

**APPENDIX C**

**RESPONSIVENESS SUMMARY**

Action Memorandum  
Mohawk Tannery Site  
Nashua, New Hampshire

**RESPONSIVENESS SUMMARY**

**MOHAWK TANNERY SUPERFUND SITE**

**NASHUA, NEW HAMPSHIRE**

**OCTOBER 2002**

**UNITED STATE ENVIRONMENTAL PROTECTION AGENCY**

**NEW ENGLAND REGION**

## INDEX

- 1.0 OVERVIEW
  - 1.1 PROPOSED CLEANUP PLAN
  - 1.2 GENERAL REACTION TO PROPOSED CLEANUP PLAN
- 2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS
- 3.0 COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES
  - 3.1 RESPONSE TO COMMENTS

## PREFACE

The U.S. Environmental Protection Agency (EPA) held a 30-day public comment period, from July 30, 2002, through August 29, 2002, to provide an opportunity for interested parties to comment on EPA's recommended cleanup plan to address the six unlined waste disposal areas at the Mohawk Tannery Superfund Site (the Site) in Nashua, New Hampshire. The cleanup plan, which consists of excavating the waste from the six disposal areas and transporting this waste off-site for disposal, is an interim remedial action, referred to as a Non-Time-Critical Removal Action (NTCRA). The NTCRA is being implemented to accelerate the removal of hazardous substances found in the disposal areas at the Site which may present a risk in the future for residents, if the property is developed in accordance with the current residential zoning. The NTCRA also addresses the risk of future migration of the waste from the Site in the event of a flood.

The cleanup proposal was selected after EPA developed an Engineering Evaluation/Cost Analysis (EE/CA) report that evaluated a number of different options for addressing the waste disposal areas at the Site. EPA presented its recommended cleanup plan in a fact sheet issued to the public at the start of the comment period that began in July of 2002. On August 7, 2002, EPA conducted a public meeting to discuss the EE/CA and the recommended cleanup plan for the Site. On August 20, 2002, EPA held a formal public hearing to receive comments on the recommended cleanup plan. A number of individuals spoke at the public hearing and provided comments. In addition, written comments were provided by several individuals during the 30-day public comment period.

The purpose of this responsiveness summary is to document EPA's response to the comments and questions raised during the public comment period. EPA considered all of the comments summarized in this document before selecting the final cleanup plan to address the waste disposal areas at the Site.

The EE/CA and the public involvement process were developed consistent with EPA's *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* (EPA 1993).

The responsiveness summary is divided into the following sections:

- Section 1.0. Overview. This section discusses the Site history, outlines the objectives of the EE/CA, identifies the alternatives evaluated in the document, and identifies and summarizes the general reaction to EPA's recommended cleanup plan.
- Section 2.0. Background on Community Involvement and Concerns. This section contains a summary of the history of community interest and concerns regarding the Mohawk Tannery Site.

Section 3.0. Comments Received During the Public Comment Period and EPA's Response to Those Comments. Each oral and written comment received on the EE/CA and the recommended cleanup plan is responded to directly.

Attachment A This attachment provides a copy of the written comments provided to EPA during the public comment period.

Attachment B This attachment is the transcript of the public hearing held in Nashua, New Hampshire on August 20, 2002.

Attachment C This attachment provides a copy of the revised cancer and noncancer risk summary tables.

## 1.0 OVERVIEW

The Mohawk Tannery Site (a.k.a. Granite State Leathers) is located at the intersection of Fairmount Street and Warsaw Avenue in Nashua, New Hampshire. The Mohawk Tannery Site (the Site) is the former location of a leather tanning facility which operated on the property from 1924 to 1984. The Site consists of two adjacent properties, a developed parcel to the north and an undeveloped parcel to the south. Each parcel is about 15 acres. The inactive tannery facility, which is the focus of the Non-Time-Critical Removal Action (NTCRA), is situated on the northern parcel. The tannery is bordered by the Nashua River to the west, the Fimbel Door Company to the north, and residential areas to the east and southeast. As of 1990, the total number of people living within one mile of the Site was 1,470.

Several structures used in tannery operations, as well as debris from several demolished structures, still remain at the Site. Remaining structures include: the main facility building; a smaller control building attached to the main building; and portions of the former wastewater treatment system. Although the tannery shut down in 1984, portions of the main building have been used since then by the owner and several renters for storage purposes. The property, although formerly industrial, has been re-zoned residential by the City of Nashua. Future development of the Site is very likely, given its close proximity to downtown Nashua.

