Nyanza Chemical Waste Dump
Sudbury River, MA

U.S. EPA | HAZARDOUS WASTE PROGRAM AT EPA NEW ENGLAND

THE SUPERFUND PROGRAM *protects human health and the environment by locating, investigating, and cleaning up abandoned hazardous waste sites and engaging communities throughout the process. Many of these sites are complex and need long-term cleanup actions. Those responsible for contamination are held liable for cleanup costs. EPA strives to return previously contaminated land and groundwater to productive use.*

YOUR OPINION COUNTS: OPPORTUNITIES TO COMMENT ON THE PLAN

EPA is accepting public comment on this proposal from **June 25 2010** through **July 26, 2010**. The following two public informational meetings will include a presentation describing the proposed plan, followed by a question and answer session.

A supplemental public informational meeting will focus on the computer model (its calibration, sensitivity, and sources of uncertainty) that was developed to evaluate different remedial alternatives.

EPA will begin a formal 30-day public comment period. A Public Hearing has been scheduled for **7:00 p.m. Monday, July 19, 2010 at the Framingham Town Library** and the public has an opportunity to make oral comments for EPA to consider. You may also submit written comments – see page 11 to find out how.

Public Informational Meeting - Sudbury
Monday, June 21, 2010 at 7:00 p.m.
National Wildlife Refuge Complex (GMNWR)
73 Weir Hill Road, Sudbury, MA

Public Informational Meeting - Framingham
Tuesday, June 22, 2010 at 7:00 p.m.
Framingham Town Library
49 Lexington Street, Framingham, MA

Informational Meeting on Computer Modeling
Thursday, June 24, 2010 at 7:00 p.m.
National Wildlife Refuge Complex (GMNWR)
73 Weir Hill Road, Sudbury, MA

For further information about these meetings, call Jim Murphy of EPA's Community Affairs office at (617) 918-1028, or toll-free at 1-888-372-7341.

THE PROPOSED PLAN AT A GLANCE

After careful study of the impacts of mercury released to the Sudbury River from the Nyanza Chemical Waste Dump Superfund site, and in consideration of the contaminant reduction accomplished by cleanup activities at other parts of the site, EPA proposes the following cleanup actions for the Sudbury River, which EPA has defined as "Operable Unit 4" (or "OU4") of the Nyanza site. This Proposed Cleanup Plan addresses mercury contamination in fish tissue, which is where mercury from the river accumulates. These contaminated fish pose an unacceptable health risk to recreational anglers who consume them. There are no other unacceptable risks to humans or to animals and plants in the river. Consistent with actions at other contaminated sediment sites, this proposed cleanup plan relies on a combination of different cleanup alternatives that apply only to specific "reaches" of the river (refer to the attached map). The Proposed OU4 Cleanup action consists of:

continued >

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INTRODUCTION & HISTORY

The Nyanza Site was occupied from 1917 through 1978 by several companies that manufactured, among other things, textile dyes and dye intermediates. During the period of operation, large volumes of chemical waste were disposed in burial pits, below ground containment structures, and various lagoons scattered throughout the "Hill" section of the site. Wastes included partially treated process water, chemical sludge, solid process wastes, solvent recovery distillation residue, numerous organic and inorganic chemicals including mercury, and other products. Process chemicals that could not be reused or recycled were also disposed of on-site or discharged into the Sudbury River through a small stream referred to as Chemical Brook.

Mercury was used as a catalyst in the production of textile dyes from 1917 to 1978. Approximately 2.3 metric tons (2,300 kg) of mercury were used per year from 1940 to 1970, with a total of 45 to 57 metric tons of mercury released to the Sudbury River during this period. From 1970 until the facility closed in 1978, wastes were treated on-site and wastewater was discharged to Ashland's town sewer system. These revised treatment practices reduced the quantity of mercury released to the Sudbury River to between 23 and 30 kg per year or about 200 kg (440 pounds) during the final eight-year period.

In 1982, the Nyanza site was placed on the National Priorities List (NPL) by the U.S. EPA. EPA has since divided the site into four operable units, or OUs. This division into OUs has allowed EPA to have different teams work separately on discrete parts of the site. OU1 consists of the former Nyanza plant, inclusive of the landfill at the site; OU2 addresses contaminated groundwater; OU3 addresses contamination in the Eastern Wetland, Chemical Brook, Trolley Brook and Outfall Creek; and OU4 addresses contamination in the Sudbury River.

EPA has completed the cleanup actions selected for OU1 (consolidation of sludges under an impermeable cap) and OU3 (removal of contaminated sediments in the wetland, brook and creek). Cleanup work is ongoing at OU2 (extraction of contaminants from groundwater and installation of systems to mitigate vapors that might otherwise pass from contaminated groundwater into overlying homes). The cleanup action proposed in this plan is for OU4, the Sudbury River.

EPA has been studying the Sudbury River since the mid-1990s, issuing several research papers, three risk assessments, a computer model that shows how mercury moves through the river into fish, and most recently the feasibility study that led to this proposed plan. Because OU4 is large – the river spans 26 miles from the Nyanza site to its confluence with the Assabet River – the study area was divided into 10 "reaches." A "reach" typically represents a section of the river with a specific set of hydrological properties – an impounded area, a fast flowing area or, in the case of Great Meadows National Wildlife refuge, an expansive wetland.

- Enhanced Natural Recovery (ENR) consisting of the addition of a 6-inch layer of sand in a portion of Reach 3 (i.e., Framingham Reservoir 2) with the highest levels of mercury contamination in sediment. The addition of a sand layer effectively accelerates natural recovery processes by which contaminated sediment are normally buried and diluted.

- Monitored Natural Recovery (MNR) in other reaches of the river. Throughout much of the river, fish are expected to become safe for regular consumption within a reasonable timeframe through natural recovery and without any active remediation; EPA would continue to take samples to monitor this progress.

- Limited Action for Reach 8 including monitoring of contamination levels in fish to insure they are stable or declining, even if they do not decline to levels that would permit regular consumption by recreational anglers.

- "Institutional Controls" throughout the river – i.e., community outreach as well as posting and maintenance of signs advising against fish consumption where fish are unsafe for regular consumption. There are currently multiple State fishing advisories due to mercury.

- No Action for Reaches 5 and 7 since there are no unacceptable risks to either a child or an adult recreational angler in these reaches.

- Reviews will also be conducted every five years to evaluate the effectiveness and adequacy of the remedial measure.

The cost of the proposed remedy is estimated at $8.5 million. A more detailed description of the proposed plan begins on page 7.

EPA is also seeking comment on EPA's finding that the cleanup represents the least-damaging practical alternative regarding potential impacts to the aquatic environment in and around the river. Page 9 contains more detail regarding this finding. This Proposed Plan summarizes parts of the Draft Feasibility Study. The entire text of the Feasibility Study can be found at **www.epa.gov/region1/superfund/sites/nyanza**. In September 2010, EPA expects to have reviewed all public comments and will issue a Record of Decision (ROD) describing the chosen cleanup plan. The ROD and a summary of responses to public comments will then be made available to the public via the internet and at the site information repositories and at the Ashland Public Library.

