UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
1 Congress Street, Suite 1100
BOSTON, MA 02114-2023

Memorandum

To: Stephen J. Ells and Leah Evison,
Co-Chairs, Contaminated Sediment Technical Advisory Group (CSTAG)

From: Daniel Keefe, RPM, EPA Region 1

Date: June 21, 2007

Subject: Response to CSTAG Recommendations for the Nyanza Chemical Waste Dump, OU4 – Sudbury River

Thank you for your Memorandum dated July 12, 2006 regarding the Nyanza Chemical Superfund Site in Ashland, Massachusetts. As you are aware, the Sudbury River Operable Unit (OU4) of the Nyanza Chemical Superfund Site (Nyanza) currently consists of an assessment and evaluation of risks posed by mercury contamination of sediments along the Sudbury River. Your memorandum contained several suggestions as well as questions, a copy of which is attached (Attachment 1). These are addressed in the same order they were presented in your Memorandum. Because of the relative length of the various questions and recommendations, I have only repeated here the various "principles" that were used to organize your comments.

Principle #1: Control Sources Early

Comment noted.

Principle #2: Involve the Community Early and Often

The last Community Update was in June 2006 and was distributed to local repositories such as Town Hall and various Public Libraries along the study area. In addition, the June 2003 Community Update was mailed to abutters and mailing list recipients. We are currently preparing an updated (2007) Community Update and are in the preliminary planning stages of another meeting with local stakeholders and also have a June 26th, 2007 meeting with the Framingham Board of Selectman for the purposes of a general status update. Future Community Updates, including one planned for later this year, will be published in a secondary language (Spanish) to avail the most people of the potential risks associated with eating fish from the Sudbury River watershed. Warning signs will continue to be posted along portions of the river with greatest access for recreational

fisherman. Signs which were previously installed will be assessed as to their condition and replaced, as necessary.

Principle #3 Coordinate with States, Local Government, Tribes and Natural Resource Trustees

Numerous wildlife data reports were completed in March 2007; these are used substantially in the Baseline Ecological Risk Assessment (BERA) which was received on April 20, 2007. In an effort to expedite the review of the BERA, as well as to share information as it is received, these wildlife reports were given to the State (MassDEP), Fish and Wildlife Service (FWS), and National Oceanic and Atmospheric Administration (NOAA) representatives in advance of the BERA.

In regard to the sluice gates associated with Framingham reservoirs, these are maintained by the Department of Conservation and Recreation (DCR) and operated by the Massachusetts Water Resource Authority (MWRA). The region has exchanged contact information with various DCR representatives (Mr. William Salomaa and Mr. David Murphy). Based on preliminary discussions regarding the use of the reservoirs and potential future maintenance (such as dredging by the MWRA to control invasive weeds), it was mutually agreed to have a meeting in July 2007 with the various stakeholders. During this meeting the potential need for active remediation and/or Institutional Controls will be discussed; an evaluation of both will be included in the Feasibility Study (FS).

Principle #4: Develop and Refine a Conceptual Site Model that considers Sediment Stability

Bullet No. 1 (Re: Utilizing Pb^{210} data)

In regard to using Pb^{210} as an indicator of sediment stability, significant work has already been completed. Reference is made to the following article "Stratigraphy and Historic Accumulation of Mercury in the Recent Depositional Sediments in the Sudbury River" by Frazier, Bradley E., James G. Wiener, Ronald G. Rada, and Daniel R. Engstrom 2000 and published in the Canadian Journal of Fisheries and Aquatic Sciences, Volume 57, Number 5, May, 2000. This study predominantly used Pb^{210} as a method to date various sediment; they documented a strong correlation between mercury concentrations in sediment at various depths and the times of maximum and residual discharge of mercury from Nyanza. In addition, it was concluded that shallower, more-recently deposited sediments contain much less mercury subsequent to the source control measures at Nyanza. In regard to sediment stability, it was also concluded that "barring human disturbance or dam failure, the probability of substantial resuspension or transport of sediment in the reservoirs appears to be small". It is also worth noting that at the time of these studies (1995 – 2000) there was still measurable mercury in surface water that was best explained by continued residual discharge from the Nyanza site. Since that time additional remediation has taken place, and recent water sampling suggests that mercury

loading attributable from the site has continued to attenuate. Another round of surface water samples was collected in May 2007; this data will be reported in the FS.

