DECLARATION FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCES PINE STREET CANAL SUPERFUND SITE BURLINGTON, VERMONT September 2011

Site Name and Location

Pine Street Canal Superfund Site, Burlington, Vermont

Lead Agency

United States Environmental Protection Agency (EPA)

Support Agency

Vermont Department of Environmental Conservation (VT DEC)

Statement of Purpose

This decision document sets forth the basis for the determination to issue the attached Explanation of Significant Differences (ESD) for the Pine Street Canal Superfund Site (VTD980523062). EPA developed this decision document after consulting with VT DEC. The State of Vermont's letter of concurrence is provided as Attachment B.

Statutory Basis for Issuance of the ESD

Pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9617(c), and the National Contingency Plan, 40 C.F.R. § 300.435(c)(2)(i), if EPA determines that the remedial action to be undertaken at a site differs significantly from the Record of Decision (ROD) for that site, EPA shall publish an explanation of the significant differences and the reasons such changes are being made. According to 40 C.F.R. § 300.435(c)(2)(i), and EPA guidance (OSWER Directive 9200.1-23-P, July 1999), an ESD, rather than a ROD amendment, is appropriate where the adjustments being made to the ROD are significant but do not fundamentally alter the remedy with respect to scope, performance or cost.

EPA has determined that the adjustments to the ROD provided in this ESD are significant but do not fundamentally alter the overall remedy for the Pine Street Canal Superfund Site with respect to scope, performance, or cost. Therefore, this ESD is being properly issued.

In accordance with Section 117(d) of CERCLA, 42 U.S.C. § 9617(d), and the rules at 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD will be available for public review at the EPA Records Center in Boston, Massachusetts and the public information repositories located at the Fletcher Free Public Library and Bailey-Howe Library at the University of

Vermont, both in Burlington. EPA issued the ESD in draft form to allow for public review and comment. Written comments were accepted between July 14 and August 15, 2011. A responsiveness summary is included as Attachment B.

Background

EPA's 1998 ROD called for a containment remedy, including placing a sand cap over contaminated sediments in the canal that posed an unacceptable ecological risk. Construction of this cap was completed in March 2003. A year later, the cap was extended over a portion of the western bank of the canal, after coal tar and oil (collectively referred to as "non-aqueous phase liquid" or NAPL) was discovered migrating along historic cribbing and the root systems of dead trees, and accumulating in pools on the ground and the surface of the underwater cap. In the spring of 2005, oily sheens and globules of coal tar were observed floating on the surface water at the southern end of the canal. It was determined that this outbreak was the result of NAPL migrating upwards through the cap into the water in the canal, and in 2009, EPA issued an ESD that called for amending a portion of the cap to better contain the hazardous materials left in place. Over the fall and winter of 2010, a section of the sand cap was removed and replaced with an engineered cap containing organoclay in its core. The organoclay binds with coal tar and oil, preventing their release into the canal. In time, the reactive core mat will fill up with coal tar and oil and will need to be replaced. To lengthen the time between change-outs, several NAPL recovery wells were also installed along the east and west banks as part of this action, to further prevent the lateral migration of NAPL from the upland source into the canal.

Another component of the containment remedy selected in 1998 was a groundwater monitoring program, the purpose of which was to ensure that dissolved contaminants in groundwater do not migrate beyond the site boundary into nearby Lake Champlain. For nearly ten years, the plume of contaminated groundwater beneath the Site was stable. However, since 2008, increases in benzene concentrations in groundwater samples along with the intermittent presence of measureable accumulations of NAPL in several monitoring wells on the lake side of the canal at the northern end of the Site indicate that additional containment is needed.

Overview of the ESD

This ESD calls for the installation of a 200-300 foot long vertical barrier below the ground surface and NAPL recovery wells to protect Lake Champlain from potentially being impacted by the migration of contaminated groundwater and NAPL left on site. The conceptual alignment of the barrier is along the train tracks between the canal and bike path; that location may be adjusted during the design process. NAPL that accumulates in the recovery wells will be removed periodically and shipped off site for treatment or disposal in an approved facility.

Declaration

For the foregoing reasons and as explained herein, by my signature below, I approve the issuance of an Explanation of Significant Differences for the Pine Street Canal Superfund Site in Burlington, Vermont, and the changes stated therein.

9/19/11

James T. Owens, III, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency – Region 1

Date

EXPLANATION OF SIGNIFICANT DIFFERENCES
PINE STREET CANAL SUPERFUND SITE
BURLINGTON, VERMONT
September 2011

Site Name: Pine Street Canal Superfund Site

Site Location: Burlington, Vermont

Lead Agency: United States Environmental Protection Agency (EPA)

Support Agency: Vermont Department of Environmental Conservation (VT DEC)

I. INTRODUCTION

This Explanation of Significant Differences (ESD) is being issued for the Pine Street Canal Superfund Site (the "Site") to address differences between the actions being considered and the remedy that was set forth in the Record of Decision (ROD) for the Site on September 29, 1998. EPA is required to publish an ESD by Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9617(c), and the rule at 40 C.F.R. § 300.435(c)(2)(i).

EPA's 1998 ROD called for a containment remedy, including placing a sand cap over contaminated sediments in the canal that posed an unacceptable ecological risk. Construction of this cap was completed in March 2003. A year later, the cap was extended over a portion of the western bank of the canal, after coal tar and oil (collectively referred to as "non-aqueous phase liquid" or NAPL) was discovered migrating along historic cribbing and the root systems of dead trees, and accumulating in pools on the ground and the surface of the underwater cap. In the spring of 2005, oily sheens and globules of coal tar were observed floating on the surface water at the southern end of the canal. It was determined that this outbreak was the result of NAPL migrating upwards through the cap into the water in the canal, and in 2009, EPA issued an ESD that called for amending a portion of the cap to better contain the hazardous materials left in place. Over the fall and winter of 2010, a section of the sand cap was removed and replaced with an engineered cap containing organoclay in its core. The organoclay binds with coal tar and oil, preventing their release into the canal. In time, the reactive core mat will fill up with coal tar and oil and will need to be replaced. To lengthen the time between change-outs, several NAPL recovery wells were also installed along the east and west banks as part of this action, to further prevent the lateral migration of NAPL from the upland source into the canal.