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (Section 117), the statute which cre-

Remedial Alternatives Summary
Nyanza Chemical Waste Dump Superfund Site
Operable Unit 4 - Sudbury River
Ashland, Massachusetts

		Sudbury River Reaches								
Alternatives	**Remedial Action**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Alternative 1	**No Action**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alternative 2	**Limited Action (LA)**	LA	LA	LA	LA	LA	LA	LA	LA	LA
Alternative 3A	**Sitewide Monitored Natural Recovery (MNR)**	MNR	MNR	MNR	NA	MNR	NA	LA	MNR	MNR
Alternative 3B	**Enhanced Natural Recovery in Reach 3 > 10ppm**	MNR	Thin Layer Placement	MNR	NA	MNR	NA	LA	MNR	MNR
Alternative 3C	**Enhanced Natural Recovery in Reaches 3, 4 and 6 > 2ppm**	MNR	Thin Layer Placement	Thin Layer Placement	NA	Thin Layer Placement	NA	LA	MNR	MNR
Alternative 4A	**In Situ Containment in Reach 3**	MNR	Capping	MNR	NA	MNR	NA	LA	MNR	MNR
Alternative 4B	**In Situ Containment in Reaches 3, 4 and 6**	MNR	Capping	Capping	NA	Capping	NA	LA	MNR	MNR
Alernative 5A	**Dredging > 10ppm in Reach 3**	MNR	Partial Removal	MNR	NA	MNR	NA	LA	MNR	MNR
Alternative 5B	**Dredging > 10ppm in Reach 3, In Situ Capping in Reaches 3, 4 and 6**	MNR	Partial Removal/ Capping	Capping	NA	Capping	NA	LA	MNR	MNR
Alternative 5C	**Dredging > 2ppm in Reach 3**	MNR	Removal	MNR	NA	MNR	NA	LA	MNR	MNR
Alternative 5D	**Dredging > 2ppm in Reaches 3, 4 and 6**	MNR	Removal	Removal	NA	Removal	NA	LA	MNR	MNR

Notes:

1) Reach 1 is upstream of the Nyanza source area and therefore is not included in this summary.

2) Since there was no actionable risk identified for Reaches 5 and 7 they are not included in this summary.

Hg = total mercury

MeHg = methylmercury

mg/kg = milligrams per kilogram

MNR = Monitored Natural Recovery

ated EPA's Superfund program, and the National Contingency Plan Section 300.430(f)(2), this document summarizes EPA's cleanup proposal. For detailed information on the options evaluated for the site, see the Feasibility Study available for review at the information repositories at the Ashland Town Library and EPA's Five Post Office Square office in Boston.

MERCURY: WHERE IT COMES FROM, WHAT IT DOES

Mercury in the environment comes from specific or "point" sources such as Nyanza, from atmospheric sources, and from other diffuse or "non-point" sources. Combustion of municipal solid waste and combustion of fossil fuels for power generation are prime examples of atmospheric sources of mercury. Nationally, the northeast has been recognized as an area of increased atmospheric deposition of mercury. Recently there have been significant regional and federal efforts to limit non-point sources of mercury, including EPA's Clean Air Mercury Rule, which creates performance standards and establishes permanent, declining caps on mercury emissions.

Despite these efforts, mercury remains present in the environment at levels that have led the Massachusetts Department of Public Health (MassDPH) to maintain a State-wide fishing advisory. The State-wide advisory warns children and women who are or may become pregnant (i.e., the populations most sensitive to mercury) not to consume fish from any body of fresh water in the State.

At the Sudbury River, the former Nyanza facility presents an additional source of mercury. Thus, the concentration of mercury in the Sudbury River sediment (and as methylmercury in the surface water and fish) is a combination of mercury from historic Nyanza discharges as well as more recent atmospheric deposition. Since 1986, in addition to the state-wide fish advisory, MassDPH has established a Sudbury River-specific fish advisory, which warns all segments of the population (not just children and women who are or may become pregnant) against consumption of fish from the Sudbury River. Both advisories remain in effect today.

HOW MERCURY AFFECTS YOUR HEALTH

There are several different types of mercury. Although some are more dangerous than others, all are toxic. While mercury does not present a cancer risk to human health, it does have a number of non-cancer health affects. Depending on the type and amount, exposures to mercury can damage the nervous system, brain, kidneys, liver and immune system. One form of mercury, methylmercury, is extremely poisonous and can damage the brain even at low levels of exposure. Children are most sensitive to mercury toxicity. The developing brains and nervous systems of children are very sensitive to mercury and may be irreversibly damaged by it. Children and adults can be exposed to methylmercury by eating certain types of fish. Children can also be exposed to mercury in the womb if their mothers eat foods contaminated with this toxin. Because of the high sensitivity to developing children, mothers who are pregnant, or may become pregnant, are similarly at an increased risk for negative health effects from the consumption of mercury-contaminated fish.

The concentration of mercury in fish and the associated risk to humans from consumption of fish is not directly proportional to the concentration of total mercury in sediment. Most of the mercury that is absorbed by fish is mercury that has combined with organic matter in the river to form methylmercury, a compound which is more "bio-available" (and more toxic) than pure mercury. Certain parts of the river are more efficient than others at converting pure or elemental mercury into methylmercury – for example, the expansive wetlands in the Great Meadows National Wildlife Meadows (Reach 8) are an environment that is particularly efficient at converting elemental mercury into the methylmercury that tends to end up in fish tissue. This means that fish in this part of the river have relatively high mercury (i.e., methylmercury) concentrations even though the sediment there is far less contaminated than the sediment in other parts of the river.

RISK – WHY IS CLEANUP NEEDED?

The only significant site-related risk to humans comes from consuming mercury-contaminated fish on a frequent basis (i.e., more than 25 meals per year). In a risk assessment completed in 1999, EPA determined that direct contact (e.g., swimming, wading, walking) or incidental ingestion of mercury in surface water or sediment was well below the level that would constitute a significant risk to human health. EPA also determined in a prior assessment that there were no other Nyanza-related contaminants in the river other than mercury that might constitute a significant risk to humans.

The human health risk from the consumption of mercury-contaminated fish was reported in the 2006 Supplemental Human Health Risk Assessment and other follow-up studies. In EPA's determination of human health risk, the average concentration of mercury in fish within each reach was measured. This was done by collecting 10 bass, 10 perch, and 10 catfish from each reach – more than 300 fish from all 10 reaches. These particular species of fish were used because they are caught frequently and are target species for consumption. The human health assessment also includes exposure assumptions – that is, how much fish a person might eat in a year. Using data from comparable studies in Maine, EPA assumed that a recreational angler; that is, the person most likely to eat the most fish taken from the river, would eat 50 fish meals per year, half of which would come from the Sudbury River. This assumption is conservative – for example, it assumes that children would consume fish at this frequency notwithstanding the state-wide fish advisory that warns children and women who are or might become pregnant from eating any fish caught in any freshwater body in the State.

The risk assessment also calculated risks to subsistence anglers – people assumed to rely on fish from the Sudbury River for all or most of their protein intake. However, because EPA has found no evidence of subsistence fishing in the Sudbury River, EPA has decided not to base cleanup decisions on subsistence fishing scenarios.

EPA uses standard toxicological data and other assumptions (e.g., human body weight, fish filet weight) to develop reach-specific "hazard index" (or "HI") figures for non-cancer effects on human health; one for a child and one for an adult, based on consumption of fish caught from each reach of the river. The higher the HI, the higher the risk. Generally, an HI greater than 1.0 indicates an unacceptable exposure from eating fish in a given reach. The HIs for each reach for both children and adult recreational anglers are listed in the table below:

	Hazard Index	
	C	I
Reach 1*	1.0	0.5
Reach 2	1.8	1.0
Reach 3	2.1	1.2
Reach 4	1.3	0.7
Reach 5	0.9	0.4
Reach 6	1.3	0.7
Reach 7	1.0	0.5
Reach 8	1.3	0.7
Reach 9	1.5	0.9
Reach 10	1.4	0.7

**Reach 1 is upstream of the Nyanza site and is one of two reference areas.*

In general, risks throughout the river are low; Reach 3 (Framingham Reservior 2) presents the greatest risk. Specifically Reaches 2, 3, 4, 6, 8, 9, and 10 were found to pose varying degrees of risks to a child recreational angler. Only Reach 3 was found to pose an unacceptable risk to both a child and adult recreational angler. The maximum HI for children was 2.1 and attributable to fish caught and consumed from Reach 3. The HIs for the other reaches were between 1 and 2, with Reaches 1, 5, and 7 at or below 1.0 for children and adults.

