As conceived in the AFS, the subaqueous cap in Subareas 1, 2, and 8, will be constructed of layers of sand and silt. A final cap thickness of 1 to 1.5 feet above the current bottom elevation will likely be sufficient to chemically isolate the PAHs and metals in the sediments in the canal and turning basin. Analysis of site-specific cap design requirements will be conducted to identify necessary elements in the final design to ensure satisfactory performance in the field. For example, it may be necessary to place at least 2.5 to 3 feet of capping material to attain the final cap thickness, after settling and consolidation occurs. The cap design must provide resistance to erosion caused by surface currents, waves caused by wind, and propeller wash, as well as a barrier to the effects of borrowing bottom dwelling organisms (bioturbation). It is not expected that excavation of existing bottom sediments prior to placement of the cap will be required to limit increases in the elevation in the bottom of the canal; however, this issue will be reevaluated during design. If it is determined that excavation is required, sediments would be dredged from the canal and transported by pipeline or truck to the turning basin for on-site disposal.

The method for placement of the subaqueous cap is expected to be hydraulic placement, as described in Section 3.5.1 of the AFS. This would require placement of the cap over and around the five sunken barges in the canal and turning basin, and would require measures to minimize disturbance. State and federal law require mitigation of the adverse effects of the remedial action on these potentially historic resources. The barges and other potential historic structures will be recorded and documented, prior to placement of the cap.

One important feature of this alternative is the construction of a permanent weir at the mouth of the turning basin where it enters Lake Champlain. This weir would will be constructed in the approximate location of the existing beaver dam and will maintain a water level of 96 feet above MSL or greater. The weir will not cause significant additional inundation during periods of high water, and will help maintain an adequate surface water depth where the subaqueous cap is constructed. The weir will also help to reduce the potential for cap erosion. Based on historic lake level records, the weir will not hinder fish migration between the Lake and canal.

Construction of the subaqueous cap will follow the steps listed below:

- mobilization and site preparation;
- site clearing to remove trees, brush, and grass from cap area;
- construction of a permanent weir and a temporary turbidity curtain over the mouth of the canal to prevent the potential migration of contaminants;
- excavation of sediments from areas to be capped, if required to maintain wetlands functions, with disposal in the turning basin;
- construction of subaqueous cap;
- wetland restoration or replacement; and,
- site restoration.

In order for the subaqueous cap to be effective, it must prevent the migration of contaminants (by erosion, diffusion, advection or bioturbation) from the underlying contaminated sediments through the cap, and then their contact with benthic organisms and fish in the biologically active portion of the canal bottom at ecologically harmful levels. Performance standards for physical, chemical and biological characteristics of the cap will be developed during the design phase. Post-construction,

ENVIRONMENTAL PROTECTION AGENCY
REGION I

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PINE STREET CANAL SUPERFUND SITE
BURLINGTON, VERMONT

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Since the installation of the ISCO sampler, there was only one storm event that exceeded the ARI peak storm through late December 2005. However, no samples were collected due to an incorrect application of the modeled trigger stage to the data logger program.

No conclusion can be drawn at this time regarding whether this performance standard is being met. Peak storm events will continue to be monitored and a conclusion regarding protectiveness will be drawn in the next five-year review.

6.3.1.5 Cap Physical and Chemical Data Review. The cap includes the subaqueous cap (Areas 1, 2, and 8), the emergent wetlands cap in Areas 3 and 7, and a topsoil cover of the scrub/shrub uplands/wetlands south of Area 8 (100 x 100 foot area). The purpose of the cap is to contain and isolate contaminated sediments through the placement of clean materials over existing substrate and minimize migration of contamination to the surrounding environment. The performance standard for the subaqueous cap is to "*prevent contact between the underlying contaminated sediments and benthic organisms and fish in the biologically active portion of the benthic habitat (1-10cm) at the ecologically harmful levels. It shall be a barrier to the effects of burrowing benthic macroinvertebrate organisms (bioturbation). It shall prevent or minimize the migration of contaminants (by erosion, diffusion, advection, or bioturbation) from the contaminated sediments through the cap. It shall also provide resistance to erosion caused by surface water currents, waves caused by wind, ice scouring, and propeller wash, as well as the effects of bioturbation*".

The additional performance standard for Areas 3 and 7 is "*to provide a suitable substrate for wetland plant species*" and for the 100 x 100 foot area is "*to provide suitable substrate for wetland plant species*".

Performance monitoring of subaqueous cap integrity includes physical inspection, chemical monitoring of cap core samples and comparison to benchmark values[1] identified in the RD/RA SOW, and biological monitoring to verify that the cap prevents migration of contaminants from the underlying contaminated sediments through the cap and contact with benthic organisms and fish at ecologically harmful levels. The performance standard for the other cap areas includes long term regular inspections to assess physical integrity of the cover and identify erosion or signs of failure (USEPA, 2000).

Bathymetry measurements are to be conducted in year 1, 3, 5, and 10 after construction completion. Seepage measurements are to be conducted in year 1, 3, and 5 after construction completion. Cap core sampling and visual inspection of the cap are to be performed annually.

Physical Monitoring. Cap core thickness assessment was conducted in the canal and turning basin (Areas 1, 2, and 8), Area 3 and Area 7 during the post construction period in 2005 (JCO, 2005c). Bathymetric surveys of the open water areas (within Areas 1, 2, 5, and 8) were conducted in 2003 and four times during the post-construction period in 2005 (JCO, 2005c). Topographic surveys of Areas 2, 3, 7, the 100 x 100 foot area, and the west bank cap were conducted in November 2005 (JCO, 2005c).

[1] Sediment benchmark values established by the 1998 ROD (Appendix B) and determined to be ecologically protective are based on NOAA Sediment Screening Guidelines (ER-Ms, Long, et al 1995) values for total PAHs, individual PAHs, copper, lead, mercury and zinc.

Five-Year Review Report

for

Pine Street Barge Canal Superfund Site

Burlington,

Chittenden County, Vermont

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