Another component of the containment remedy selected in 1998 was a groundwater monitoring program, the purpose of which was to ensure that dissolved contaminants in groundwater do not migrate beyond the site boundary into nearby Lake Champlain. For nearly ten years, the plume of contaminated groundwater beneath the Site was stable. However, since 2008, increases in benzene concentrations in groundwater samples along with the intermittent presence of

measureable accumulations of NAPL in several monitoring wells on the lake side of the canal at the northern end of the Site indicate that additional containment is needed.

This ESD calls for the installation of a 200-300 foot long vertical barrier below the ground surface and NAPL recovery wells to protect Lake Champlain from potentially being impacted by the migration of contaminated groundwater and NAPL left on site. The conceptual alignment of the barrier is along the train tracks between the canal and bike path; that location may be adjusted during the design process. NAPL that accumulates in the recovery wells will be removed periodically and shipped off site for treatment or disposal in an approved facility.

In accordance with CERCLA §117(d), 42 U.S.C. § 9617(d), and the rules at 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD and its supporting documents have been added to the Administrative Record for the Site and are available for public review at the following locations:

U.S. EPA Region 1 Records Center
5 Post Office Square
Suite 100 (LIB01-2)
Boston, Massachusetts 02109-3912
By appointment only: 617-918-1440

Fletcher Free Public Library
Reference Desk
235 College Street
Burlington, Vermont 05401
802-865-7217

Bailey-Howe Library
Special Collections
University of Vermont
538 Main Street
Burlington, Vermont 05405
802-656-2138

The documents and reports cited herein are also available as links from EPA's website for the Pine Street Canal Site: www.epa.gov/ne/superfund/sites/pinestreet

II. SITE HISTORY, CONTAMINATION AND THE SELECTED REMEDY

The Pine Street Canal Superfund Site is located between Pine Street and the eastern shore of Lake Champlain, about half a mile south of downtown Burlington, Vermont. The Site consists of an abandoned barge canal and turning basin, stormwater management areas, vegetated wetlands and uplands (see figure). The canal is hydraulically connected to Lake Champlain and, as such, is subject to flooding when lake levels are high. The upland areas along Pine Street and Lake Street are zoned for enterprise (light manufacturing). The majority of the 38-acre Site is vacant, but is used occasionally by trespassers. The wetlands and open water along the lakefront

are zoned recreation/greenspace and conservation. Groundwater beneath the Site has been classified by the State of Vermont as Class IV, designating it non-potable and suitable for agricultural or commercial uses only.

The Site has been used for various industrial/commercial purposes since the mid-1800s when the railroad on the western edge of the canal was built. The canal and turning basin were first dredged in 1868 to provide access to Lake Champlain for several lumber companies, a coal company, and a boat builder. By 1879, two slips for barges, one running north from the turning basin, the second running east towards Pine Street from the middle of the canal, had also been constructed.

Around 1895, Burlington Gas Works, a manufactured gas plant (MGP), was constructed on Pine Street, just north of what is now the Burlington Electric Department. The plant used a coal gasification process to generate gas for the city. Burlington Gas Works reportedly disposed of large quantities of coal gasification wastes, such as coal tar, fuel oil, contaminated wood chips, iron oxide, cinders, and associated contaminants such as cyanide and metals, on site and in the adjacent wetlands. These waste materials are the primary source of contamination at the Site.

Disposal practices at the MGP, as well as the operations of other industries at the Site, have resulted in the infilling of wetlands and peaty soils at much of the Site. The gas plant ceased operations in 1966 and was dismantled in 1967. By 1977, both barge slips had been filled in. Naturally occurring processes, such as deposition, eutrophication, and sediment trapping in large root mats, continued to fill in the canal and turning basin.

The first observation of visible contamination on surface water was documented in 1926, when a daily log book for the MGP noted that light tar from the plant's tar well was running into the lake. A series of oily releases to the canal occurred in the late 1960s and early 1970s. In 1977 and 1978, the State of Vermont took exploratory borings for the proposed Southern Connector highway. The borings revealed extensive subsurface contamination.

The Site was proposed for the Superfund National Priorities List on October 23, 1981 and was listed on September 8, 1983. In 1985, EPA undertook an emergency removal action at the former Maltex Pond; VT DEC provided field oversight. Six to 18 inches of soil contaminated with coal tar were removed from the surface, mixed with limestone, solidified, and shipped off site for disposal at an approved facility. A permeable geotextile membrane was placed over the excavated area, and topped with clean topsoil. Contaminated soil was left in place below the geotextile membrane.
The Vermont Agency of Transportation continued their investigations for the Southern Connector right-of-way until 1988 when EPA took the lead for site investigations. In November 1992, EPA proposed a cleanup plan for the Site. The plan included dredging contaminated sediments and placing them in a containment/disposal facility (CDF) to be built on site, and, collecting mobile coal tar and oil. Public comment on the 1992 proposed plan was negative. Commenters were critical of aspects of EPA's remedial investigation, including the nature and extent of ecological risk at the Site, the migration of contaminated groundwater, and air quality. Commenters were also concerned about the short-term health effects of excavation and the

construction of a large CDF on the shores of Lake Champlain. After a six-month comment period, EPA withdrew the proposed cleanup plan.