EPA also evaluated whether contamination in the river poses an unacceptable risk to the environment – that is to say animals which inhabit or utilize the river – and found that it did not pose a risk. The 2008 Final Supplemental Baseline Ecological Risk Assessment reports the results of these studies. The assessment measured the concentration of mercury in various media (blood, feathers, eggs) for animals living in the Sudbury River watershed as well as those which reside in sediment (crayfish and mussels) and surface water (fish). These concentrations were then compared to literature values – i.e., values in published research found to have "no effects" or "low effects" on certain species. The majority (225 out of more than 229 measurement endpoints) of the concentrations from the Sudbury River samples were either below the "no effects level" or below the "low effects level." Thus, the ecological risk assessment concluded that contamination in the Sudbury River is not likely to result in population-level risk to animals or other organisms in or adjacent to this resource.

RISK SUMMARY:

- The only significant risk to human health is from eating fish contaminated with mercury, except in Reaches 5 and 7 where there are no risks to human health. There is also no significant risk to animals or other organisms in or adjacent to the river.
- There are no risks to human health from direct contact (e.g., swimming, wading, walking) or incidental ingestion of mercury in surface water or sediment in any part of the river.
- EPA assumes that the maximum reasonable exposure to mercury is to a child and adult recreational angler, who is assumed to consume 50 fish meals per year, half of which are assumed to come from the Sudbury River, consisting of equal parts of 3 local species (bass, perch and catfish)
- Based on the preceding, a likelihood of adverse health effects for the following receptors were documented:
  - to a child (in 7 reaches); and
  - to an adult (in 1 reach).

REMEDIAL ACTION OBJECTIVES FOR SUDBURY RIVER

EPA has determined that the risk to recreational anglers is an unacceptable threat to human health. The OU4 Feasibility Study was developed to identify cleanup options to address this threat. A first step in this process was to develop remedial action objectives (RAOs) – goals by which cleanup alternatives identified in the Feasibility Study can be evaluated. The RAOs for the Sudbury River are (1) to prevent the ingestion of mercury-contaminated fish to the extent that such ingestion would result in an unacceptable risk to human health; and (2) to reduce the amount of mercury available to fish in sediment and/or surface water to ensure mercury concentration in fish tissue no longer presents an unacceptable risk, except in Reach 8. According to the risk calculations described above, mercury concentrations in fish must be reduced to 0.48 parts per million (ppm, or milligrams per kilogram) to avoid unacceptable risks to a child recreational anglers, the most sensitive population.

The first RAO focuses on mercury concentrations in fish, because the only unacceptable risk is from consumption of these fish; prevention of consumption is one way to achieve the necessary risk reduction. The second RAO focuses on sediment and/or surface water. This is because sediment cleanups are one of the more effective ways (apart from discouraging fish consumption) of cleaning up surface water, which in turn is essentially the only way to make fish tissue less contaminated and safe for human consumption.

Sudbury River

This second RAO has an exception for Reach 8, the Great Meadows Wildlife Refuge. In this reach, sediment concentrations are low (generally between 1 and 3 ppm), yet fish tissue concentrations remain marginally above safe levels (HI=1.3 for a child angler). EPA believes that the risk in Reach 8 is largely attributable not to Nyanza mercury in sediment, but a) to ongoing mercury deposits from the atmosphere and other non-point sources and b) to the chemical and biological conditions in this wetland, which convert even small amounts of mercury in the reach into significant concentrations of methylmercury in fish. In fact, it appears that even if natural recovery processes eliminated unacceptable risks to human health attributable to Nyanza-related mercury, fish from this Reach might still be unsafe to eat due to ongoing atmospheric

pollution. On this basis, EPA has determined that it is inappropriate to clean up sediment and/or surface water in Reach 8, because doing so is unlikely to significantly reduce fish tissue concentrations. EPA's only goal in Reach 8, therefore, is the first RAO, which aims to prevent ingestion of contaminated fish.

EPA believes that, over time, risks in Reach 8 from Nyanza-related contamination should attenuate, but hydrological factors make fish in this reach vulnerable to even small amounts of mercury contamination, whether from the atmosphere or other non-point sources. As part of its proposed remedy for the river, EPA will continue to monitor fish tissue data to ensure that fish tissue concentrations in Reach 8 decrease or at least remain more or less stable over time. EPA will also ensure that institutional controls remain in place to advise against consumption of contaminated fish.

DESCRIPTION OF CLEANUP ALTERNATIVES FOR THE SUDBURY RIVER

In the Feasibility Study (FS) EPA considered a full range of options to address contamination and risks at a Superfund site before selecting a remedy. Only those alternatives that meet EPA's threshold criteria of protecting human health and complying with other environmental laws are summarized below, except that a "no action" alternative is also presented as a baseline. A more detailed description and analysis of each alternative developed is presented in the Feasibility Study, which is also available for public comment.

The cleanup options, or remedial alternatives, that were evaluated in detail and were considered for the Sudbury River are summarized below.

Alternative 1: No Action
The No Action alternative would not involve any type of work other than Five Year Reviews (i.e., reports every five years by EPA on conditions in the river). No monitoring data would be generated and no institutional controls (beyond those in existence) would be implemented to potentially reduce or limit the consumption of contaminated fish. EPA is required to evaluate this alternative by EPA's Superfund regulations, so as to provide a baseline for comparison to other alternatives.
Alternative 1 Cost: $ 0

Alternative 2: Limited Action
The Limited Action alternative is the same as Alternative 1, but relies on institutional controls

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– e.g., posting of fish advisory signs, public outreach and education – as a means of discouraging fish consumption and thereby reducing the risk to human health and may include monitoring. There are naturally-occurring processes that are expected to reduce mercury concentrations in sediment and ultimately to reduce concentrations of mercury in fish. These processes include physical processes (sedimentation and burial of contaminated sediments) and biological (biodegradation) and chemical (sorption) processes that act together to reduce the risk posed by a contaminant. In most reaches, fish contamination would decline to acceptable levels within a reasonable timeframe – i.e., within approximately 30 years through these natural processes. But in Reach 3 it is expected to take more than 70 years, and in Reach 8 fish contamination is expected to remain at unacceptable levels for a much longer period of time due to atmospheric sources of mercury.
Alternative 2 Cost: $ 192,000

Alternative 3: Monitored Natural Recovery and Enhanced Natural Recovery
Three variations of this alternative were evaluated (Alternatives 3A, 3B, and 3C). Alternative 3A utilizes Monitored Natural Recovery (MNR) for all reaches except Reach 8. This would consist of monitoring natural processes to confirm that reductions in fish tissue concentrations are occurring in those reaches where reductions are expected. Monitoring would also be conducted in Reach 8 to insure concentrations are stable or decreasing. Institutional controls (signs, public outreach) would also be implemented. Alternatives 3B and 3C are similar to Alternative 3A, except they contemplate the placement of a thin layer of sand on top of more highly contaminated sediments. The use of a sand layer in conjunction with monitoring is referred to as Enhanced Natural Recovery (ENR). In Alternative 3B a 6-inch thin layer of sand would be placed at locations in Reach 3 where total mercury in surface sediment uniformly exceeds 10 ppm, which constitutes about 70% of the reach. Alternative 3C evaluated the placement of sand over sediments with mercury above 2 ppm; this includes all of Reach 3, and large portions of Reach 4 and 6. Under alternatives 3B and 3C, the level of mercury contamination in fish in all reaches except Reach 8 is expected to decline to acceptable levels within a reasonable timeframe (i.e., less than 30 years).
Alternative 3A Cost: $1,070,000
Alternative 3B Cost: $8,500,000
Alternative 3C Cost: $22,190,000

Alternative 4: In-situ Containment
Alternatives 4A and 4B are similar to Alternative 3A; however they consist of two variations of "in-situ containment." In-situ containment relies on the installation of an isolation barrier over

contaminated sediment. In-situ containment is different from a thin layer of sand: while the sand would mix with and dilute contaminated sediment, the in-situ containment would function to prevent direct contact with contaminated sediment, reducing resuspension and providing chemical and physical isolation of contaminants. Alternative 4A would apply the barrier over sediments in Reach 3 only (Reservoir 2) where mercury concentrations exceed 2 ppm; Alternative 4B would apply the barrier over sediments exceeding 2 ppm of mercury in Reaches 3, 4 and 6. Institutional controls (signs, public outreach) would also be implemented and regular monitoring would be included in both alternatives. Under alternatives 4A and 4B, fish contamination in all reaches except Reach 8 is expected to decline to acceptable levels within a reasonable timeframe (i.e., less than 30 years).