Bullet No. 2 (Re: Changed use of Reservoirs)

The existing as well as potential future uses of the reservoirs will be evaluated during the FS. Refer to response above re: coordination with DCR and MWRA representatives.

Bullet No.3 (Re: Potential for sediment resuspension)

As part of the FS, a detailed evaluation of the previously performed stability analysis by the U.S. Army Corps of Engineers will be performed. The need for additional sediment stability analysis, such as SEDFlume, will be determined at that time; however, preliminary review of the existing empirical data (using Pb210) suggest that over the last 100 years, sediment in the Sudbury River watershed, including the reservoirs, has generally been competent and undisturbed.

Bullet Nos. 4, 5, and 6 (Re: CSM, Modeling, Atmospheric Deposits and Mercury Methylation)

It was suggested that the development of a Conceptual Site Model (CSM) follow the Contaminated Sediment Remediation Guidance. Moreover, this guidance suggested that, at complex sediment sites, up to three CSM be developed. In this regard, the Region would like to emphasize that there are currently several CSMs. As recommended in the Guidance, there is a Human Health CSM that was originally developed in 1992 and which was recently reviewed, updated, and is described in the Final 2006 Human Health Assessment. In regard to an Ecological CSM, this is described in the 2007 Draft BERA which is currently being reviewed. The third, and perhaps the most germane to understanding the fate and transport (F&T) of mercury, is developing a CSM that attempts to address site "sources, releases and [contaminated] media". However, as has been noted in various articles as well as the draft BERA, understanding mercury speciation and the factors which contribute to its mobility is very complex. In an effort to understand the relationships which govern mercury fate and transport, we are intending to utilize a process-based, steady-state risk-assessment model referred to as "SERAFM" (Spreadsheet-based Ecological Risk Assessment for the Fate of Mercury). What follows is an except from the SERAFM Model Development prepared by Christopher Knightes and Robert B. Ambrose, Jr., both of whom are from EPA's Office of Research and Development (ORD), National Research Exposure Laboratory :

> "The SERAFM model incorporates the chemical, physical, and biological processes governing mercury transport and fate in a surface water body including: atmospheric deposition; watershed mercury transport, transformations, and loadings; solid transport and cycling within the water body; and water body mercury fate and transport processes. SERAFM estimates exposure mercury concentrations in the sediment, water column,

> and food web, and calculates hazard indices for exposed wildlife and humans. Because mercury risk assessments are complicated due to the different source types, that is, from historical loadings of mercury from current atmospheric deposition and watershed loadings, SERAFM simultaneously calculates exposure conditions for three different scenarios at any given site. These are: 1) the historical case of mercury-contaminated sediments; 2) suggested clean-up levels necessary to protect the most sensitive species, if possible; and 3) background conditions that would be present if there were no historical contamination."

In support of its use, we have begun (in April 2007) a process of collecting a one year of hydrogeological data (such as river water height, flow measurements, and determining residence times at different river reaches). These measurements coincide with a number of additional water quality parameters and chemical analyses (such plankton, filtered and unfiltered mercury and methyl mercury, total suspended solids, and total and dissolved organic carbon to name a few). These data will be used in the SERAFM model, the outputs of which should assist with determining the F&T of Mercury in the Sudbury River watershed. In regards to atmospheric contributions, the model is also expected to quantify the relationship between point and non-point (atmospheric) sources of mercury.

Bullet No.7 (Re: Relationship between total mercury and methylmercury in various reaches)

It is currently not known, with any degree of certainty, why the relationship between total and methylmercury is not a "constant". It is likely attributable to the wide variety of hydrogeological settings which exist within the watershed. As noted in the Draft BERA (currently under review) given "the length and complexity of the Sudbury River ecosystem, it would be impractical to describe this system in anything but general terms." The 26-mile reach of the Sudbury River is made up of a wide variety of flow regimes including: urban, fast and slow moving, wetlands, ponds and reservoirs. Based on the variety of hydrogeological conditions, it may not be possible to elucidate (with a high degree of certainty) all of the relationships that exists. However, as mentioned above, additional data collection is underway. This data will primarily be used as inputs to the SERAFM model that, among other things, is expected to be a useful tool in evaluating the effect of historical mercury loading as a result of past non-point disposal practices as well as a predictive tool used for evaluating the potential effectiveness of various remedial technologies that will be detailed in the FS,

Principle #5: Use an Iterative Approach in a Risk-based Framework

Bullet No. 1

Comment Noted.