In 1993, environmental regulators, the potentially responsible parties (PRPs), and other citizens and groups who had been active in commenting on the 1992 proposed plan formed the Pine Street Barge Canal Coordinating Council (PSBCCC). The PSBCCC's mission was to design and oversee the implementation of additional studies to fill in data gaps in the remedial investigation, and to recommend a remedy for the Site to EPA. Under the oversight of EPA and the State of Vermont, and with involvement of the PSBCCC, the PRPs performed additional studies of the Site. In 1993, the State of Vermont reclassified the groundwater from drinking water to commercial and agricultural uses only. This action removed a significant pathway for human exposure. In late 1997, the PSBCCC recommended a remedy for the Site. EPA adopted that recommendation, and in May 1998, released a second proposed cleanup plan for public comment. In September 1998, EPA issued the ROD for the Site, selecting the remedy recommended by the PSBCCC.

The remedy set forth in the 1998 ROD for the Pine Street Canal Site included the following:

- capping contaminated sediments in the canal and turning basin with sand and silt;
- capping contaminated sediments in emergent wetlands with sand and top soil;
- construction of a weir at the mouth of the turning basin where it enters Lake Champlain
- improving on-site stormwater management features;
- habitat restoration;
- mitigating adverse effects from the remedy, if any, on historically-significant structures;
- establishing and monitoring compliance with deed restrictions that prohibit potable use of groundwater, prevent unsafe contact with contaminated soil below five feet, and prevent certain land uses that could result in unacceptable human-health risk (e.g., residential, children's day care);
- long-term compliance monitoring of groundwater, surface water, stormwater, sediment and performance monitoring of the cap; and
- performing five-year reviews of the remedy to ensure that it remains protective.

On February 11, 2000, a Consent Decree was entered in United States District Court for the State of Vermont between EPA, VT DEC and the PRPs. In it, three Performing Defendants agreed to implement the remedy selected in the 1998 ROD. Groundwater monitoring, pre-design studies and pilot tests began in the fall of 2000. Construction began in October 2001 with the concrete weir built at the outlet to Lake Champlain. The reconfiguration of on-site stormwater features and capping emergent wetlands took place over the summer and fall of 2002. Construction of the cap was completed in March 2003.

In June 2003, oily sheens and globules of coal tar were observed floating on the water surface in one area of the canal. Pools of coal tar were also found on the surface of the underwater cap and an uncapped area immediately adjacent to the canal. Absorbent booms were placed across the canal to prevent the contamination from migrating to Lake Champlain. In the summer of 2004, the cap was extended over a portion of the west bank of the canal where historic cribbing and the root systems of dead trees were pathways for NAPL migration. The expanded cap seemed to be

working to control the releases until oily sheens and globules of coal tar were once again observed floating on the surface water at the southern end of the canal in the spring of 2005.

In 2006, a five-year review of the protectiveness of the remedy was conducted, as required by the ROD. EPA determined that, except for the poor performance of the subaqueous cap in the southern portion of the Site, the remedial actions were functioning as intended by the ROD. There, the cap did not meet the performance standard for the isolation of contaminants.

Subsequent studies indicated that the primary mechanism for the release of coal tar and oil into the canal was gas ebullition, a process by which contamination is transported by gas bubbles that form in organic-rich sediment and become coated as they encounter NAPL (*Final NAPL Investigation Report,* ARCADIS, February 2008). At the Pine Street Site, bubbles coated with NAPL passed through the sand cap, leaving behind an oily sheen on the surface of the water in the canal as they burst. In addition, the gas moving through the sand cap created a pathway for droplets of coal tar to migrate. Depending on the density of the coal tar, it either floated on the water surface or sank and accumulated on the surface of the cap.

To address this concern, EPA issued an ESD in 2009 that called for replacement and/or augmentation of the existing cap in a 350-foot stretch at the southern end of the canal. Over the fall and winter of 2010, the Performing Defendants removed 800 cubic yards of sand and replaced it with an engineered cap containing organoclay in its core. The organoclay material binds with coal tar and oil, preventing their release into the canal. In time, the reactive core mat will fill up with coal tar and oil and will need to be replaced. To lengthen the time between change-outs, several NAPL recovery wells were also installed along the east and west banks as part of this action, to further prevent the lateral migration of NAPL into the canal.

Neither coal tar nor oily sheens have been observed in the water or on the underwater cap at the northern end of the canal. However, starting in 2008, the results of bi-annual groundwater monitoring began to reflect an increasing trend in benzene concentrations at several locations between the canal and Lake Champlain (D. Maynard to T. Helgason, memorandum, July 1, 2010, *Pine Street Canal Superfund Site, Shallow Overburden Groundwater Quality Data*). Accumulations of NAPL were also intermittently measured, and NAPL removed, from monitoring wells on the lake side of the canal. Unlike at the southern end of the Site where coal tar and oil moved upwards aided by gas pressure, the horizontal transport of NAPL and its associated groundwater plume at the northern end is facilitated by stratigraphy (soil conditions) and groundwater flow gradients. When there is a gradient towards Lake Champlain, contaminated groundwater moves westward along interbedded layers of coarse sand and gravel that are sandwiched between a peat layer and an underlying clay/silt unit. EPA has concluded that additional containment in this area of the Site is needed to prevent off-site migration of contaminated groundwater and NAPL.

III. BASIS FOR THIS ESD

Performance standards for groundwater are not being met in the northern portion of the canal. Specifically, groundwater samples collected outside the Class IV boundary are exceeding the

federal Maximum Contaminant Limit (MCL) for benzene[1]. The MCL and VT Groundwater Enforcement Standard for benzene is 5 μg/L, or parts per billion (ppb). In the fall of 2007, the highest concentration of benzene that had ever been detected in wells outside the Class IV boundary was 1 ppb. Since then, the data has shown a sharply increasing trend: 11 ppb (spring 2008), 110 ppb (fall 2008), 270 ppb (spring 2009), 390 ppb (fall 2009), 530 ppb (spring 2010) and 1100 ppb (fall 2010).

The 1998 ROD's groundwater performance standard included the following condition: "A statistically significant increase in the mass flux [of contaminants across the Class IV boundary] shall trigger a detailed data review to determine the cause, significance and additional measures or monitoring that should be implemented." This ESD calls for additional measures and monitoring to be implemented.