Alternative 4A Cost: **$24,310,000**
Alternative 4B Cost: **$48,910,000**

Alternative 5: Sediment Removal

Alternatives 5A through 5D consist of four variations of a sediment removal. Sediment removal (via dredging) relies on the physical removal of mercury-contaminated sediments to reduce the mercury concentration in fish. Some of the removal alternatives would be implemented in tandem with other technologies, such as containment. Specifically, Alternative 5A contemplates removal of sediment with mercury greater than 10 ppm (regardless of depth) and would apply only to Reach 3 (Reservoir 2). Alternative 5B evaluates the effectiveness of removing Reach 3 sediments with mercury greater than 10 ppm and capping lesser-contaminated portions of Reach 3 as well as portions of Reach 4 and Reach 6. Alternative 5C contemplates sediment removal in Reach 3 where mercury is greater than 2 ppm – effectively the entire reach. Alternative 5D, the most comprehensive removal alternative, evaluates removal of sediment having mercury concentration greater than 2 ppm from Reaches 3, 4 and 6. In all of these alternatives, institutional controls (signs, public outreach) would be implemented along with regular monitoring activities. Under all these alternatives, 5A through 5D, fish contamination in all reaches except Reach 8 is expected to decline to acceptable levels within a reasonable timeframe (i.e., less than 30 years).

Alternative 5A Cost: **$59,710,000**
Alternative 5B Cost: **$88,510,000**
Alternative 5C Cost: **$99,820,000**
Alternative 5D Cost: **$213,920,000**

A CLOSER LOOK AT EPA'S PROPOSAL

After careful study of the remedial alternatives evaluated for the Sudbury River, EPA proposes Alternative 3B as the final remedy. This is based on EPA's analysis of the nine criteria for remedy selection prescribed by the National Contingency Plan (NCP); this analysis is provided on page 9.

Alternative 3B includes:

- Enhanced Natural Recovery (ENR), or the placement of 6-inch layer of sand over sediments in Reach 3 that have at least 10 ppm of mercury contamination, to be followed by regular monitored natural recovery. This area is located north of the Fountain Street Bridge and extends to the Reservoir No. 2 (Brackett Reservoir) dam.
- Monitoring of natural recovery processes (MNR) in the other reaches of the river, excluding Reach 8 (Great Meadows National Wildlife Refuge) and Reaches 5 and 7 (where there is no significant risk).
- Monitoring of Reach 8 to ensure mercury concentrations in fish tissue are stable or decreasing. (This monitoring program is not referred to as MNR because it is unclear whether natural processes are adequate to allow this part of the river to fully recover.)
- Implementation of institutional controls (i.e., posting of fish advisory signs and public outreach to discourage excessive consumption of contaminated fish) throughout the river.
- Periodic Five-Year Reviews of remedy protectiveness and performance.

ENR: Enhanced Natural Recovery consists of the placement of a thin layer of sand over existing contaminated sediment that exceeds mercury concentrations of 10 ppm. The sand would be placed in the downstream section of Reservoir 2, located in Reach 3 between Fountain Street and the Reservoir No. 2 Dam. The area is estimated to be approximately 84 acres; it is the only part of the river, other than Reach 8, where natural processes alone are not expected to be adequate over a reasonable period of time to eliminate unacceptable risks from consuming fish. The placement of sand in this quantity is anticipated to be equal to approximately 400 years of natural sedimentation, which should result in a significant dilution of mercury concentrations in sediment and thus in lower fish tissue contamination. Because excess water from the reservoir flows over the dam continually (even in non-flood conditions), adding sand to the bottom is not expected to increase the surface water level in the reservoir or result in any loss of any flood storage capacity. During pre-design studies, additional analysis regarding grain size and sediment stability may be required as well as studies to determine the optimum substrate to encourage re-colonization of the sand layer by benthic organisms.

MNR: Monitored Natural Recovery is proposed for other river reaches, excluding Reach 8, Reach 5, and Reach 7 (the latter two due to the lack of actionable risk in those reaches). According to EPA's computer model, fish tissue contamination is projected to continue to attenuate such that the target fish tissue concentration of mercury (which should allow for unlimited recreational angling) should be achieved in a reasonable amount of time (i.e., less than 30 years) in the reaches where MNR is proposed. This is unlike Reach 3, where MNR alone is not expected to achieve the target fish tissue concentration without the enhancements identified above. It should be noted that certain reaches (i.e., Reaches 2, 9, and 10) were not part of the computer model's simulation of MNR. However, the rate of natural recovery in these reaches is anticipated to be similar to the modeled reaches, and thus these reaches should attain remedial goals over similar timeframes (i.e., less than 30 years).

Fish Tissue Monitoring: A baseline of fish tissue concentrations was established during previous site investigation studies. As part of the proposed remedy, monitoring will be conducted in all reaches (except possibly Reaches 5 and 7, where there is no unacceptable risk to human health) and will likely consist of the collection of a single species (bass) every five years and three species (bass, perch and catfish) every 10 years so as to allow for the recalculation of human health risk. The first round of monitoring activities will be performed five years after the Record of Decision is issued.

Limited Action in Reach 8: The Great Meadows National Wildlife Refuge is a unique hydrological environment encompassing 3,600 total acres, of which approximately 1,100 aces are routinely (annually) flooded. As discussed above, wetlands, like those in GMNWR, have a significantly higher rate of methylation than other river environments. The wetlands are very efficient at converting mercury contamination into methyl mercury, where it is much more readily absorbed into the food chain. Concentrations of mercury in fish in Reach 8 are elevated even though the sediment concentration of mercury is relatively low (between 1 and 3 ppm). Because of this efficient methylation, and because of on-going atmospheric deposition of mercury, EPA's computer model predicts that even a very extensive attempt to excavate contaminated sediments would result in only marginal reductions in fish tissue concentrations. In light of these facts, and in light of the relatively low risks, EPA proposes to rely on institutional controls (signs, public outreach discouraging consumption of contaminated fish from the Sudbury River) to address contamination in Reach 8. EPA will continue to monitor Reach 8, to verify that fish tissue concentrations are declining or stable. EPA believes that, over time, risks in Reach 8 from Nyanza-related contamination will attenuate but that fish may continue to be contaminated at unsafe levels, due to the interaction between atmospheric pollution and conditions in the reach that tend to favor mercury accumulation in fish tissue.

Institutional Controls:
The current state fishing advisory and local Sudbury River fish advisory will function as a component of informing the population against eating mercury-contaminated fish taken from the Sudbury River. If these measures were discontinued, EPA would evaluate the need for additional measures. EPA will also implement a public outreach and education program and install signs to ensure safe consumption habits are followed.

Five-Year Reviews:
EPA would perform Five-Year Site reviews to confirm the effectiveness and adequacy of the above measures.

IMPACTS TO THE LOCAL COMMUNITY DURING REMEDY IMPLEMENTATION

Remedial activities are expected to have minimal impact on the adjacent communities of Ashland and Framingham. Alternative 3B - Enhanced Natural Recovery (ENR) entails the placement of an approximately 6-inch-thick layer of sand in the downstream portion of Reach 3 (Reservoir No. 2) between the Fountain Street bridge and the Reservoir No. 2 Dam (refer to attached Figure); this area is approximately 84 acres. This will involve the use of heavy equipment, transportation of materials used for capping, and construction of a temporary staging area. Traffic and noise impacts will be minimized to the extent possible. Monitoring activities will be conducted every five years and will have virtually no impacts on the community.