Bullet No. 2 (Re: using a dietary approach to assess risk to raptors)

The risk assessment team further evaluated the inclusion of a raptor scenario in the ecological risk assessment and after discussions with two experts in the field (Drs. Charles Henny and Chris Custer, USGS) it was determined that we lacked the necessary data to develop a raptor scenario that would have an associated "reasonable" level of uncertainty.

Bullet No. 3 (Re: sensitivity analysis for the human health risk assessment)

Since the human health risk assessment has already been finalized, any future human health risk communications will include the risks as calculated, a thorough discussion of the exposure assumptions that were used to develop the risks, and tables and/or graphics to indicate potential risks based on ingesting different proportions of fish from the Sudbury River versus other sources.

Principle #6: Carefully Evaluate the Assumptions and Uncertainties Associated with Site Characterization

Bullet No. 1 (Re: ensuring useable outputs from the SERAFM modeling effort)

Refer to response to Principle No 4 (re: Conceptual Site Model). To reiterate, we believe, through our discussions with EPA's National Exposure Research Laboratory - Ecosystems Research Division personnel, that he model will be a useful *tool* (emphasis added) to determining if the reservoirs export mercury, if the mercury is cycling out of the wetlands, and what the other inputs into the system might be.

Bullet No. 2 (Re: sensitivity analysis and model limitations)

Comment noted. Those individuals whom are responsible for the model's calibration and execution will be asked to provide sensitivity and uncertainty analyses. These analyses will assist end-users evaluate the data and to make more-informed risk management decisions.

Bullet No. 3 (Re: Monitored Natural Recovery)

Monitored Natural Recovery (MNR) will be evaluated along side other remedial alternatives as part of the Feasibility Study. The human health risk associated with an MNR approach will be contemplated and evaluated in the remedy selection process.

Principle #7: Select Site Specific, Project-specific and Sediment Specific Risk Management Approaches that will Achieve Risk-Based Goals

The project team will consider background and anthropogenic sources of mercury when determining remediation goals. To date, MassDEP has devoted significant resources to

characterize the extent of atmospheric mercury deposition and its regional impacts over the last decade. A list of published reports from the MassDEP web site is included as Attachment 2. These, as well as other recent data reports generated in support of the BERA, will be used to determine local background concentrations and to evaluate atmospheric deposition.

It is likely that MNR will be evaluated in the FS among other potential remedial technologies. The indicator processes recommended will be evaluated both empirically, via the use of the SARAFM model, as well as and measured in the field.

It is likely that some *de minimus* level of mercury has migrated from the Sudbury to the Concord River. However, a comprehensive review of data from the last reach of the study area (i.e., Reach 10), as well as further evaluation (as part of the FS) of various MassDEP reports regarding regional mercury deposition, is expected to show that this contribution is negligible and indistinguishable from non-point sources. Notwithstanding this, additional samples from both the Assabet and Concord Rivers were recently collected in May 2007.

Principle #8: Ensure that the Sediment Cleanup Levels are Clearly tied to Risk Management Goals

Comment noted.

Principle #9: Maximize the Effectiveness of Institutional Controls and recognize their Limitations

The effectiveness of certain Institutional Controls is difficult to ascertain (such as the posting of warning signs). Notwithstanding this, efforts will be made to ensure the signs are legible in several languages and we will coordinate fish advisories with MDPH. As suggested, we will also identify additional distributions locations (bait/tackle shops and fishing license proprietors) as additional repositories for all future Community Updates.

Principle #10: Design Remedies to Achieve Long-term Protections and Minimize Short-term Risks.