NAPL has also been found in wells very close to, but not outside, the Class IV boundary. However, without additional containment, NAPL may continue to migrate laterally, with the potential to reach Lake Champlain which is a source of drinking water for the City of Burlington.

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

This ESD provides for the following enhancements to the containment remedy set forth in the 1998 ROD:

- installation of a 200–300 foot long vertical barrier below the ground surface to contain NAPL and prevent the off-site migration of the groundwater plume,

- installation of NAPL recovery wells and NAPL removal, as necessary, to ensure that coal tar and oil does not migrate around or below the vertical barrier, and

- groundwater monitoring on both sides of the vertical barrier to track the flow and extent of contaminants in groundwater (in the dissolved phase).

The conceptual alignment of the barrier is along the train tracks between the canal and bike path (*Subsurface Investigation and Evaluation, Northern Well Area, Pine Street Canal Superfund Site, Burlington, Vermont*, The Johnson Company, December 2010). The final placement and type of vertical barrier will be determined during design.

The remaining components of the original remedy are unchanged.

Change in Expected Outcomes

It is expected that the vertical barrier and NAPL recovery wells will meet the performance standard for isolation of contamination. Consistent with EPA's February 2, 2002 guidance entitled *Principles for Managing Contaminated Sediments at Hazardous Waste Sites*, OSWER directive 9285.6-08, which was issued after the Pine Street ROD, this ESD is part of an iterative

[1] Deed restrictions and state regulations prevent the groundwater within the Class IV boundary at the Site from being used for drinking water purposes.

approach. If new information indicates that site assumptions should be re-evaluated, EPA may require additional measures to address the isolation of contamination performance standard in the future.

All other expected outcomes remain unchanged.

V. Support Agency Comments

VT DEC indicated its support for the enhancements to the containment remedy set forth in this ESD in a letter dated January 11, 2011 (Attachment A).

VI. Statutory Determinations

EPA believes that the remedy as modified herein will remain protective of human health and the environment, and satisfies the requirements in Section 121 of CERCLA. The changes proposed in this ESD have not changed the remedial action objectives for the Site. Rather, the enhancements will allow the remedy to continue to perform in the most cost-effective manner practicable while meeting all of the statutory requirements of CERCLA.

VII. Public Participation

In accordance with Section 117(d) of CERCLA and Section 300.825(a) of the NCP, this ESD and all the reports cited herein are included in the Administrative Record for the Site. The Administrative Record is available for public review at the repositories identified in the introduction to this document and as links from www.epa.gov/ne/superfund/sites/pinestreet

Although a formal comment period is not required when issuing an ESD, given the considerable public involvement in the remedy selected in 1998, EPA issued the ESD in draft to allow for public review and comment. Written comments were accepted between July 14 and August 15, 2011. A responsiveness summary documenting EPA's responses to comments and questions raised during the comment period is included as Attachment B. One comment was received during the comment period, and is also included in Attachment B.

As required by NCP section 300.435(c)(2)(i)(B), EPA will publish a notice of availability and a brief description of the actions set forth by this ESD in a major local newspaper of general circulation (*Burlington Free Press*).

Attachment A – VT DEC Concurrence Letter
Attachment B – Responsiveness Summary
Attachment C – ESD Administrative Record Index

