

## SECTION 5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

EPA made the determination during the last five-year review that the remedy is currently protective, except for the subaqueous cap in portions of Areas 1 and 2 (USEPA, 2006). EPA also concluded that the remedy will not be protective in the future without a mechanism in place to determine compliance with the institutional controls that have been established to restrict land and groundwater use at the Site.

Two additional issues that the 2006 *Five-Year Review Report* indicated must be evaluated included:

1. The potential for a vapor intrusion to indoor air pathway, and the potential for this pathway to impact current and future indoor receptors; and
2. The ability of the existing compliance monitoring program to adequately monitor performance standards for contaminant migration given new site conditions.

Each of these topics is addressed in the following sections.

### 5.1 Subaqueous Cap in Areas 1 and 2

EPA determined that the subaqueous cap in the southern portion of the canal between approximately T9 and T13 (Figure 3) was not protective because it (a) did not meet the performance standard for isolation of contaminants, (b) exceeded the ecologically-sensitive benchmarks established in the ROD, (c) exposed fauna living in and around the canal to highly-contaminated waste in the form of free-phase NAPL and (d) may constitute a loss of benthic habitat. There, coal tar underlying the sand cap was migrating upwards through the cap into the water column, and significant seepage into the canal had occurred.

The Performing Defendants conducted field investigations under the supervision of EPA and VTDEC in 2006 and 2007 to evaluate the rate at which NAPL was being released, its distribution, and mechanism(s) of release. Those studies concluded that the primary mechanism for the release of NAPL in the area between T9 and T13 was gas ebullition (ARCADIS, 2008a). The organic-rich canal sediment and peat beneath the sand cap generates gas, presumed to be methane. As the gas passes through the contaminated sediment, it can become coated with NAPL. Coated bubbles pass through the sand cap and when they hit the water surface and burst, an oily sheen is left behind. The path that the gas takes through the sand can act as a pore through which additional coal tar can migrate. Depending on the density of the coal tar, it either accumulates with the sheens on the water surface, or sinks and accumulates on the cap surface.

In 2008, the Performing Defendants evaluated options that could be implemented as partial replacement for, augmentation of, or addition to the existing cap to prevent NAPL from seeping into the canal (ARCADIS, 2008b). In April 2009, following a 30-day public comment period, EPA issued an Explanation of Significant Differences (ESD) for the modification of the sand cap. Following discussions with EPA and VTDEC, the Performing Defendants designed a modification, referred to as the Amended Cap (ARCADIS, 2010). **The Amended Cap was constructed from August 2010 to February 2011, as follows:**

- Removal of 800 yd<sup>3</sup> of existing sand cap between approximately T9 and T12+50 via vacuum dredging and off-site disposal.
- Placement of the following cap components, from bottom to top:
  - geocomposite layer
  - reactive core mat (three layers overall, with up to six layers in some areas near the west bank)
  - turf reinforcement mat
- Installation of ten NAPL monitoring and recovery wells, five each on the east and west banks.
- Restoration and seeding.
- Long-term operation, maintenance and monitoring.

Due to the absence of a surface sand layer in the Amended Cap, the cap mid-depth chemical, sediment trap and habitat restoration performance standards established in the RD/RA SOW are no longer applicable. However, the performance standard for the isolation of contaminants that requires that contaminant migration through the cap be minimized is still applicable to the Amended Cap and the long-term monitoring program has been revised to include monitoring for visual sheens, potential gas build-up, and the removal of NAPL from monitoring/recovery wells.

## 5.2 Institutional Controls

Institutional controls (easements that restrict certain activities on the site) have been placed on parcels on the Site and adjacent to the Site.

In the last five-year review, EPA concluded that the remedy will not be protective in the future without a mechanism in place to determine compliance with the institutional controls that have been established to restrict land and groundwater use at the site.

In September 2007, EPA conditionally approved the *Institutional Controls Plan* (H&W, 2004) which contains a mechanism to monitor and maintain compliance with the institutional controls. Each landowner must submit an annual certification to EPA in form attached in Attachment 1, stating whether they have complied with the institutional controls required in the Consent Decree:

## 5.3 Vapor Intrusion

The subsurface vapor intrusion to indoor air pathway was not considered in the risk evaluations for the 1998 ROD. EPA concluded in the last five-year review that the potential for this pathway to impact current or future indoor receptors must be evaluated. Per EPA guidance developed after the 1998 ROD was issued (USEPA, 2002), the vapor intrusion pathway should be evaluated at buildings that are within approximately 100 feet laterally or vertically of known or interpolated soil gas or groundwater contaminants. Groundwater data collected from monitoring wells at the Site that are sampled for performance monitoring are not in the vicinity of occupied buildings. However, a review of historical groundwater data indicates that groundwater concentrations in excess of EPA's vapor intrusion screening

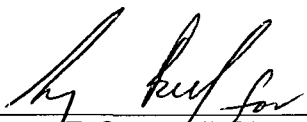
Superfund Records Center  
SITE: PINE STREET CANAL  
BREAK: 8.3  
OTHER: 501469

**Second Five-Year Review Report**  
  
**for**  
  
**Pine Street Barge Canal Superfund Site**  
  
**Burlington,**  
  
**Chittenden County, Vermont**

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