Comment noted. Should capping be identified as the preferable remedial action, EPA Region I will contact ORD to discuss the general applicability, and possibly piloting, of a reactive sediment cap.

Principle #11: Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness.

In general, should intrusive work impair any wetland along the study area, appropriate re-vegetative monitoring will be conducted. In regard to the Eastern Wetland, this was remediated between 1999 and 2001 and subsequently O&M was transferred to the

Commonwealth of Massachusetts in 2003. MassDEP has not, as part of their routine O&M, collected sediment samples from the wetland; however, surface water samples from areas of standing water are collected. MADEP representatives maintain that sediment sampling is on an "as-needed" basis and to date, there has not been a need to collect this data. MassDEP is evaluating the need to collect sediment data in the next round of semi-annual sampling (2007) and we will evaluate the need for additional data as part of periodic 5-year reviews.

If you have any questions or would like need further information regarding the current status of the Nyanza Chemical, OU4 – Sudbury River project, please do not hesitate to contact Daniel Keefe at (617) 918-1327.

Cc: Larry Brill, EPA Region 1
Bob Cianciarulo, EPA Region 1
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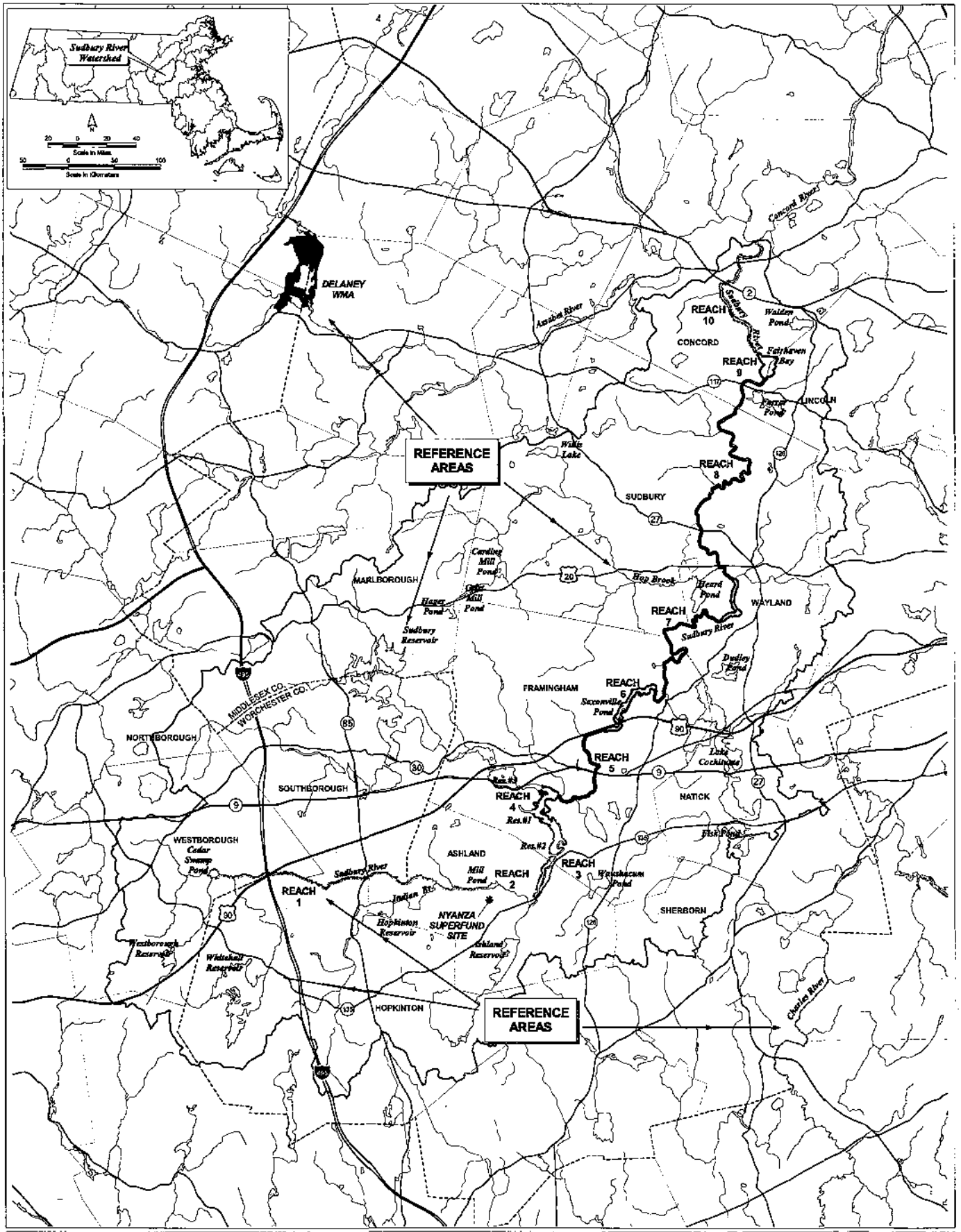
Ken Finkelstein, NOAA
Kenneth Munney, FWS
Jennifer McWeeney, MassDEP