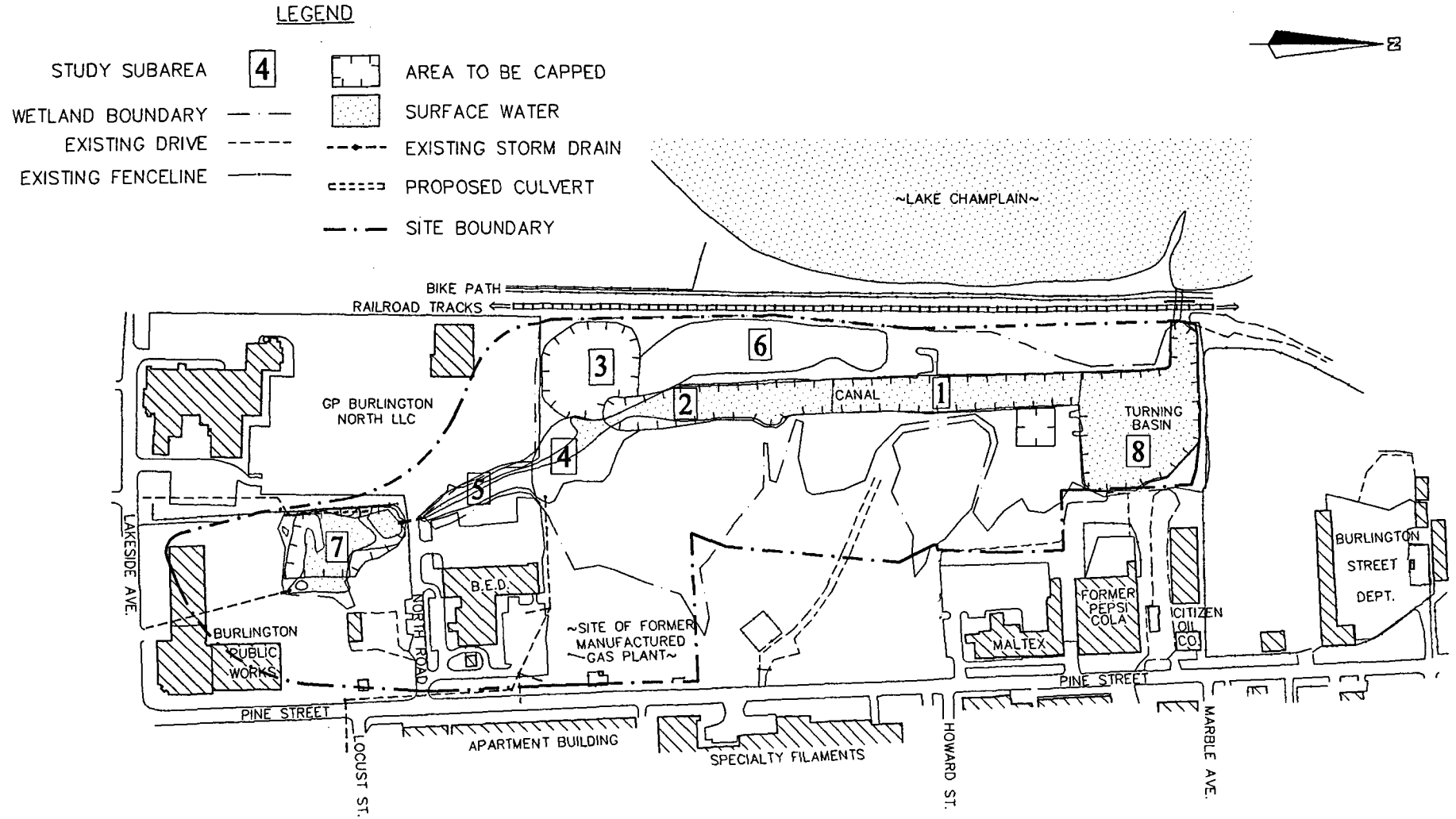


FIGURE FSP 1-1

OVERALL SITE PLAN
PINE STREET CANAL SITE
BURLINGTON, VERMONT

REVISED 3/25/02 TJK
PROPOSAL.dwg

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET MONTPELIER, VT 05602

DATE: 1/4/00 PROJECT: 1-0870-2
DRAWN BY: TJK SCALE: 1"=400'

Attachment A

VT DEC Letter of Concurrence

VERMONT

AGENCY OF NATURAL RESOURCES

State of Vermont
Department of Environmental Conservation
Waste Management Division
103 South Main Street/West Building
Waterbury, VT 05671-0404
(802) 241-3879
FAX (802) 241-3296
michael.b.smith@state.vt.us

11 January 2011

Ms. Karen Lumino
US EPA Region 1
5 Post Office Square
Suite 100 (OSRR 07-4)
Boston, MA 02109-3912

Dear Ms. Lumino:

The VT Department of Environmental Conservation, Waste Management Division, Sites Management Section (SMS) has reviewed the 17 December 2010 Johnson Company "Subsurface Investigation and Evaluation – Northwestern Well Area" for the Pine Street Barge Canal Superfund site in Burlington, VT. The SMS has the following comments.

1) VT is very concerned that the data collected in the recent Johnson Company investigation, during periodic site monitoring, and from other recent investigations of the barge Canal site demonstrate that dissolved phase Benzene is migrating in groundwater towards Lake Champlain. We also have determined that coal tar non-aqueous phase liquid (NAPL) is migrating in the subsurface towards the lake.

2) If NAPL or dissolved phase contamination from the Pine Street Barge Canal site reaches Lake Champlain it will pose an immediate and unacceptable threat to human health or welfare and the environment.

3) The SMS believes this is an emergency situation and the migration must be prevented as soon as possible, preferably by the end of summer 2011.

4) The Johnson Company report as referenced above is acceptable to the SMS as submitted.

5) We concur with the report and believe that a vertical barrier as detailed in the report is the best method to prevent NAPL and/or dissolved phase contamination in groundwater from migrating to the lake.

6) The potential location of the barrier wall detailed in the Johnson Company report is limited to a small area due to the presence of railroad tracks and due to geology. If the barrier is installed in this area as shown in the report, it will prevent the migration of NAPL and contaminants dissolved in groundwater towards Lake Champlain and prevent the immediate and unacceptable risk to human health or welfare and the environment posed by the migrating contamination.

7) If the barrier is installed where the existing infrastructure and geology limits installation it to the locations proposed by the Johnson Company, some residual dissolved phase contamination in groundwater between the barrier and the lake. The SMS is not concerned about this for the following reasons:
    a. Once the barrier is in place, the hydraulic forces causing migration of groundwater towards the lake will no longer drive the contaminated groundwater toward the lake and the rise and falling level in the lake will create an equilibrium condition where the contaminated groundwater near the wall will not discharge to the lake.
    b. Absence the presence of NAPL, the dissolved phase volatile organics in groundwater west of the barrier will readily naturally degrade. Monitoring of this natural attenuation that will occur is the only action the SMS believes is necessary to address this issue as long as the barrier is installed.

Thank you for reviewing our comments. I would like to again stress that the VT Department of Environmental Conservation, Waste Management Division considers the threat of migration of NAPL and/or dissolved phase groundwater contamination to Lake Champlain from the Barge Canal site a significant issue and emergency action is warranted to prevent this migration from continuing.

Sincerely,

Michael B. Smith
Hydrogeologist

cc: Margery Adams, US EPA (by email)
Chuck Schwer, VT Dept. Env. Conservation, Waste Management Division (by email)

Attachment B

Responsiveness Summary

Responsiveness Summary for the Explanation of Significant Differences
Pine Street Canal Superfund Site
September 2011

The U.S. Environmental Protection Agency (EPA) held a 32-day comment period from July 14 to August 15, 2011, to provide an opportunity for public review and comment on the differences between the remedial actions proposed and the remedy set forth in the Record of Decision (ROD) for the Site on September 29, 1998. The purpose of a responsiveness summary is to document EPA's responses to the questions and comments raised during the comment period.

The remedy selected by the 1998 ROD called for placing a sand and silt cap over contaminated sediments in the canal and turning basin. Construction of the cap was completed in 2003. In 2004, the cap was extended over a portion of the western bank of the canal, after it was discovered that coal tar and oil (collectively referred to as "nonaqueous phase liquid" or NAPL) was migrating to the surface along historic cribbing and the root system of dead trees. Oily sheens and globules of coal tar were once again observed floating on the surface water at the southern end of the canal in 2005. To address the ongoing releases, EPA issued an Explanation of Significant Differences (ESD) in 2009 that called for replacement and/or augmentation of the existing cap in a 350-foot stretch at the southern end of the canal. Construction of an amended cap took place over the fall and winter of 2010. Since the amended cap was constructed, no sheens or globules have been observed.

