reported.
 Field parameters analyzed using an Insitu Troll 9000 multi-parameter meter with a flow-through cell. All ground water samples collected by USEPA Region I Low Flow Purging and Sampling Methods.
 VOCs = Volatile Organic Compounds
 SVOCs = Semi-Volatile Organic Compounds
 VGES = Vermont Ground Water Enforcement Standard
 MCL = Maximum Contaminant Level; the highest level of a contaminant that is allowed in drinking water (USEPA).
 NA = Not Analyzed
 ND = None Detected above detection limits
 Highlighted values exceed one or more Ground Water Quality Standard
 Values in bold font indicate that the analyte was detected at a concentration greater than the laboratory reporting limit.

Created by: SAH
 Checked by: KML

TABLE 4. MAXIMUM CONCENTRATIONS IN WATER SAMPLES: 2009-2014

Residential Wells

Pownal Tannery
Pownal, Vermont

Sample ID:				LUBECK (Primary) Max (Unfiltered)	SARGALIS Max (Unfiltered)
Parameter	Analytical Method	MCL	Primary VGES		
VOCs					
(None Detected)	SW8260B	varies	varies	ND	ND
SVOCs					
(None Detected)	SW8270C	varies	varies	ND	ND
SVOCs					
(None Detected)	SW8260B	varies	varies	ND	ND
Metals (Target List)					
Antimony	SW6010B	6.0	6.0	ND< 20.0	ND< 20.0
Barium	SW6010B	2,000	2,000	ND< 200	ND< 200
Chromium	SW6010B	100	100	ND< 10.0	ND< 10.0
Manganese	SW6010B	---	840	ND< 15.0	ND< 15.0
Zinc	SW6010B	---	5,000	176	ND< 20.0

Notes:

All results reported in micrograms per liter, unless otherwise noted.

Only detected analytes reported.

VOCs = Volatile Organic Compounds

SVOCs = Semi-Volatile Organic Compounds

MCL = Maximum Contaminant Level; the highest level of a contaminant that is allowed in drinking water (USEPA).