Attachment 1

Site Figure/Locus Map



Nyanza Superfund Site OU IV
Sudbury River Mercury Contamination

Figure 2
River Reaches and Reference Area Locations

Attachment 2

Copy of CSTAG Recommendations Memorandum
Nyanza Chemical Waste Dum – OU4 (Sudbury River)
July 12, 2006

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

July 12, 2006

MEMORANDUM

SUBJECT: CSTAG Recommendations for the Nyanza Chemical Waste Dump, Operable Unit 4 - Sudbury River

FROM: Stephen J. Ells **/s/ Stephen J. Ells**
Leah Evison **/s/ Leah Evison**
Co-chairs, Contaminated Sediment Technical Advisory Group

TO: Cheryl Carver-Sprague, Remedial Project Manager
U.S. Environmental Protection Agency, Region 1

Background

OSWER Directive 9285.6-08, Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (February 12, 2002), established the Contaminated Sediments Technical Advisory Group (CSTAG) as a technical advisory group to "...monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites...." The main purpose of the CSTAG is to assist Regional site project managers manage their sites throughout the Superfund process in accordance with the eleven risk management principles set forth in the OSWER Directive. CSTAG membership consists of nine regional representatives, two from the Office of Research and Development, and two from the Office of Superfund Remediation and Technology Innovation (OSRTI).

Brief Description of the Site

The Nyanza Chemical Waste Dump Superfund Site (hereafter Nyanza Site) was occupied from 1917 through 1978 by several companies that manufactured textile dyes and dye intermediates. Additional products manufactured on-site included various colloidal solids and acrylic polymers. 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 contained in these disposal areas included partially treated process water, chemical sludge, solid process wastes (chemical precipitate and filter cakes), solvent recovery distillation

residue, numerous organic and inorganic chemicals (including mercury), and off-specification products. Process chemicals that could not be reused or recycled, such as phenol, nitrobenzene, and mercuric sulfate, were also disposed on-site or discharged into the Sudbury River mainly through a small stream referred to as Chemical Brook. Mercury and chromium were used as catalysts 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 approximately 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 0.2 metric tons during that eight-year period.

To expedite remediation, the RI/FS for the Nyanza Site was originally divided into the following Operable Units (OUs):

- OU I - addressed on-site surficial soil, sediment and sludges.
- OU II, Nyanza II Groundwater Study - addressed groundwater contamination from the site and evaluated the presence of off-site migration.
- OU III, Nyanza III Sudbury River - originally addressed contamination of the Sudbury River from discharges of wastewater and sludge; OU III focused on addressing mercury contamination in soils and surface water in the continuing source areas (Eastern Wetlands, Trolley Brook, Outfall Creek, and the Lower Raceway).
- OU IV, Sudbury River Proper - As a result of the findings in the OU III RI, EPA determined that the potential continuing risk to both human health and ecological receptors could be attributed principally to mercury contamination of the Sudbury River. To further evaluate the nature, extent, and potential impacts of chemical contamination in the river, EPA established Operable Unit IV - Sudbury River to specifically address mercury contamination within the river proper. OU IV was subdivided into 10 Reaches in order to more fully characterize the extent of mercury contamination and the associated risks to human and ecological receptors.

