

**October 3, 2007 City Council Workshop
Tolend Road Landfill Update
Background Memo**

The Tolend Road Landfill Potentially Responsible Party (PRP) Group, including the City of Dover, have completed a significant portion of the required Pre-design Investigations outlined in the 2004 Amended Record Of Decision (AROD) issued by the EPA in September 2004. The Pre-Design Investigations focused on performing additional field work to answer questions about potential impacts to the Bellamy Reservoir, the Cochecho River, and the homes along Tolend Road immediately adjacent to the landfill, and to gather necessary information to facilitate design of the source control remedy, an air sparging trench.

Results of the pre-design studies completed to date will be presented at the workshop. The information obtained is very important and useful in moving closer to implementing a cleanup and permanent closure at the landfill. The new information suggests that the Group modify the remedy from a treatment trench to an extraction system of wells at the toe of the landfill. The Group has prepared a draft Focused Feasibility Study for EPA consideration. Recent discussions with EPA and the State of New Hampshire have been very positive with respect to this modification. The extraction well approach has several advantages:

- it can be fully implemented and operational two years sooner;
- it utilizes simpler technology elements to design, construct, and operate;
- it provides permanent effective treatment for all contaminants without the need for potentially costly contingent remedies; and
- it will cost significantly less to construct and operate.

I have attached a copy of the draft Executive Summary of the Focused Feasibility Study for your review prior to the meeting. This is an exciting development in the closure process. I look forward to sharing it with the City Council, the Solid Waste Advisory Committee and the community. I anticipate the change will receive community support because it implements an effective cleanup remedy faster, is less disruptive to the neighborhood, and is less costly.

EXECUTIVE SUMMARY
SOURCE CONTROL FOCUSED FEASIBILITY STUDY
DOVER MUNICIPAL LANDFILL SUPERFUND SITE
DOVER, NEW HAMPSHIRE

The 2004 Amended Record of Decision (AROD) selected a Source Control (SC) remedy for the Dover Landfill Superfund site in Dover, New Hampshire that employed an air sparging trench located at the downgradient perimeter of the Landfill to intercept and treat impacted ground water. The Source Control Focused Feasibility Study (SC-FFS) presented in this document compares the air sparging trench (SC-A) with an alternative (SC-Ex) that involves the use of an extraction well system located at the downgradient toe of the Landfill to intercept and transfer impacted ground water to off-site treatment at the City of Dover publicly-owned treatment works (POTW). This evaluation was prompted by and premised, in part, upon evaluation of new information obtained regarding:

- Southern Plume pre-design investigation (PDI) results indicating that the plume center of mass is located relatively close to the southwest corner of the Landfill footprint;
- data from the Northwest Landfill PDI indicating an area of relatively high concentrations of target constituents of concern (COCs) in northwestern corner of the Landfill; and
- data from the Air Sparging Trench PDI indicating the absence of other localized areas of significant COC impacts within the Landfill footprint and at its downgradient perimeter.

Alternative SC-Ex involves replacing the air sparging trench with a network of extraction wells. The 2004 AROD remedy (SC-A) included a separate ground water recirculation system installed at the southwest corner of the Landfill to address concentrations of tetrahydrofuran (THF) that exceed the treatment capacity of the trench. In Alternative SC-Ex, this system will be eliminated because the THF concentrations are treatable by the POTW. In addition, the use of hydraulic flow barriers to ensure capture in the trench will not be necessary in Alternative SC-Ex because of the flexibility of extraction well location and operation to ensure capture. Aside from these changes, the technical elements of Alternative SC-Ex are functionally equivalent to those of SC-A. Alternative SC-Ex was determined to be:

- simpler and faster to install;
- pose fewer uncertainties with respect to long-term operation and maintenance (O&M); and
- cost significantly less than SC-A.