Neither coal tar nor oily sheens have been observed in the water or on the underwater cap at the northern end of the canal. However, starting in 2008, the results of bi-annual groundwater monitoring began to reflect an increasing trend in benzene concentrations at several locations between the canal and Lake Champlain. Accumulations of NAPL were also intermittently measured, and NAPL removed, from monitoring wells on the lake side of the canal. To address these concerns, this ESD calls for a 200-300 foot long vertical barrier to be installed at the northern end of the site, between the canal and Lake Champlain. The vertical barrier will be entirely below the ground surface and will be designed to contain NAPL and prevent contaminants in the groundwater (in the dissolved phase) from migrating off site. NAPL recovery wells will also be installed at strategic locations and NAPL removed, as necessary, to minimize the potential for coal tar and oil to migrate around or below the barrier. The existing groundwater monitoring program will be modified to increase monitoring on both sides of the barrier to verify its effectiveness.

The remaining components of the original remedy, as amended by the ESD issued in 2009, are unchanged.

The draft ESD and its supporting documentation were added to the Administrative Record for the Site and were made available for public review at the following locations:

EPA New England Records Center
One Congress Street, Suite 1100
Boston, MA
By appointment only: 617-918-1440

Fletcher Free Public Library
235 College Street
Burlington, VT
802-865-7217

Bailey-Howe Library
University of Vermont
Burlington, VT
802-656-2138

EPA published a notice in the *Burlington Free Press* on July 8, 2011, and issued a press release on July 13, 2011, announcing the dates of the comment period and the availability of the Administrative Record. In addition, EPA mailed the draft ESD to members of the Pine Street Barge Canal Coordinating Council and other interested parties on July 1, 2011. One comment was received during the comment period (see attached), and is addressed below.

Comment

Rather than utilizing further containment measures to restrict the coal tar sediment, coal tar oil and contaminated ground water from migrating offsite at the Barge Canal site would it be more cost effective to remove the materials for offsite treatment? The sediment and oils could be thermally treated at the EMSI Thermal Desorber Facility located in Loudon, New Hampshire or at the Piney Creek Power Plant located in Clarion, Pennsylvania.

EPA Response to Comment

Use of the coal tar contamination at the Pine Street Canal Superfund site as a possible alternative fuel was one of several options considered by EPA and other members of the Pine Street Barge Canal Coordinating Council (PSBCCC) during the remedy selection process in the 1990s. After carefully evaluating all the feasible options and performing a comparative analysis using Superfund's nine criteria[1], the PSBCCC recommended, and EPA adopted, the capping remedy selected in the 1998 ROD.

Our knowledge of the behavior of NAPL in the subsurface at the Pine Street site and at other manufactured gas plant sites around the country has increased in the intervening thirteen years since the ROD was issued. EPA's approach to contaminated sediment sites has also evolved and since 2002, EPA generally recommends that source removal be an integral component at remedies such as Pine Street[2]. However, given that the selected remedy in 1998 called for capping materials in place, EPA believes that an iterative approach is preferable. Reasonable efforts should first be taken to ensure that the 1992

[1] Protection of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; cost; state agency acceptance; and community acceptance.

[2] *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (OSWER 9285.6-08), Feb 2002.

remedy can work as planned, rather than moving directly to removal of the coal tar and NAPL, which would present difficult technical problems at this Site.

EPA has several mechanisms it uses to modify remedies post-issuance of the ROD when site conditions change and/or the selected remedy is not functioning as intended. Remedy changes fall along a continuum from minor to fundamental based on scope, performance and cost. Removing coal tar and contaminated sediment from the site for off-site reuse would constitute a fundamental change to the remedy selected in 1998. EPA, after consulting with the State of Vermont, has made the determination that the capping remedy as amended by the actions described in this ESD will meet the remedial action goals set forth for the site without going through a fundamental change. EPA will continue to monitor site conditions and groundwater data to ensure that the vertical barrier performs as expected

No changes will be made to the ESD in response to this comment.

Pine Street Canal
Richard Turnbell to: Karen Lumino 07/18/2011 01:59 PM
Cc: Emily Zimmerman, michael.b.smith

History: This message has been replied to.

Karen,

Rather than utilizing further containment measures to restrict the coal tar sediment, coal tar oil and contaminated ground water from migrating offsite at the Barge Canal site would it be more cost effective to remove the materials for offsite treatment? The sediment and oils could be thermally treated at the EMSI Thermal Desorber Facility located in Loudon, New Hampshire or at the Piney Creek Power Plant located in Clarion, Pennsylvania. Attached is a copy of a poster regarding the treatment of coal tar waste as an alternative fuel.

Best regards,

Richard Turnbell
106 Miller Lane
Hubbardton, VT
(802) 273-2433 or (410) 820-9836

01_Turnbell.pdf

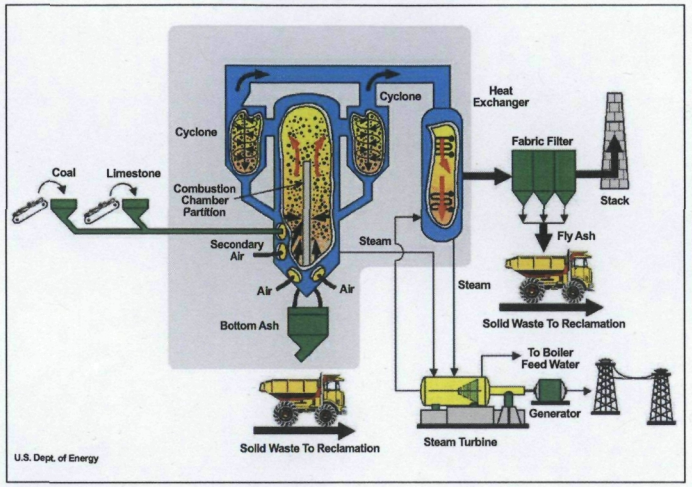
Co-firing Manufactured Gas Plant (MGP) Waste at Circulating Fluid Bed Power Plants

Fluid bed combustion is a clean coal technology capable of burning waste coal and industrial waste to produce steam and electricity while meeting stringent environmental requirements. Coal waste (refuse) is the low BTU-value waste material remaining from the coal mining process that is discarded by mining companies. Coal refuse consists primarily of rock with some attached carbon material that can not be separated from the rock. MGP waste consists of coal tar waste, purifier waste, coal tar soils and sediment from former MGP sites.