A variety of potential staging and work areas were evaluated in the FS; however, one area looks to be the most favorable and is included in this Proposed Plan to illustrate one potential option for implementation of the proposed remedy. This area is approximately 2.5 acres and is located just south of the Sudbury River and Fountain Street (near the Fountain Street Bridge). Materials could be delivered to this area by road or possibly by rail. Sand delivery by rail may be both cost effective as well as reduce impacts to local traffic patterns. The use of rail or trucking and the specific staging location will be developed during the remedial design phase of the cleanup.

The staging area may consist of a large dock on piers and will be used to store and transfer sand to the actual placement equipment. Depending on the location of the waterfront staging area as well as method of sand delivery (rail versus truck) a conveyor system could be used to move material from the primary staging area (south of Fountain Street) to the waterfront staging area. In that way re-routing of traffic on Fountain Street could likely be avoided. The placement of the sand can be completed using a variety of methods. It is likely that sand from the waterfront staging area would be transferred to a mobile (floating) barge. The mobile barge would be used to applied sand to the bottom sediments via hydraulic (wet) methods such as a by mixing sand with water and applying as a slurry through a pipe, or by mechanical (dry) methods such as broadcast spreading – such as is typically used when fertilizing. A variety of equipment is available

Sudbury River

that can be used for both and the final methodology will be determined during remedial design.

Since some intrusive work would be required, best work practices would be utilized to protect surrounding environmental receptors from eroding soil and/or sediment as well as stormwater run-off from staged materials. Engineering controls such as hay bales or silt curtain would be implemented as a means of reducing the transport of contaminated sediments adjacent to the work areas. Traffic control plans will be developed in coordination with local police and noise will be minimized to the extent possible. Air monitoring will be conducted during the work and engineering controls such as misting will be used if necessary for dust suppression.

It is estimated that Alternative 3B would require 2 years for construction and implementation.

PUBLIC NOTICE OF IMPACTS TO WETLANDS AND AQUATIC RESOURCES

Several state and federal laws regulate activities in and around floodplains, wetlands and rivers, including the remedial action proposed in this plan. For example, under a federal wetlands executive order, EPA is required to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Using these principles, EPA is further required to select the least environmentally damaging practicable alternative for reducing environmental risks at the site. Similarly, EPA is also required by Section 404 of the Clean Water Act to avoid discharging fill material into rivers if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem. EPA has determined that the proposed remedy is a discharge of fill material, and it involves unavoidable adverse impacts to wetlands and aquatic resources, primarily in the form of the deposition of the thin sand layer in Reach 3, which is a federally-regulated wetland. EPA has evaluated the applicable regulations, including Section 404 of the Clean Water Act, and identified the proposed action as the least damaging practical alternative to protect federally regulated wetlands and aquatic resources from contamination in sediments and surface water. EPA expects that the thin sand layer will help prevent mercury from bioaccumulating in fish and other organisms, and that the impacts to the river bottom from putting down the layer will be temporary and minor; benthic organisms will quickly re-colonize the sand layer. Other alternatives considered for Reach 3 either would do nothing about mercury in the river or would have short-term impacts on the benthic environment that would either be as severe (e.g., in-situ containment) or more severe (e.g., dredging). See "Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)" below for further discussion on wetland impacts. Through this Proposed Plan, EPA is also soliciting public comment concerning its determination that the alternative chosen for Reach 3 is the least damaging practicable alternatives for protecting wetland resources.

HOW DOES EPA CHOOSE A FINAL CLEANUP PLAN?

EPA uses nine criteria to compare alternatives and select a final cleanup plan. Of the nine, protection of human health and the environment and compliance with other environmental laws (known as applicable or relevant and appropriate requirements, or "ARARs") are considered threshold requirements that must be met by the selected remedy. EPA balances its consideration of alternatives with respect to long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost. State and community concerns are modifying criteria and may prompt EPA to modify the preferred alternative or choose another alternative. Following are definitions of the nine criteria.

1. **Overall protection of human health and the environment:** Will it protect you and the plant and animal life on and near the site? EPA will not choose a plan that does not meet this basic criterion.
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs):** Does the alternative meet all federal and state environmental statutes, regulations and requirements?
3. **Long-term effectiveness and permanence:** Will the effects of the cleanup plan last or could contamination cause future risk?
4. **Reduction of toxicity, mobility or volume through treatment:** Using treatment, does the alternative reduce the harmful effects of the contaminants, the spread of contaminants, and the amount of contaminated material?
5. **Short-term effectiveness:** How soon will site risks be adequately reduced? Could the cleanup cause short-term hazards to workers, residents or the environment?
6. **Implementability:** Is the alternative technically feasible? Are the right goods and services (i.e. treatment machinery, space at an approved disposal facility) available for the plan?
7. **Cost:** What is the total cost of an alternative over time?
8. **State acceptance:** Do state environmental agencies agree with EPA's proposal?
9. **Community acceptance:** What objections, suggestions or modifications does the public offer during the comment period?

EVALUATION OF ALTERNATIVES UNDER THE NINE CRITERIA

This section summarizes EPA's evaluation of how well each of the cleanup alternatives described above (including the alternative

proposed in this plan) meets the first seven criteria. A fuller description is provided in the Feasibility Study Report. Once comments from the state and the community are received, EPA will select the final cleanup plan.

Overall Protection of Human Health and the Environment

Alternative 1 (No Action) does not protect human health in that it allows for unlimited exposure to contaminated fish (not withstanding the fishing advisories which may be maintained by others agencies). All the other alternatives protect human health and the environment. However, Alternatives 2 and 3A are less protective because they merely discourage fish consumption through fish advisories and public outreach, without doing anything to accelerate the natural attenuation of contamination in fish. These two alternatives also rely on routine monitoring to ensure that fish tissue levels are decreasing (or, in the case of Reach 8, decreasing or remaining stable). All other alternatives (including 3B, the alternative proposed in this plan) protect human health and the environment by reducing the availability of mercury to fish in portions of the river, thus leading to a reduction in mercury in fish tissue over time. These alternatives also include fish advisories, public outreach and monitoring.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Despite the absence of active remediation, Alternatives 1, 2, and 3A would meet ARARs. All other alternatives are also expected to comply with ARARs, except for ARARs related to minimizing impacts on wetlands and related aquatic resources. The wetlands order, Section 404 of the Clean Water Act and several other state laws require EPA to avoid adverse impacts to wetlands and other aquatic environments, unless there is no practicable alternative with lesser effects. Alternatives 1, 2 and 3A would not cause impacts; however, they would also do nothing to reduce mercury in fish tissue, particularly in Reach 3 in a reasonable amount of time. All the active remediation alternatives (Alternatives 3B through 5D) have an adverse impact – the thin sand layer, the cap, and the dredging all constitute a temporary degradation of the river bottom environment, which is a wetland. Thus the question is which alternative constitutes the practicable alternative with the least adverse effects on the aquatic environment. EPA has determined that Alternative 3B (the proposed remedy), which would place a thin layer of sand over sediments in Reach 3, and Alternative 4A, which would place an "in situ containment" cap over Reach 3, have essentially the same impact on the aquatic environment, and constitute the alternatives that have the least adverse impact. Like the other active remediation alternatives, these alternatives reduce fish tissue contamination to acceptable levels in much of the river within a reasonable timeframe. They differ from the other active remediation alternatives in two significant ways: (1) more than the other active remediation alternatives, Alternatives 3B and 4A have impacts on only a small portion of the river, i.e., Reach 3, (2) they do not involve significant re-suspension of contaminated sediments, as do the removal/dredging technology contemplated by Alternatives 5A through 5D. On this basis, EPA believes that Alternatives 3B and 4A are the active remediation alternative that best comply with the wetlands executive order, Section 404 and the state wetlands regulations.