2004 AROD SOURCE CONTROL REMEDY

The SC elements of the 2004 AROD remedy (Alternative SC-A) included (Part I, Section E, pages ii through iv, 2004 AROD):

- interception and treatment of impacted ground water using an air sparging trench located at the downgradient toe of the Landfill;

- removal from the Landfill perimeter ditch and drainage swale of sediment containing arsenic at concentrations above the Interim Cleanup Level (ICL) established in the 2004 AROD;
- maintenance of the existing vegetative cover over the entire Landfill to mobilize and convey COCs to the air sparging trench at the perimeter;
- removal of arsenic-impacted sediment from the perimeter ditch and drainage swale to meet the cleanup level (Part II, Section K.4(a)(2), pages 74 through 75, 2004 AROD) of 50 milligrams per kilogram (mg/kg);
- direct removal or pumping and treating of ground water with COC concentrations that may exceed the treatment capacity of the trench (e.g., in the area of the southwest corner of the Landfill where THF is present in ground water); and
- identifying and addressing areas of high COC contamination (hotspots) identified within the Landfill.

The 2004 AROD established two contingent SC remedies. The first involved designing the air injection systems installed in the air sparging trench so that they could be converted to use as extraction systems in the event that in-trench treatment was unable to attain Performance Standards (Part II, Section K.1, pages 66 and 67, 2004 AROD). The second contingent remedy involved abandonment of the air sparging trench approach and construction of the remedy selected in the 1991 Record of Decision (ROD), which included an impermeable cap and a ground water extraction system at the downgradient toe of the Landfill with transfer of the intercepted water and leachate to the City POTW for treatment (Part II, Section K.4.b(1), pages 75 and 76, 2004 AROD). The merits of the ground water extraction at the Landfill toe and treatment at the City POTW were thoroughly evaluated and established through the 100 percent design process for the 1991 ROD remedy, completed in 1996. (Hotspot identification and removal and treatment and removal of arsenic-impacted sediment were also included in the 1991 ROD remedy.)

ALTERNATIVE SOURCE CONTROL REMEDY

The proposed revised SC remedy (Alternative SC-Ex) would include:

- interception of impacted ground water at the downgradient toe of the Landfill (including THF impacts at the southwest corner of the Landfill) using a network of extraction wells;
- transfer of the intercepted water and leachate to the City POTW for treatment;
- removal from the Landfill perimeter ditch and drainage swale of sediment containing arsenic at concentrations above the 50 mg/kg cleanup level established in the 2004 AROD;
- maintenance of the existing vegetative soil cap on the Landfill to ensure flushing of COCs to the capture system for off-treatment; and
- identifying and addressing areas of high COC contamination (hotspots) identified within the Landfill.

The 2004 AROD and draft Statement of Work issued pursuant to the AROD identified several issues of uncertainty regarding the construction and operation of the air sparging trench component of Alternative SC-A that were sufficient to require several specific mitigation measures that included:

- construction and operational optimization of one segment of the air sparging trench prior to construction of the other segments;
- design requirements that would allow conversion of the air injection system to a ground water extraction system;
- design requirements for trench backfill cleaning and replacement to address possible clogging by inorganic precipitates; and
- specification of a contingent remedy involving construction of an impermeable cap and leachate control system, a remedy described in the AROD as “less protective” than Alternative SC-A.

The uncertainties identified regarding the leachate control elements of Alternative SC-A included:

- the constructability of the trench with regard to the reliability and quality of the air sparging system at depth, particularly in the area of the southwest corner of the Landfill where the depth to the marine clay layer is the greatest;
- the treatability of THF in the area of the southwest corner of the Landfill;
- the adequacy of residence time in the trench segment at the northeast corner of the Landfill to attain treatment Performance Standards for target VOCs due to higher ground water flow rates;
- reliably demonstrating trench performance, necessitating a more dense and complex monitoring network and associated higher monitoring costs;
- the potential for clogging of the trench backfill or the interface between the native aquifer material and the trench backfill by inorganic solids and possible biological growth during active operation of trench; and
- the long-term stability of precipitated arsenic after active operation of the air sparging trench ends with potentially high costs for treatment or removal if the arsenic proves to be unstable.

NEW INFORMATION

Newly obtained information from the recently completed PDI activities that influenced this proposed change to the SC remedy included:

- identification of the Southern Plume center of mass at a location relatively close to the southwest corner of the Landfill;
- confirmation of the presence of a hotspot of relatively high COC concentrations in ground water in the northwest portion of the Landfill that serves as a source of surface water VOC impacts in the northern portion of the perimeter ditch that ultimately discharges to the drainage swale and the Cochecho River;
- the absence of other COC hotspots within the Landfill;
- the presence of relatively dilute COC concentrations along and upgradient of most of the Landfill toe; and

- information from the Vapor Intrusion PDI indicating that the long-term flushing of COCs from the landfill in the absence of a Source Control measure has not resulted in unacceptable indoor air risks downgradient of the landfill.