The CSTAG visited the site and met with the RPM and the site team on May 31, 2006 and June 1, 2006. Twelve stakeholder groups associated with the Superfund site were invited to present their ideas and concerns about the project to the CSTAG. No one opted to present, but written comments were submitted by the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the SuAsCo Watershed Community Council, and Malcolm Smart (resident of Ashland).

CSTAG Recommendations

Based upon our site visit and review of the site information provided to us, the CSTAG offers the following recommendations to the site manager to more fully address the 11 sediment management principles. The CSTAG expects that the site project manager will consider these recommendations as the site characterization continues, as the conceptual site model is refined, and as remedial alternatives are developed and evaluated. The site manager is asked to submit, within 60 days, a written response to these recommendations to the CSTAG co-chairs.

Principle #1: Control Sources Early.

- CSTAG commends the project team for controlling known upstream sources of mercury to the Sudbury River.

Principle #2: Involve the Community Early and Often.

- Continue community outreach and share site information as it becomes available.
- Consider specialized outreach to non-English speakers and potential subsistence fishers. For example, distribute written materials in appropriate languages, and go to community meetings to explain risks from the consumption of mercury contaminated fish.
- When discussing EPA's risk assessment results with the community, explain the differences between State health advisories and EPA's human health risk assessments and their limitations (*e.g.*, risk to men/children's health).
- Replace fish consumption advisory signs that are sun-damaged and no longer readable.

Principle #3: Coordinate with States, Local Governments, Tribes, and Natural Resource Trustees.

- Consider hosting a meeting with the trustees to share data and update them on site progress before the draft Baseline Ecological Risk Assessment is issued.
- Talk with the Massachusetts Department of Conservation & Recreation (DCR) about the operation and maintenance of the sluice gates and any sediment flushing at the three dams.
- If EPA determines remedial action is necessary at this site:
    - Coordinate remediation activities with possible trustee restoration activities.
    - Coordinate with DCR if any proposed remedy would impact reservoir capacity.
    - Talk with DCR about the enforcement of institutional controls required to maintain remedy protectiveness (*e.g.*, dam maintenance and management, use of reservoir).

Principle #4: Develop and Refine a Conceptual Site Model that Considers Sediment Stability.

- Consider using the Pb210 data to refine the sediment stability analyses.
- Evaluate whether increased or changed use of the reservoirs would increase the transport of mercury contaminated sediments and thereby increase potential risks to human health and the environment.
- Determine what device and methodology was used to measure resuspension critical shear stress and erosion rate. Depending on the device and methodology used, additional sediment erodibility testing may be necessary.
- Previous sediment transport modeling performed in Reservoirs 1 and 2 is of limited use to evaluate potential transport and fate of contaminated sediment to make a remedy decision. These sediment transport models had the following limitations, among others: a) minimal level of calibration and no validation was performed for either the hydrodynamic or sediment transport models; b) site specific settling velocities for cohesive sediments were apparently not measured; c) only cohesive sediment, and not non-cohesive sediment, was modeled; and d) upstream suspended sediment concentration boundary conditions were set equal to a constant. Calibration and validation of sediment transport models should be performed using simulations of runoff events when the majority of sediment is transported. CSTAG recommends that the following tasks be performed:
    - Use the Conceptual Site Model to determine if additional sediment transport modeling should be performed in any of the reaches. This decision should be made after consulting the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites.* The project team may also consult with Earl Hayter for assistance in making this decision.
    - If additional transport modeling is deemed necessary, decide what level of analysis (*e.g.*, 2D depth-averaged or 3D) is needed, what reaches need to be modeled, and what site-specific data need to be collected to perform this modeling.
    - If additional modeling is necessary, a modeling work plan should be developed. This work plan should describe the following: i) the modeling framework (see aforementioned guidance document), ii) the model to be used to perform the hydrodynamic and sediment transport modeling, iii) the data collection plan, and iv) the methodology to be followed in performing the modeling study.
- Evaluate the extent of chemical transport caused by bioturbation and groundwater flux.
- Update the Conceptual Site Model to include methylation and atmospheric deposition of mercury.
- Explain the relationship between total mercury (tHg) and methylmercury (MeHg) in various reaches and, if possible, explain why the relationship is not constant throughout all of the reaches.