VGES = Vermont Ground Water Enforcement Standard

PAL = Preventive Action Level

ND = None Detected above laboratory reporting limits

Created by: LJR

Checked by: SAH

TABLE 5. MAXIMUM CONCENTRATIONS IN SEDIMENT SAMPLES: 2009-2014

Pownal Tannery
Pownal, Vermont

Sample ID:				SD-30	SD-31	SD-34	SD-36	SD-37
				Max.	Max.	Max.	Max.	Max.
Analyte	Analytical Method	Sediment Quality Guidelines ⁽⁶⁾ (SQGs)						
		TEC	PEC					
SVOCs (µg/kg)								
2-Methylnaphthalene	SW8270C	--	--	46	21	26	13	36
Acenaphthene	SW8270C	--	--	110	18	23	18	43
Acenaphthylene	SW8270C	--	--	80	83	480	30	64
Anthracene	SW8270C	57.2	845	270	100	270	64	150
Benz(a)anthracene	SW8270C	108	1,050	150	400	1,100	210	390
Benzo(a)pyrene	SW8270C	150	1,450	460	450	1100	200	370
Benzo(b)fluoranthene	SW8270C	--	--	450	560	1400	190	330
Benzo(g,h,i)perylene	SW8270C	--	--	210	260	900	180	340
Benzo(k)fluoranthene	SW8270C	--	--	450	420	520	210	300
Chrysene	SW8270C	166	1290	480	430	1,100	200	440
Dibenz(a,h)anthracene	SW8270C	33	NE	52	69	230	70	150
Fluoranthene	SW8270C	423	2,230	1200	720	1,700	340	620
Fluorene	SW8270C	--	--	200	18	36	29	51
Indeno(1,2,3-cd)pyrene	SW8270C	--	--	22	250	810	150	300
Naphthalene	SW8270C	--	--	67	18	27	13	39
Phenanthrene	SW8270C	--	--	1100	310	630	220	500
Pyrene	SW8270C	195	1,520	1000	860	2,300	370	760
Polychlorinated Biphenyls (µg/kg)								
Total Monochlorobiphenyls	680M	--	--	ND< 0.0194	ND< 0.0194	0.259 J	0.17	0.344 J
Total Dichlorobiphenyls	680M	--	--	ND< 0.0194				
Total Trichlorobiphenyls	680M	--	--	ND< 3.08	26.6	10.9	ND< 3.32	23.3
Total Tetrachlorobiphenyls	680M	--	--	3.20	24.8	21.5	6.54	66.4
Total Pentachlorobiphenyls	680M	--	--	1.86	14.4	17.2	6.62	33.0
Total Hexachlorobiphenyls	680M	--	--	0.376 J	2.67 J	8.95	3.39	18.3
Total Heptachlorobiphenyls	680M	--	--	0.088	0.903	1.78	0.57	3.96
Total Octachlorobiphenyls	680M	--	--	0.092	1.77	0.476	0.13	1.03
Total Nonachlorobiphenyls	680M	--	--	0.061	1.60	0.426	0.10	0.807
Total Decachlorobiphenyls	680M	--	--	5.84	116	0.256	0.05	0.519
Total Polychlorobiphenyls	680M	59.8	676	11.5	162	50.6	17.6	148
Metals (Full List) (mg/kg)								
Aluminum	SW6010B	--	--	9,760	15,300	13,000	7,850	15,100
Antimony	SW7041	--	--	1.40	1.30	1.80	1.00	2.2
Arsenic	SW7060A	9.79	33.0	4.43	6.94	7.32	5.13	6.13
Barium	SW6010B	--	--	40.3	112	73.0	41.4	94.4
Beryllium	SW6010B	--	--	ND<	0.819	0.573	ND< 0.403	0.822
Cadmium	SW6010B	0.99	5	ND<	1.65	0.905	ND< 0.806	ND< 1.41
Calcium	SW6010B	--	--	9,540	15,200	13,700	4,780	149,000
Chromium	SW6010B	43.4	111	25.5	55.7	509	23.3	33.6
Cobalt	SW6010B	--	--	10.10	17.8	11.6	11.40	14.4
Copper	SW6010B	--	--	41.7	51.7	55.1	20.8	34.8
Cyanide	SW9010B			ND< 1.3	ND< 1.4	ND< 1.7	ND< 1.3	ND< 2.3
Iron	SW6010B	--	--	23,100	29,800	24,900	19,900	28,400
Lead	SW6010B	35.8	128	109	62.3	59.6	19.1	56.9
Magnesium	SW6010B	--	--	7,800	9,940	8,460	4,960	12,500
Manganese	SW6010B	--	--	323	943	846	1,620	1,120
Mercury	SW7471A	0.18	1.1	0.098	0.275	0.735	0.174	0.124
Nickel	SW6010B	22.7	48.6	20.3	35.7	23.4	18.9	26.5
Potassium	SW6010B	--	--	1,600	2,640	1,990	1,330	2,360
Selenium	SW7740	--	--	ND< 2.0	ND< 2.0	ND< 2.2	ND< 1.6	ND< 1.8
Silver	SW6010B	--	--	ND< 2.14	ND< 2.33	ND< 3.06	ND< 2.29	ND< 3.95
Sodium	SW6010B	--	--	447	ND< 538	ND< 545	ND< 409	ND< 445
Thallium	SW7841	--	--	ND< 1.5	ND< 1.7	ND< 2.2	ND< 1.6	ND< 1.8
Vanadium	SW6010B	--	--	8.16	14.1	19.1	8.50	18.9
Zinc	SW6010B	121	459	255.0	204	148	84.4	140

Notes:

SVOCs = Semi-Volatile Organic Compounds

ND = Indicates compound was analyzed for, but not detected at or above the reporting limit.