Circulating Fluidized Bed Systems

- Utilize fuels such as waste coal and MGP waste which have no other value
- Have low firing temperature reducing the formation of nitrogen oxides

The heart of a circulating fluid bed system (CFB) is a vertical chamber called the combustor. Large amounts of air are blown into the bottom of the combustor where fuel is added and suspended in air as it is burned to produce heat. The walls of the combustor are made of tubes containing water. These tubes absorb the heat from the burning fuel, in turn heating the water and converting it into steam. The steam is sent to a steam turbine to produce electricity. A CFB uses a unique process to capture sulfur dioxide (SO2) gas produced when the fuel is burned. As the fuel is burned, fine grained limestone is fed into the combustor and reacts with the SO2 to form gypsum. At the outlet of the combustor, cyclones separate solids from the exiting hot air stream.The cyclones use centrifugal force to separate the solids, returning them to the bottom of the combustor, where the fuel again burns and the limestone is used again to capture more SO2. This continuous recycling "circulating" of solids in the combustor provides a mixing and remixing of the fuel ensures that everything is burned thoroughly. Hot air leaving the cyclones is cooled and filtered in a baghouse before cleaned air is returned to the environment.



CFB diagram

Coal tar waste / waste coal

Gas plant waste for use as an alternative fuel

Colmac Resources, Inc. (CRI) provides a service to utilize non-hazardous manufactured gas plant waste materials as an alternative fuel at the Sunnyside Cogeneration Associates Power Plant (SCA) located at Sunnyside, Utah and the Piney Creek Power Plant (PCLP) located at Clarion, Pennsylvania. The Sunnyside & Piney Creek facilities have successfully reused more than 35,000 tons of non-hazardous coal tar contaminated waste generated from MGP and Coke Plant sites. One 53 MW & one 32 MW circulating fluid bed boiler are using the waste to produce electricity.The boilers use waste coal as the primary fuel. MGP waste materials entering the plants are metered into the coal handling system at a ratio of up to 10%

COLMAC RESOURCES, INC.

alternate fuel. Conveyors transport the coal and waste to hammer mill crushers where the material is reduced to less than one-quarter inch size prior to burning. All waste material is burned with the exception of metal, which is magnetically removed prior to crushing. Gate tip fees for MGP waste are approximately $ 40 per ton based on fuel heat value and sulfur content. Ash by-products of combustion are beneficially reused at operating strip mines or former coal mine sites for acid neutralization and stabilization of overburden.

Average fuel value for waste coal and MGP waste utilized at the power plants is:

Waste Coal as Received	MGP Waste as Received
6,800 Btu/lb.	600 – 10,500 Btu/lb.
<40% Ash	<90% Ash
<3% Sulfur	<4% Sulfur
<10% Moisture	<30% Moisture
15-22% Volatile Matter	<80%Volatile Matter

Coal tar remediation site

Piney Creek Power Plant

Modified operating permits

The Piney Creek and Sunnyside Power Plants modified their existing Title V Operating permits to allow the use of MGP waste as an alternative fuel. The Piney Creek Power Plant conducted stack emission tests for zinc, arsenic, beryllium cadmium, hexavalent chromium, lead, mercury, nickel, dioxins, furans, acid gases, HCL, SOx, NOx, CO, particulates and other organic Products of Incomplete Combustion, such as Poly Aromatic Hydrocarbons, Polycyclic Organic Matter and Benzene, Toluene, Ethyl Benzene and Xylene. The facility used the results of the emission tests to conduct modeling for the pollutants of concern. In addition, an inhalation risk assessment was conducted to evaluate the excess lifetime cancer risk and noncancer risk introduced by the use of the fuel-mixture.

10 % fuel additive would pose no additional health risk

The Pennsylvania Department of Environmental Protection determined that the use of the 10% fuel additive would pose no additional health risk over the use of the existing fuel. Based on the analysis of the emission test results, the emissions increase associated with burning the 10% blend with the existing fuel would be less than significant. The Piney Creek Power Plant also has a General Permit for coal tar residual and solid waste including the beneficial use of ash produced during the combustion of coal tar waste. The ability of CFB technology to utilize a wide range of fuels, including difficult to burn MGP waste, helped both power plants improve operating costs. If you have any questions or would like more information or a site visit, please call Richard Turnbell at (410) 820-9836 or email him at rht@atlanticbb.net.

COLMAC RESOURCES, INC.

Attachment C

Administrative Record Index

Pine Street Canal
NPL Site Administrative Record
Explanation of Significant Differences
(ESD)

Index

ESD Dated: September 2011
Released: September 2011

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record for the Pine Street Canal Superfund Site, Burlington, Vermont, Explanation of Significant Differences (ESD), released September 2011. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This record includes, by reference, the administrative records for the removal action issued March 8, 1985, the removal action issued December 20, 1988, the Record of Decision (ROD) issued September 29, 1998, the Explanation of Significant Differences (ESD) issued April, 2009 and the Draft Explanation of Significant Differences (ESD) for public Comment released July 2011.