Principle #5: Use an Iterative Approach in a Risk-Based Framework.

- CSTAG commends the site team for a thorough and systematic analysis of the ecological risks.
- Consider using a dietary approach to assess risks to raptors.
- Consider conducting a sensitivity analysis for the human health risk assessment with respect to the proportion of fish species eaten from the Nyanza site versus other sources.

Principle #6: Carefully Evaluate the Assumptions and Uncertainties Associated with Site Characterization Data and Site Models.

- Ensure that Spreadsheet-based Ecological Risk Assessment for the Fate of Mercury (SERAFM) answers the following questions: Do the reservoirs export mercury? Is mercury cycling out of the wetlands? Are there other inputs of mercury?
- The SERAFM modeling effort should include a detailed sensitivity and uncertainty analysis. Ensure that the limitations of SERAFM are clearly described and considered in decision-making.
- If Monitored Natural Recovery (MNR) is evaluated as a potential remedy, ensure that future risks from the ingestion of contaminated fish are characterized.

Principle #7: Select Site-specific, Project-specific, and Sediment-specific Risk Management Approaches that will Achieve Risk-based Goals.

- Consider the contribution of mercury from continuing background sources when selecting remediation goals (consider using State monitoring data to help with this evaluation).
- If MNR will be evaluated in a Feasibility Study, ensure that adequate data exist to evaluate natural recovery processes, including estimates of methylation and sediment deposition rates.
- Clarify how the downstream boundary of the site was selected and whether site-related mercury contamination is transported downstream of Reach 10. If site-related mercury is transported into the Concord River, ensure that this is considered in the risk management plans for the site.

Principle # 8: Ensure that Sediment Cleanup Levels are Clearly Tied to Risk Management Goals.

- CSTAG will evaluate this later in the RI/FS.

Principle # 9: Maximize the Effectiveness of Institutional Controls and Recognize their Limitations.

- Consider working with MDPH to provide greater public outreach to improve awareness of and compliance with fish consumption advisories (*e.g.*, public education programs, brochures, postings in bait/tackle shops and fishing license proprietors).

Principle #10: Design Remedies to Achieve Long-term Protection and to Minimize Short-term Risks.

- If EPA determines that a remedial action such as capping is necessary at this site, evaluate relative performance of reactive caps versus traditional caps. Consider contacting ORD to conduct a pilot study regarding reactive caps (*e.g.*, bauxite, iron, AquaBlok, apatite).

Principle #11: Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness.

- Consider sediment chemistry (tHg and MeHg) analyses in the eastern wetland in addition to the revegetation monitoring.

Regional Response

Please send a written response to these recommendations within 60 days. If you have any questions or would like a clarification to any of these recommendations, please call either Steve Ells at (703) 603-8822, or Leah Evison at (703) 603-9022.

cc: Susan Studlien, Region 1
Bob Cianciarulo, Region 1
Doug Ammon, OSRTI
Rafael Gonzalez, OSRTI
Michael Cook, OSRTI
Betsy Southerland, OSRTI

Attachment 3

List of Recently completed Mercury Studies completed
by the Commonwealth of Massachusetts

Recently completed Mercury Studies completed by the Commonwealth of Massachusetts:

Fish Monitoring Through Public Requests

Statewide Study of Lakes in Diverse Sub-ecosystems

Merrimack River Valley Fish Mercury Study

Mercury Bioaccumulation in the Food Webs of Two Northeastern Massachusetts Freshwater Ponds

Assessment of Mercury in Massachusetts Wildlife

Lake Sediment Mercury Deposition Study

Sediment Coring Workshop

Fish Mercury Seasonal Variability Study

Examining Laboratory Methods to Reduce Variability and Facilitate Reporting Results

Long Term Monitoring Program for Fish Tissue Mercury Trends

Sources Of Variation In Fish Tissue Mercury Concentration - Suggestions For Study Design And Data Interpretation Improvement

Reports can be obtained via the internet by accessing the MassDEP's website at the following address: http://mass.gov/dep/toxics/stypes/hgres.htm