PURPOSE

The purpose of this outline is to provide guidance to the Pine Street Coordinating Council and its working groups in the development of a Statement Of Work (SOW) for further study at the Pine Street Site. It includes general questions, possible data gaps identified through public comments, and suggestions for future data collection.

SELECTED APPLICABLE EPA GUIDANCE FOR RI/FS AND RISK ASSESSMENTS

National Contingency Plan (NCP) (40 CFR Part 300).


A Compendium of Superfund Field Operations Methods: Volumes 1 and 2 (EPA/540/P-87/001a and EPA/540/P-87/001b, August 1987).


Section 404(b)(1) Guidelines of the Clean Water Act regarding wetlands. In addition, Executive Order 11990 "Protection of Wetlands", May 24, 1977, concerns all impacts to wetlands and Executive Order 11988 "Floodplain Management" is involved where actions are to be evaluated in regard to projects which may impact a floodplain.


EPA RESPONSIBILITIES

EPA must:

A. Make a risk management decision.
B. Select a remedy that meets the nine criteria set out in the National Contingency Plan (NCP), including the threshold criteria of protection of human health and the environment, and compliance with ARARs.
C. Consider the site as itself in any remedy decision, as well as the effect of the site on the lake.

SCOPE OF SOW

Based on public comment, the following four broad areas have been identified for further consideration:

I. Contaminant Fate and Transport
II. Human Health Risk
III. Ecological Risk
IV. Evaluation of Remedial Alternatives

The following sections outline EPA's suggestions for the objectives of further study, the questions to be answered, data needs identified by EPA from public comment for each of these areas.
I. Contaminant Fate and Transport

A. Objectives

1. Identify data which will produce a better understanding of contaminant fate and transport at the site in order to:
   a. reevaluate the need for remedial action objectives to prevent further migration
   b. reevaluate the effects of potential remedial alternatives on the transport and fate of contaminants

B. General Questions

1. Actual or potential transport of contaminants to Lake Champlain
2. Extent of contamination west of the canal
3. Extent and rate of natural biodegradation
<table>
<thead>
<tr>
<th>Question</th>
<th>Data Need</th>
<th>Suggested Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contaminant Fate and Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Water flux</td>
<td>inflow including stormwater runoff, CSO and process discharge, including natural fluctuations</td>
<td>monitoring of flow direction, volume, contaminant concentrations</td>
</tr>
<tr>
<td></td>
<td>outflow to lake from canal, inflow from lake to canal</td>
<td>monitoring of flow direction, volume, contaminant concentrations</td>
</tr>
<tr>
<td>Groundwater flux</td>
<td>natural fluctuations</td>
<td>continuous water level recorders in selected wells, periodic monitoring of all wells</td>
</tr>
<tr>
<td></td>
<td>influence of pumping wells</td>
<td>monitor volume and quality of pumping wells</td>
</tr>
<tr>
<td></td>
<td>groundwater transport to canal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>groundwater transport to lake</td>
<td>multilevel piezometers west of canal and in lake, especially sand unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>marine seismic to identify potential discharge zones</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Additional Information</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sediment transport</td>
<td>transport from canal to lake</td>
<td>bedload study, possible tracer study</td>
</tr>
<tr>
<td></td>
<td>transport in lake</td>
<td>information on longshore drift, prevailing currents</td>
</tr>
<tr>
<td>Natural biodegradation</td>
<td>rate and byproducts</td>
<td>may be able to use existing research data</td>
</tr>
<tr>
<td>Extent of contamination</td>
<td>extent of contamination west of canal</td>
<td>water quality samples from peizometers/wells between canal and lake, water quality samples from surface water/sediment interface in lake</td>
</tr>
</tbody>
</table>
D. Specific Data Needs Identified in Public Comments

NOTE: These items are in no particular order.

1. Contaminant migration under the no action scenario.
2. Retardance capability of silt/clay basin.
3. Actual effective gradients - horizontal and vertical.
4. Average permeability.
5. Effect of two phase flow.
7. Degree of continuity of free phase (pools or discontinuous pockets).
8. Migration of free phase through sediments.
10. Inclusion of colloidal particles in measurements of dissolved phase concentration (low flow sampling).
11. Lake sampling should utilize time composites at various seasons of the year during worst case weather conditions.
14. Extent of contamination west of canal.
15. Monitoring wells west of canal.
16. Long term monitoring of canal/wetlands discharge to Lake.
17. Extent to which contaminants have migrated into bedrock and extent to which geologic strata act as barriers.
18. Extent to which contaminated water flows west of the canal and discharges to Lake Champlain west of the railroad tracks.
20. Further characterization of canal sediments.
21. Quantification of groundwater discharge to Lake Champlain from western border of site.
22. Off-site migration of surface water during storm events and/or flooding of site at high lake levels.
23. Evaluate biological transport via fish and migrating birds.
25. Variability of vertical gradients due to lake level changes.
26. Existence of clay ridge in west of site (peat does
not extend to lake).
27. Lake currents and sediment deposition patterns.
29. Influence of beaver dam on site hydrology.
30. Rate of sedimentation in the canal and turning basin.
II. Human Health Risk