The administrative record is available for review at:

EPA New England Superfund Records and Information Center
1 Congress Street, Suite 1100 (HSC)
Boston, MA 02114
(by appointment)
617-918-1440 (phone)
617-918-1223 (fax)
www.epa.gov/region01/superfund/resource/records.htm

Fletcher Free Public Library
235 College Street
Burlington, VT 05401
http://www.fletcherfree.org/

University of Vermont
Bailey-Howe Library
Burlington, VT 05401
http://library.uvm.edu/

An administrative record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Please note that the compact disc(s) (CD) containing this Administrative Record may include index data and other metadata (hereinafter collectively referred to as metadata) to allow the user to conduct index searches and key word searches across all the files contained on the CD. All the information that appears in the metadata, including any dates associated with creation of the indexing data, is not part of the Administrative Record for the Site under CERCLA and shall not be construed as relevant to the documents that comprise the Administrative Record. This metadata is provided as a convenience for the user and is not part of the Administrative Record.

Questions about this administrative record file should be directed to Karen Lumino, EPA's remedial project manager for the Pine Street Canal Superfund Site, at 617-918-1348 or lumino.karen@epa.gov.

Phase 05: RECORD OF DECISION (ROD)

216973 **RECORD OF DECISION (ROD)**

# of Pages: 322
Doc Date: 09/29/1998

Author: -US EPA REGION 1

Addressee:

Doc Type: DECISION DOCUMENT
RECORD OF DECISION (ROD)
REPORT

File Break: 05.04
Access Type(s): REL

482184 **DRAFT FOR PUBLIC COMMENT EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**

# of Pages: 11
Doc Date: 07/01/2011

Author: -US EPA REGION 1

Addressee:

Doc Type: DECISION DOCUMENT
EXP SIGNFICANT DIFF (ESD)
REPORT

File Break: 05.04
Access Type(s): REL

490678 **RESPONSIVENESS SUMMARY FOR EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**

# of Pages: 3
Doc Date: 09/01/2011

Author: -US EPA REGION 1

Addressee:

Doc Type: REPORT

File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

493211 **EMAIL REGARDING PUBLIC COMMENT ON RESPONSIVENESS SUMMARY FOR EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) (POSTER REGARDING THE TREATMENT OF COAL TAR WASTE AS AN ALTERNATIVE FUEL ATTACHED)**

# of Pages: 3
Doc Date: 07/18/2011

Author: RICHARD TURNBELL-HUBBARDTON (VT) - RESIDENT

Addressee: KAREN LUMINO US EPA REGION 1

Doc Type: EMAIL
PUBLIC (AND OTHER) COMME

File Break: 05.03
Access Type(s): REL

493729 **EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) - OU 01**

# of Pages: 31
Doc Date: 09/19/2011

Author: -US EPA REGION 1

Addressee:

Doc Type: DECISION DOCUMENT
EXP SIGNFICANT DIFF (ESD)
REPORT

File Break: 05.04
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

291830 **FINAL NON-AQUEOUS PHASE LIQUID (NAPL) INVESTIGATION REPORT**

# of Pages: 230
Doc Date: 02/01/2008

Author: GARRY E HORVITZ-ARCADIS
BARRY L KELLEMS-ARCADIS
PHILIP A SPADARO-ARCADIS

Addressee: GREEN MOUNTAIN POWER CORP

Doc Type: REPORT

File Break: 08.05
Access Type(s): REL

478696 **VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION COMMENTS ON SUBSURFACE INVESTIGATION AND EVALUATION, NORTHWESTERN WELL AREA**

# of Pages: 2
Doc Date: 01/11/2011

Author: MICHAEL SMITH-VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Addressee: KAREN LUMINO US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME

File Break: 08.01
Access Type(s): REL

478697 **SUBSURFACE INVESTIGATION AND EVALUATION, NORTHWESTERN WELL AREA (12/17/2010 TRANSMITTAL LETTER ATTACHED)**

# of Pages: 156
Doc Date: 12/13/2010

Author: DONALD M MAYNARD-JOHNSON COMPANY

Addressee: THOR HELGASON DE MAXIMIS INC
NORM TERRERI GREEN MOUNTAIN POWER CORP

Doc Type: REPORT

File Break: 08.09
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

487322 **MEMO REGARDING SHALLOW OVERBURDEN GROUNDWATER QUALITY DATA**

# of Pages: 5
Doc Date: 07/01/2010

Author: DONALD M MAYNARD-JOHNSON COMPANY

Addressee: THOR HELGASON DE MAXIMIS INC

Doc Type: CORRESPONDENCE
LETTER

File Break: 08.01

Access Type(s): REL

493213 **LETTER REGARDING ENHANCEMENTS TO THE REMEDY SELECTED IN RECORD OF DECISION (ROD)**

# of Pages: 4
Doc Date: 07/01/2011

Author: KAREN LUMINO-US EPA REGION 1

Addressee:

Doc Type: CORRESPONDENCE
LETTER

File Break: 08.01

Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

482182 **PUBLIC NOTICE OF SUMMER 2011 WORK ON SITE**

# of Pages: 1
Doc Date: 07/06/2011

Author: -US EPA REGION 1

Addressee:

Doc Type: PUBLIC INFORMATION

File Break: 13.03
Access Type(s): REL

487352 **NEWS RELEASE: COMMENTS SOUGHT ON REVISED CLEANUP PLAN FOR BURLINGTON'S PINE STREET**

# of Pages: 2
Doc Date: 07/13/2011

Author: -US EPA REGION 1

Addressee:

Doc Type: PRESS RELEASE
PUBLIC INFORMATION

File Break: 13.03
Access Type(s): REL

Number of Documents in Administrative Record: 12

EPA Region 1 AR Compendium GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region 1 OSRR Records and Information Center in Boston, Massachusetts.

TITLE	DOCDATE	OSWEREPAID	DOCNUMBER
PRINCIPLES FOR MANAGING CONTAMINATED SEDIMENT RISKS AT HAZARDOUS WASTE SITES	12-Feb-02	OSWER 9285.6-08	C565