U = Analyte not detected above the specified reporting limit

⁽⁶⁾ VT DEC Investigation and Remediation of Contaminated Properties Procedures Sediment Quality Guidelines.

TEC = Threshold Effects Concentrations; PEC = Probable Effects Concentrations (from MacDonald et al., 2000)

NE = PEC not established for dibenz(a,h)anthracene

Highlighted values exceed one or both of the Sediment Quality Guidelines.

Values in bold font indicate that the analyte was detected at a concentration in excess of the laboratory reporting limit.

Created by: LJR

Checked by: SAH

TABLE 6. MAXIMUM DETECTED CONCENTRATIONS IN LANDFILL GAS: 2010-2014

Dean Road and Lagoon Landfill Areas

Pownal Tannery
Pownal, Vermont

Sampling Area:	Leachate Tank		Dean Road Landfill								Lagoon Landfill								
Sample ID:	Background	Leachate Tank	Clean Out 1	Clean Out 2	Clean Out 4	Clean Out 5	Background	North ¹	Mid ¹	South ¹	Background	GV-1	GV-2	GV-3	GV-4	GV-5	GP-1	GP-2	GP-3
	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Parameter and units																			
%LEL	0.0	0.0	0.0	100	0.0	0.0	10	0.0	784	556	10	10	150	0.0	250	100	0.0	0.0	0.0
Methane - CH ₄ (% gas)	0.0	0.0	0.0	5.0	0.0	0.0	0.5	0.0	39.2	27.8	0.5	0.5	7.5	0.0	12.5	5.0	0.0	0.0	0.0
Carbon Monoxide (ppm)	NA	2.0	2.0	0.0	0.0	0.0	NA	0.0	1.0	0.0	NA	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Carbon Dioxide - CO ₂ (% gas)	0.3	2.0	0.084	0.102	0.083	0.083	0.3	0.1	8.6	9.0	0.1	21.3	4.6	0.7	1.6	2.4	3.44	0.242	2.4
Oxygen - O ₂ (% gas)	21.4	21.1	19.6	20.6	20.9	20.9	21.2	0.9	3.2	7.0	20.4	13.8	20.5	10.7	17.5	19.3	8.1	20.7	4.7
PID (ppmv)	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
Pressure (inches of water)	0.0	0.0	NA	NA	NA	NA	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	NA	NA	NA

NA - Parameter was not measured

¹ - 2011 and 2013 Data only. Unable to determine 2010 locations.

LEL: lower explosive limit, calibrated to methane (methane LEL = 5% gas)

PID: photoionization detector

ppmv: parts per million by volume

% gas = percent gas by volume

Created by: LJR

Checked by: SAH

**TABLE 7. SUMMARY OF SOIL
ANALYTICAL AND QA/QC RESULTS
Berm Soil Sampling, 2013**

Pownal Tannery, Pownal, Vermont

Sample ID:		Berm-1	Berm-2	Berm-3	Trip Blank
Sample Collection Date:		9/25/2013	9/25/2013	9/25/2013	9/25/2013
Analyte	EPA Region III Regional Screening Levels				
	Residential (mg/kg)	Industrial (mg/kg)			
VOCs (mg/kg)					
Methylene chloride	11	53	0.047	0.043 U	0.047 U
Metals (mg/kg)					
Arsenic	0.39	1.6	6.95	8.28	8.56
Barium	15,000	190,000	61.2	55.4	41.3
Cadmium	70	800.0	0.716 U	0.776	0.811 U
Chromium	--	--	8.52	42.1	23.2
Lead	400	800	10.2	35	20.3
Mercury	10	43	0.102	0.729	0.643

Notes:

VOCs = Volatile Organic Compounds

NA = Not Analyzed

U = Analyte not detected above the specified reporting limit

Highlighted values exceed the US EPA RSL for either residential or industrial soils.