Little is known about the tannery's effluent treatment practices prior to the 1960's. In general, industry practice prior to that time did not require any treatment of wastewater prior to its discharge into nearby waterways. In the 1960's the facility began providing some treatment of wastewater prior to its discharge into the Nashua River. Two unlined lagoons were constructed along the western side of the Site approximately 60 feet from the Nashua River. These lagoons are located predominantly within the 100-year floodplain of the Nashua River.

Initially, treatment within the two lagoons consisted of combining acid and alkaline waste streams and allowing the solids to settle out before the liquid fraction was discharged to the river. Periodically, the sludge from the two lagoons was dredged and disposed of in several other disposal areas on the property. During the 1970's, a new treatment facility was constructed at the Site and it was reported that sludge located in the vicinity of the new treatment facility was transferred to several other areas at the Site. In 1980, materials including hide scraps and other miscellaneous refuse that were located near the main facility were excavated and moved to the southwest in preparation for the construction of the control building.

A majority of the lagoons and disposal areas at the Site have been covered with varying amounts of fill material and allowed to naturally revegetate. The one exception is the Area 1 lagoon, an open lagoon approximately one acre in size, that contains approximately 25,000 cubic yards of wet odorous waste material.

During the 1980's, dried sludge from the tannery was placed in a PVC-lined landfill on the adjacent Fimbel Door Company property (Fimbel Landfill). The Fimbel Landfill has since been capped with a low permeability cover and closed under New Hampshire State Regulations. The Fimbel Landfill was not evaluated as part of this NTCRA.

While operating, the tannery used numerous hazardous substances in the preparation and tanning of animal hides including chromium, pentachlorophenol, and 4-methylphenol. Dioxin has also been found at the Site and is believed to be a by-product associated with the use of pentachlorophenol and other chlorinated phenolic compounds in the treatment of hides. Based on earlier investigations it appears that the southern undeveloped parcel has not been impacted by contamination associated with past operations and waste disposal practices at the tannery.

EPA investigations concluded that during the time that the tannery operated, hazardous substances, such as those mentioned above, were discharged directly into the Nashua River and deposited into the lagoons and waste disposal areas at the Site. There are approximately 60,000 cubic yards of waste at the Site. A majority of the waste is located within the 100-year floodplain of the Nashua River. The waste at the Site has not been disposed of in a manner which would prevent human exposure nor the washout of materials in the event of a flood.

The Site was proposed for inclusion on the National Priorities List (NPL) in May of 2000, based upon letters of support from both the City of Nashua and the State of New Hampshire. In July of 2002, the City of Nashua submitted a letter to Senator Bob Smith of New Hampshire requesting that finalization of the Site on the NPL be delayed at this time. It is EPA's understanding that the City is exploring alternative means for funding the cleanup of the Site. In response to the City's request, the Mohawk Tannery Superfund Site was not included in the most recent group of sites to be finalized on the NPL on September 5, 2002.

With regard to actual or potential exposure to nearby human populations, EPA has documented elevated levels of hazardous substances including, but not limited to, dioxin, 4-methylphenol, pentachlorophenol, antimony, and chromium in the six unlined waste disposal areas at the Site. At least one of the disposal areas (Area 1) at the abandoned tannery remains open and uncovered, with wastes easily accessible to persons trespassing on the property. The Site abuts a densely settled neighborhood and there is evidence of

children (mainly adolescents) entering the Site and playing in and around Area 1 potentially exposing themselves to the hazardous substances present there. Additionally, the Site has been zoned residential and future development of the property is likely, given its close proximity to downtown Nashua. Development of the Site without any further remediation would have the potential to expose future residents (both children and adults) to hazardous substances buried in many of the disposal areas.

The findings of the Streamlined Human Health Risk Evaluation strongly indicates that there are unacceptable risks to the public, primarily to future residents, if the property is developed in accordance with the current residential zoning.

One of the primary substances of concern in the six waste disposal areas is dioxin. Levels of dioxin in the six waste disposal areas typically exceed 1 ppb, and concentrations at the Site have been detected as high as 2.6 ppb. EPA recommends that 1 ppb (TEQs, or toxicity equivalent) be used as a starting point for the residential soil cleanup level for CERCLA non-time critical removal sites and as a preliminary remediation goal (PRG) for remedial sites (Approach for Addressing Dioxin on Soil at CERCLA and RCRA Sites, OSWER Directive 9200.4-26, April 13, 1998).