Operation of an extraction system to address the Southern Plume will add uncertainty with regard to potential hydraulic interferences with the function of the sparging trench and the local THF recirculation system. The Southern Plume PDI results obtained to date indicated that the Southern Plume center of mass is located relatively close to the southwest corner of the Landfill. Because of the plume center of mass location, ground water extraction operations are likely to be sited relatively close to the western end of the air sparging trench with the resulting potential for hydraulic interference with the SC remedy function. In addition, the results of the Northwest Landfill and Trench PDIs obtained to date indicate that the Northwest Landfill hotspot may be the source of the THF impacts observed at the southwest corner of the Landfill. Accordingly, recirculation of ground water back into the Landfill footprint upgradient of the southwest toe may disperse the THF impact, complicating its treatment. In any event, recirculation will likely interfere with or reduce the efficiency of flushing to and capture by the trench of COCs present in the Northwest Landfill hotspot area.

RATIONALE FOR SOURCE CONTROL REMEDY CHANGE

Alternative SC-Ex eliminates the uncertainties associated with design and construction of the air sparging trench in Alternative SC-A. It provides:

- permanent, effective treatment of all identified COCs, including THF and arsenic, both of which require additional treatment systems or contingencies in Alternative SC-A;
- simpler technology elements to design, reliably construct at depth, and operate;
- efficient and cost-effective coordination with the Southern Plume ground water extraction and treatment remedy;
- efficient and cost-effective treatment of THF in the area of the southwest corner of the Landfill; and
- more flexible, cost-effective treatment of the relatively dilute COC concentrations located along and upgradient of the majority of the Landfill toe.

Alternative SC-A involves construction of six separate trench segments each with its own set of air blowers and pressurized injection points. In addition, it includes a contingency for THF extraction, aboveground treatment, and re-injection system with multiple pieces of associated mechanical equipment. Alternative SC-Ex employs a single technology with which there is substantial experience and that is substantially less mechanically complex, employing a set of ground water pumps that are readily available and easily and quickly replaced. With fewer and simpler mechanical elements, alternative SC-Ex is simpler and less costly to maintain with lesser potential for mechanical breakdowns that will compromise its effectiveness.

It is estimated that bringing the full air sparging trench to an operational and functional status will require a substantial period of time, currently projected to be October 2010. This lengthy schedule is necessitated by the AROD requirements for pilot testing and optimizing a single

trench segment before proceeding with design and construction of the other five segments. In contrast, Alternative SC-Ex is far simpler to design and construct and is estimated to be completed within six months, accelerating full-scale implementation of SC by approximately 2.5 years.

Alternative SC-A is estimated to cost \$14.1 million to construct and operate for 30 years. In addition to these costs, there are significant potential additional costs that might be incurred in the event that precipitated arsenic requires removal (\$900,000 for one trench segment). In contrast, Alternative SC-Ex is estimated to cost \$9.2 million to construct and operate for 30 years, substantially less than Alternative SC-A. Given the relatively dilute concentrations of COCs along and upgradient of approximately three-quarters of the downgradient Landfill toe, Alternative SC-Ex is more cost-effective than Alternative SC-A for the COC mass that will be removed and treated.

CONCLUSION

As described in the preceding paragraphs, new information obtained from recently completed PDI activities prompted evaluation of a revised SC component to the 2004 AROD remedy. The revised component, Alternative SC-Ex, will:

- provide permanent, effective treatment of all identified COCs without the need for contingency measures;
- employ simpler technology elements to design, construct, and operate;
- coordinate efficiently and cost-effectively with management of migration and hotspot remedies;
- be constructed and reach full operational status more than two years sooner than the 2004 AROD SC remedy; and
- cost significantly less to implement and operate than the SC components of the 2004 AROD remedy with far less uncertainty regarding long-term functionality and effectiveness.