Long-term Effectiveness and Permanence

Under the No Action alternative, long-term risks would remain unaddressed. All other alternatives rely, in varying degrees, on institutional controls such as the posting of warning signs for long-term effectiveness. Since these types of controls are not enforceable and compliance with such warnings is difficult to track, alternatives that rely more heavily on these controls (such as Alternatives 2) may be less effective in the long-term compared to other, more active alternatives. The active remedial alternatives (Alternatives 3B through 5D) are expected to reduce fish tissue mercury concentrations and, therefore, would achieve protectiveness sooner than Alternatives 1, 2 and 3A. The removal alternatives (Alternatives 5A through 5D) are expected to take longer to attain protectiveness due to potential resuspension of contaminated sediment, but do result in the permanent removal of more contaminated sediment from the river. To ensure the long-term protectiveness of Alternatives 3B, 3C, 4A, and 4B, further design work would be necessary to ensure the stability and integrity of sand or other capping materials to be placed in the river pursuant to these alternatives. Long-term maintenance and monitoring activities would be conducted as necessary.

Reduction of toxicity, mobility and volume through treatment

The alternatives that do not contemplate active remediation (Alternatives 1, 2, and 3A) do not reduce toxicity, mobility or volume of mercury in the river. All other alternatives partially satisfy this criterion: the thin sand layer (3B and 3C) and the cap (4A and 4B) reduce the mobility and toxicity of mercury significantly – reducing the amount that is capable of bio-accumulating in fish and thereby controlling the only threat to human health in the river. The dredging and removal alternatives (5A through 5D) are more effective still at meeting this criterion, removing significant quantities of mercury from the river entirely; however, the material must be removed and disposed offsite.

Short-term effectiveness/impacts

As no active remediation is proposed for Alternative 1, this would not result in any short-term risks to on-site workers or adverse effects to the environment or community during implementation. The time required to implement Alternative 2 would be minimal since it only involves maintaining institutional controls. Alternative 3A adds a monitoring component, which would allow for verification of the effectiveness of the site-wide remedy; this monitoring would pose few short-term risks to workers during implementation as sampling techniques employed would be traditional and non-harmful to the environment or surrounding community. Alternative 2 could also include monitoring activities. The remaining alternatives all have short-term impacts. The alternatives that limit active remediation to Reach 3 (Alternative 3B, 4A, 5A and 5C) would obviously have fewer short-term impacts than the alternatives that propose remediation across several reaches (Alternatives 4B, 3C, 5B, and 5D). A more significant difference is that the sand and capping alternatives (3B, 3C, 4A, 4B) may have fewer short-term

impacts than the dredging alternatives (5A, 5B, 5C, 5D), because it is faster and easier to place material over a riverbed than to dredge it up. With the dredging alternatives there is also the potential for sediment re-suspension, which could cause a temporary elevation in fish tissue concentrations. Overall, among the alternatives that go beyond monitoring and institutional controls, the proposed alternative (3B) appears to have the fewest short-term impacts, because putting down a thin sand layer is relatively simple and because this activity would be limited to Reach 3.

Implementability
Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. All the alternatives are readily implementable and rely on established technologies, though the larger the scope of the remedy, the greater the effort required to construct. Alternatives 5A through 5D are relatively large construction projects, but projects as large or larger have been conducted at numerous sites across the country. Thin-layer capping (Alternatives 3B and 3C) and in-situ containment (Alternatives 4A and 4B) have also been successfully completed at other sites and employ readily available technologies and materials. There is also sufficient land area for staging as well as road and rail access to the site.

Cost
Costs for each alternative are outlined above. Alternative 1 (No Action) is the least costly of proposed alternative to implement. Alternatives 2 (Limited Action) and Alternative 3A (MNR) requires little cost to complete compared to active remediation. Comparing the active remedial alternatives, Alternative 3B is the least costly, followed by 3C, 4A, 4B, 5A, 5B, 5C and 5D in ascending order.

State Acceptance
State acceptance will be evaluated based on comments the State submits during the comment period.

Community Acceptance
Community acceptance will be evaluated based on comments submitted during the comment period.

WHY EPA RECOMMENDS THIS CLEANUP PROPOSAL

EPA proposes Alternative 3B, MNR with Enhanced Natural Recovery via thin layer sand capping, with Limited Action in Reach 8 for several reasons. First, it is protective and more effective than the alternatives that don't involve active remediation (Alternatives 1, 2, and 3A). Whereas Alternative 3B takes active steps to reduce the contamination in fish in the most contaminated reach of the river, Alternatives 1, 2 and 3A rely mainly on fish advisories to discourage consumption of contaminated fish although Alternative 3A also adds a monitoring component. Second, except in Reach 8, Alternative 3B is expected to reduce fish contamination to acceptable levels to approximately the same extent as the other, more intensive alternatives evaluated, yet it costs much less than any other active remediation alternatives. Third, it has the least impact on wetlands of any active remediation alternative, in that it buries and dilutes mercury that would otherwise remain available for methylation, it has construction impacts on smallest area of the river of all active alternatives, and it does not involve re-suspension of contaminated sediments. With regard to Reach 8, EPA believes that Limited Action is the best alternative given the amount of risk reduction that would be achieved with active remediation in light of the relatively low concentrations of mercury in the sediment.

EPA believes that Alternative 3B meets the two threshold criteria of overall protection of human health and the environment and compliance with ARARs and represents the best balance of the other criteria and, thus, is proposing this remedy for state and public comment.

NEXT STEPS

This summer/fall, EPA expects to have reviewed and evaluated all comments received on this proposal and will sign a Record of Decision, which is a document that describes the chosen cleanup plan. The Record of Decision and a summary of responses to any public comments (the Responsiveness Summary) will then be made available to the public at the Ashland Public Library and at EPA's Records Center in Boston, and via the internet. EPA will announce the final decision on the cleanup plan through the local media and via EPA's website.

HOW YOU CAN COMMENT ON EPA'S CLEANUP PROPOSAL

During the 30-day formal comment period, EPA will accept formal written comments and hold a hearing to accept formal verbal comments. EPA uses public comments to improve the cleanup proposal. To make a formal comment you need only speak during the Public Hearing on July 19, 2010 at 7 pm at the Framingham Town Hall or submit written comments during the 30-day comment period no later than July 26, 2010.

Provide EPA with your written comments about the Proposed Plan, **postmarked no later than July 25, 2010 to:**