A. Objectives

1. Identify data which will be useful in support of additional human health risk assessment.

2. Identify types and amount of data which will be appropriate and sufficient to support risk management decisions.

B. General questions

1. Evaluate human health risk associated with fish consumption.

2. Reevaluate human health risk associated with exposure to surface water and sediment.

3. Reevaluate human health risk associated with ambient air.

4. Evaluate human health risks to a site worker based on exposure to subsurface soil.

5. Evaluate acute human health effects associated with dermal exposure to site soils.
C. Data needs and data collection methods suggested for consideration

<table>
<thead>
<tr>
<th>Question</th>
<th>Data Need</th>
<th>Suggested Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish consumption</td>
<td>Fish samples</td>
<td>Fish sampling to include metabolic byproducts which may impact human health</td>
</tr>
<tr>
<td>Surface Water &amp; Sediment</td>
<td>SW and Sed sampling</td>
<td>Recalculation of human health risk to include additional data</td>
</tr>
<tr>
<td>Ambient air</td>
<td>Air sampling</td>
<td></td>
</tr>
<tr>
<td>Site worker exposure to subsurface soil</td>
<td>Reevaluate exposure assumptions</td>
<td>Questionnaire of workers, etc.</td>
</tr>
<tr>
<td>Acute health effects</td>
<td></td>
<td>Literature search</td>
</tr>
</tbody>
</table>
D. Specific Data Needs Identified in Public Comment

NOTE: These items are in no particular order.

1. Likelihood of future use of area as a drinking water source.
2. Effect of former bottling plant operations with intake near the Site.
3. Worker exposure assumptions based upon actual site worker activities.
4. No comprehensive assessment of the health hazard due to remedial actions has been developed.
5. Fish consumption pathway including metabolic byproducts.
6. Inhalation of airborne VOCs pathway with detection limits lower than state standards.
7. Effect of background concentration.
8. Cancer potency of certain PAHs.
10. Lake water samples with detection levels lower than drinking water standards.
III. Ecological Risk

A. Objectives

1. Problem formulation

2. Identify appropriate assessment endpoints*.

3. Identify data (types, amount, collection methods) which will be appropriate and sufficient to serve as measurement endpoints* which will provide the basis for a revised ecological risk assessment.

4. Identify methodologies to be used for characterization of exposure and ecological effects.

5. Use "weight of evidence" approach instead of ecosystem assessment which would be very lengthy and costly.

B. General questions

1. Reevaluate likelihood of adverse effects to canal species.

2. Reevaluate likelihood of adverse effects to wetland species.

3. Reevaluate likelihood of adverse effects to lake species.

* "Risk Assessment Guidance for Superfund, Vol. II, Environmental Evaluation Manual" (EPA/540/1-89/001, March 1989), page 42, defines assessment and measurement endpoints as follows: "Assessment endpoints are those describing the effects that drive decision making, such as reduction of key populations or disruption of community structure. Measurement endpoints are those used in the field to approximate, represent, or lead to the assessment endpoint."

4. Data Needs and Data Collection Methods Suggested for Consideration
<table>
<thead>
<tr>
<th>Question</th>
<th>Data Need</th>
<th>Suggested Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adverse effects on canal species</td>
<td>macroinvertebrates</td>
<td>whole sediment bioassays</td>
</tr>
<tr>
<td></td>
<td>fish</td>
<td>histopathologic studies (especially for bottom dwelling species)</td>
</tr>
<tr>
<td></td>
<td>amphitbians</td>
<td></td>
</tr>
<tr>
<td>Adverse effects on wetland species</td>
<td>bioaccumulation potential</td>
<td>caged mussel uptake</td>
</tr>
<tr>
<td></td>
<td>quantification of wetland function and values</td>
<td>quantification for certain species using a Habitat Evaluation Protocol (HEP) (USF&amp;W)</td>
</tr>
<tr>
<td></td>
<td>exposure potential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>natural fluctuations of species</td>
<td>measurement of air &amp; soil PAH concentration in burrows &amp; lodges</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comparison with regional data</td>
</tr>
<tr>
<td>Adverse effects on Lake species</td>
<td>chronic and subchronic effects (using indicator species including mammals, birds, reptiles, and amphibians)</td>
<td>histopathological studies</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Adverse effects from site-related contaminants</td>
<td>use of reference site</td>
<td>biomarker studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland mitigation</td>
<td>evaluation of threatened critical wetlands in the Burlington and Southern Lake Champlain area for possible offsite mitigation</td>
<td>field population studies long enough to observe natural life cycle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fisheries study to determine interconnection between canal and lake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reference site for population studies, toxicity studies, effects studies, macroinvertebrate studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>consultation with governmental and environmental groups, including the Nature Conservancy, to identify potential wetland sites</td>
</tr>
</tbody>
</table>
C. Specific Data Needs Identified in Public Comment

NOTE: These items are in no particular order.

1. Contaminant mobility reduction performance of existing wetland.
2. Degree of contamination of proposed replication site and its ability to duplicate the function of the existing wetland.
3. A thorough understanding of the existing wetland and its functions.
4. The effect of groundwater pumping on wetland replication.
5. Bioavailability of contamination in sediments.
6. Sufficient sampling activities to provide the basis for quantitative analysis of the Site's ecological condition.
7. Sufficient data to compare the relative abundance of muskrat populations.
8. Limitations in the comparability of the Mallets Creek reference site.
9. Actual bioaccumulation of PAHs.
10. Dermal contact model based upon appropriate exposure values.
11. Appropriate air concentration in burrows for inhalation pathway.
12. Appropriate exposure depth for canal, wetlands and uplands.
15. Studies comparing canal benthic populations to Burlington Harbor benthos.
16. Samples of bottom-dwelling fish from the canal.
17. Cellular, tissue, or reproductive studies of fish.
18. Impact of weather patterns and natural disturbances.
19. Trends in the contamination or viability of biotic communities.
20. Evidence that indicates toxics are being transported through the food chain based on movement of species to and from the Lake.
22. More intensive canal sediment sampling program considering temporal and spacial variability.
23. Laboratory or field toxicity testing of sediments.
24. Fish population study: reproduction, histopathology, metabolic breakdown products, contamination of fish leaving canal.
25. Screen wildlife for symptoms such as reproductive failure, teratogenic effects in offspring.
26. Effects of non-site related contaminants and physical factors such as bottom type on benthic community.
27. Sedimentation rate in canal.
IV. Evaluation of Remedial alternatives

A. Objectives

1. Identify data which will be useful in support of additional evaluation of remedial alternatives.

2. Focus additional evaluation on non-intrusive technologies, innovative technologies, and recycle/reuse alternatives.

3. Evaluate possibility of phasing site remediation i.e. dividing site into operable units.

4. Focus additional evaluation on short-term impacts of remedial alternatives.

B. General questions

1. What is potential for use of treatment technologies which have not been previously evaluated?

2. What is potential for use of recycle/reuse alternatives?

3. What is potential for use of non-intrusive treatment/containment technologies which have not been previously evaluated?

4. What is potential for remediation of the canal sediments prior to a full evaluation of the rest of the site?

C. Data Needs and Data Collection Methods Suggested for consideration

1. Site specific treatability studies of those technologies under consideration, including in-situ subaqueous solidification.

2. Initial screening and detailed evaluation of recycle/reuse alternatives including asphalt batching and cogeneration of coal tar wastes.

3. Initial screening and possible detailed evaluation and treatability studies of new technologies (especially innovative technologies) not considered in the previous feasibility study.
4. Technology pilot tests and physical sampling; could include free phase yield, air emissions, slope stability, dewatering, consolidation tests, column tests for dewatering.

5. Evaluation of remediation of other coal tar and coal gasification plant sites.
D. Specific Data Needs Identified in Public Comment

NOTE: These items are in no particular order.

1. Use of asphalt batching as a treatment technology.
2. Use of infrared desorption as a treatment technology.
3. Performance of bioremediation technologies used elsewhere for coal tar remediation.
4. Performance of IWT fixation technology.
6. Use of Molten Metal Technology (MMT) as a treatment technology.
7. Performance of Kipin Industries process.
8. Determine if minimal upgrades in the capacity of the canal wetlands will act as natural treatment/containment.
9. Reevaluate biodegradation and study in situ biodegradation.
10. Look at minimum engineering controls to control releases to Lake Champlain.
11. Solidification of canal bottom.
12. Data base research of implementation risks experienced or assessed at other former manufactured gas sites.