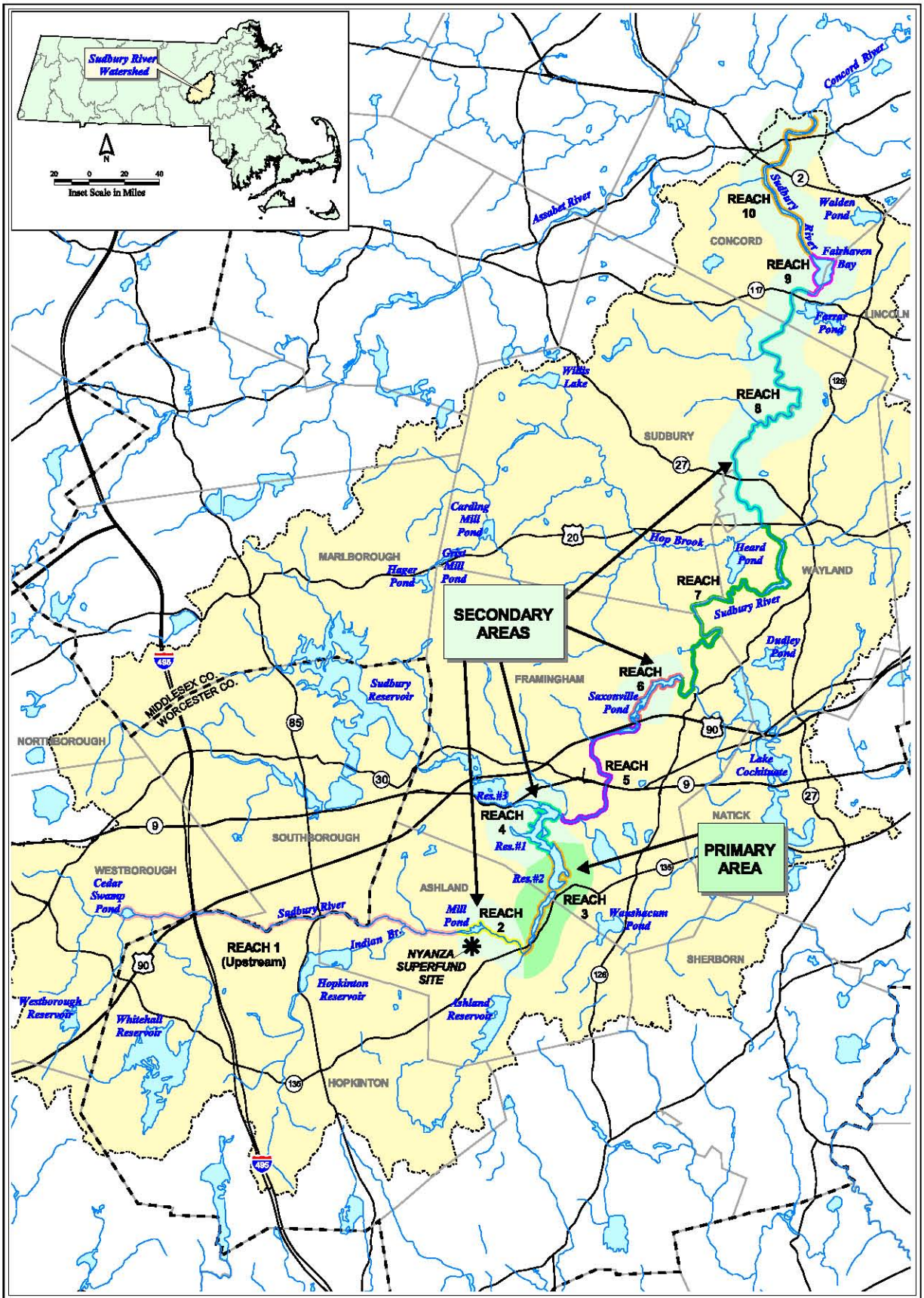
Daniel Keefe, Project Manager
U.S. EPA New England
5 Post Office Square, Suite 100
Mail code: OSRR07-1
Boston, MA 02109-3912

Or, submit comments by e-mail to:
keefe.daniel@epa.gov or
Fax comments to: 617-918-0327.

Although EPA cannot respond to comments submitted at the Public Hearing, EPA will respond to both your oral and written comments in the written Responsiveness Summary that will be included with the Record of Decision. EPA will review the transcript of all formal comments received at the hearing, and all written comments received during the formal comment period, before making a final cleanup decision.

The fact that EPA responds to formal comments in writing at the time the Record of Decision is issued, does not mean that EPA cannot answer questions. EPA will be holding three informational meetings in June as indicated on page 1 to answer any questions about the Proposed Plan.

Your formal comment will become part of the official public record. The transcript of comments and EPA's written responses will be issued in a document called a Responsiveness Summary when EPA releases the final cleanup decision.



LEGEND:

Township Boundary
County Boundary
Watershed Boundary
Sudbury River Watershed
Hydrography

Target Areas: Primary, Secondary

River Reaches: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

N

4000 0 4000 8000
Scale in Feet

1 0 1 2
Scale in Miles

Source:
Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

Nobis

Nobis Engineering, Inc.
Tel (603) 224-4182
Fax (603) 224-3067
www.nobisengineering.com

FIGURE 2-1

OPERABLE UNIT 4 LOCUS - SUDBURY RIVER REACHES

Nyanza Chemical Waste Dump Superfund Site
OU4 - Sudbury River
Ashland, Massachusetts

DRAWN BY:	JWC	APPROVED BY:	SH
PROJECT:	80026		JUNE 2010

C:\Nyanza\OU-4\fish_aquatic_maps_2010.apr | Number11x17 | c:\nyanza\reports\dwg\2-1_reaches_062810.apx | 3:51 PM, 6/28/2010

Alternatives Comparison
Nyanza Chemical Waste Dump Superfund Site
Operable Unit 4 - Sudbury River, Ashland, Massachusetts

	Alt. 1 No Action	Alt. 2 Limited Action	Alt. 3A Sitewide MNR	Alt. 3B ENR in Reach 3 > 10ppm	Alt. 3C ENR in Reaches 3, 4, 6 > 2ppm	Alt. 4A In Situ Containment in Reach 3	Alt. 4B In Situ Containment in Reaches 3, 4 and 6	Alt. 5A Dredging > 10ppm in Reach 3	Alt 5B Dredging > 10ppm in Reach 3, In Situ Containment in Reaches 3, 4 and 6	Alt. 5C Dredging > 2ppm in Reach 3	Alt. 5D Dredging > 2ppm in Reaches 3, 4 and 6
Timeframe to Implement *	0 Years	2 Years	2 Years	3 Years	4 Years	3 Years	4 Years	3 Years	4 Years	4 Years	5 Years
Timeframe to Remediation Goals**	>70 Years	>70 Years	>70 Years	<30 Years	<30 Years	<30 Years	<30 Years	<30 Years	<30 Years	<30 Years	<30 Years
Comparison Criteria											
Overall Protectiveness	☒	✓	✓	☑	☑	☑	☑	☑	☑	☑	☑
Compliance with ARARs	☑	☑	☑	☑	✓	☑	✓	✓	✓	✓	✓
Long-Term Effectiveness	☒	✓	✓	☑	☑	☑	☑	☑	☑	☑	☑
Reduction of TMV	☒	☒	☒	✓	✓	✓	✓	✓	✓	✓	✓
Short-Term Effectiveness	☒	✓	✓	☑	☑	☑	☑	☑	☑	☑	☑
Implementability	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Cost (in Millions)	$0.0	$0.2	$1.1	$8.5	$20.8	$24.3	$48.9	$59.7	$88.5	$99.8	$213.5
State Acceptance	To Be Determined After Public Comment Period										
Community Acceptance	To Be Determined After Public Comment Period										

Notes:

Alt = Alternative
TMV = Toxicity, Mobility and Volume

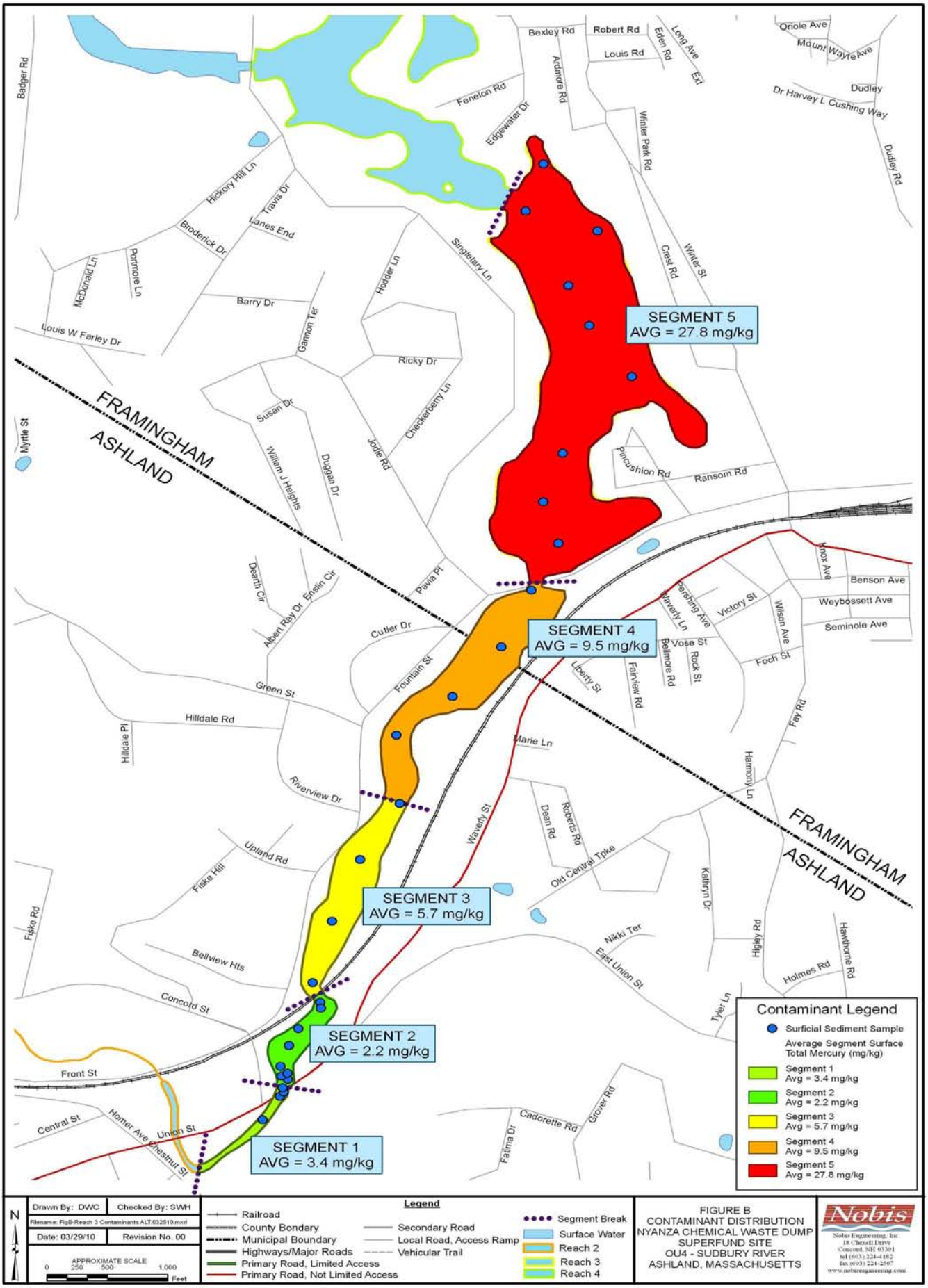
☑ Meets Criteria

✓ Partially Meets Criteria

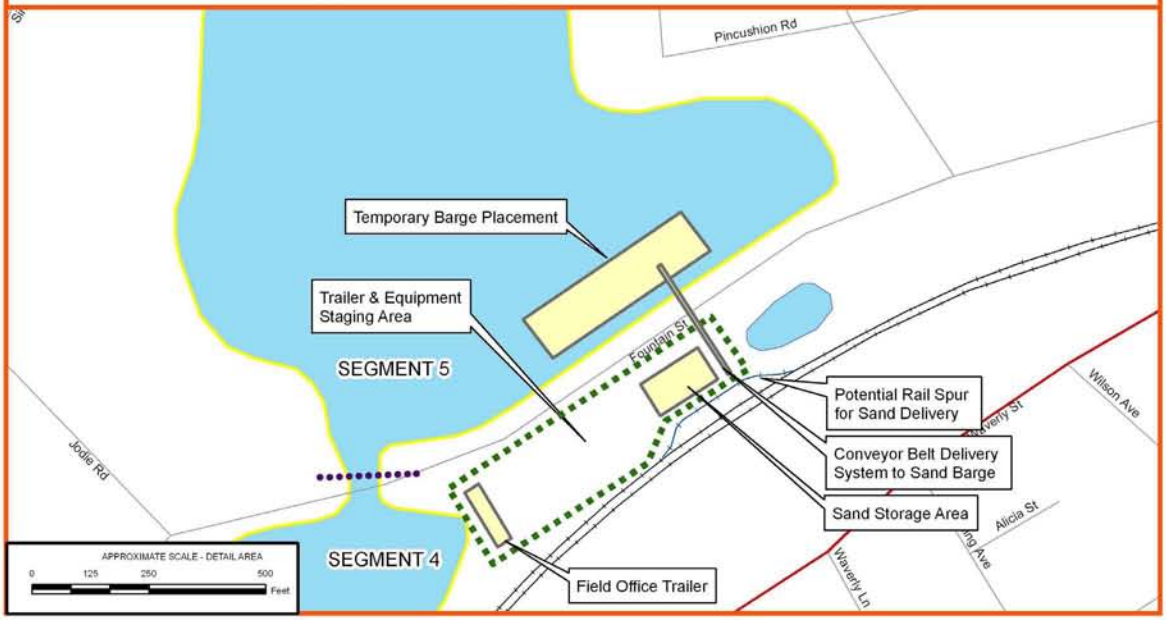
☒ Fails to Meet the Criteria

* Includes a 1 to 2 Year Period to Complete Remedial Design

** Defined to mean attainment of both remedial action objectives: a) prevent consumption of contmainated fish through advisories; and b) reduction of mercury in fish to acceptable levels (except in Reach 8).


SEGMENT 5
AVG = 27.8 mg/kg
SEGMENT 4
AVG = 9.5 mg/kg
SEGMENT 3
AVG = 5.7 mg/kg
SEGMENT 2
AVG = 2.2 mg/kg
SEGMENT 1
AVG = 3.4 mg/kg
FRAMINGHAM
ASHLAND
FRAMINGHAM
ASHLAND
Contaminant Legend
Surficial Sediment Sample
Average Segment Surface Total Mercury (mg/kg)
Segment 1 Avg = 3.4 mg/kg
Segment 2 Avg = 2.2 mg/kg
Segment 3 Avg = 5.7 mg/kg
Segment 4 Avg = 9.5 mg/kg
Segment 5 Avg = 27.8 mg/kg
Legend
Railroad
County Bondary
Municipal Boundary
Highways/Major Roads
Primary Road, Limited Access
Primary Road, Not Limited Access
Secondary Road
Local Road, Access Ramp
Vehicular Trail
Segment Break
Surface Water
Reach 2
Reach 3
Reach 4
Drawn By: DWC
Checked By: SWH
Filename: FigB-Reach 3 Contaminants ALT.032510.mxd
Date: 03/29/10
Revision No. 00
APPROXIMATE SCALE
0 250 500 1,000 Feet
N
FIGURE B
CONTAMINANT DISTRIBUTION
NYANZA CHEMICAL WASTE DUMP
SUPERFUND SITE
OU4 - SUDBURY RIVER
ASHLAND, MASSACHUSETTS
Nobis
Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
tel (603) 224-4182
fax (603) 224-2507
www.nobisengineering.com

AREA OF DETAIL: POTENTIAL STAGING AREA



Drawn By: DWC	Checked By: SWH
Filename: FigC-Reach 3 Detail ALT 031810.mxd	
Date: 03/29/10	Revision No. 00

APPROXIMATE SCALE
0 250 500
Feet

Legend

- Railroad
- County Bondary
- Municipal Boundary
- Highways/Major Roads
- Primary Road, Limited Access
- Primary Road, Not Limited Access
- Secondary Road
- Local Road, Access Ramp
- Vehicular Trail
- Segment Break
- Surface Water
- Reach 2
- Reach 3
- Reach 4

FIGURE C
POTENTIAL STAGING AREA DETAIL
REACH 3 SEGMENTS
NYANZA CHEMICAL WASTE DUMP
SUPERFUND SITE
OU4 - SUDBURY RIVER
ASHLAND, MASSACHUSETTS

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