The EE/CA report identified the following removal action objectives to address the risks and hazards at the Site:

- < Prevent, to the extent practicable, the exposure of human and ecological receptors to contaminants exceeding PRGs established for the Site.
- < Prevent, to the extent practicable, the migration of contaminants exceeding PRGs from the Site into the groundwater and the Nashua River.
- < Address tannery sludge/waste and associated soil with contaminants exceeding PRGs to restore the Site to its intended residential use.

Over ten different technologies and processes were screened in the EE/CA for their ability to meet the above removal action objectives. The three which best satisfied the screening criteria were fully developed and evaluated as removal alternatives. The three removal alternatives which were evaluated against the required criteria (i.e., effectiveness, implementability, and cost) were:

- < Alternative 1 - excavation and off-site disposal in a permitted facility
- < Alternative 2 - excavation and on-site disposal in a landfill

- < Alternative 3 - excavation and off-site treatment using incineration

### **1.1 Proposed Cleanup Plan**

EPA selected Alternative 1 - excavation and off-site disposal in a permitted facility as its recommended cleanup approach for the NTCRA at the Site. The proposed cleanup plan includes:

- < Clearing and grubbing of areas at the Site where excavation, staging, and transportation will take place.
- < Improvements to features at the Site such as construction of staging area and grading of roads to facilitate removal action.
- < Dewatering of disposal areas which have surface water or waste buried below the groundwater.
- < Excavation of contaminated waste and addition of bulking agents and odor control agents, as needed.
- < Sampling of stockpiled waste to ensure that disposal facility criteria are met.
- < Transportation of waste off-site to a permitted facility.
- < Backfilling and grading of excavated areas with clean fill material.
- < Re-seeding of excavated areas to prevent erosion.

Alternative 1 best meets the removal action objectives identified for the Site.

### **1.2 General Reaction to Proposed Cleanup Plan**

The overall reaction to EPA's recommended NTCRA cleanup proposal, both at the public meeting held on August 7, 2002, and the public hearing held on August 20, 2002, was favorable. The public was very supportive of the efforts of EPA and the New Hampshire Department of Environmental Services (NH DES) to clean up the Site. Several persons expressed some confusion and concern about the City of Nashua's efforts to delay finalization of the Site on the National Priority List and the potential impacts such efforts might have on the progress as well as the extent of the cleanup. During interviews and public meetings several residents expressed their frustration that the City has not been responsive to their efforts to deal with the tannery. As a result, the relationship between the neighborhood and the City has become strained. This sentiment was evident in some of the oral as well as written comments provided by local residents during the public comment period.

## **2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS**

Many of the older residents living in the community abutting the tannery have had, at some point during the operation of the tannery, some involvement and interaction with representatives of either the City of Nashua or the tannery. This involvement and contact may have been through individual conversations, actions of quasi-formal neighborhood groups, or through running for local elected office. The level of community involvement and interest appears to have peaked between the 1960's and the 1980's when odor problems at the tannery were reported to be at their worst. Most of the individuals interviewed as part of the preparation of the community relations plan for the Site indicated that their involvement with tannery officials as well as City officials were less than satisfactory.

Since the tannery closed in 1984, the level of community involvement has decreased. However, many of the residents who lived in the area while the tannery was operating, continue to be distrustful of the tannery owner and the City as a result of past problems. The major historical concerns as identified by the community at public meetings and community interviews had to do with odors and potential health effects associated with the operation of the tannery. More recently though, the community has expressed concerns about the lack of progress in cleaning up the Site, truck traffic going to and from the Site, open access to the Site as a result of "renters" who currently use some of the on-site buildings for storage leaving the front gate open, the owner potentially profiting from the cleanup of the Site, and being able to participate in the decision-making process for determining an appropriate future use for the Site.

## **3.0 COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES**

The following individuals provided comments in support of EPA's recommended cleanup approach for the Site, although it should be noted that some support was conditional.

### Written Comments:

- < New Hampshire Department of Environmental Services (NH DES) (O'Brien)
- < Paula Johnson (Alderman-at-Large)
- < Deborah Chisholm
- < Stephanie Dufoe
- < David Ownen
- < Robert Power

### Verbal Comments:

- < Jeff Rose (Aide to Senator Smith)
- < David Gleneck (State Representative, Ward 4)
- < John Regan (NH DES)
- < Sandy Belknap
- < Catherine Corkery (Sierra Club)
- < Paula Johnson (Alderman-at-Large)
- < Jim Dufoe
- < Mary Gorman (State Representative, Ward 4)
- < George Crombie (City of Nashua, Public Works Director)
- < Stephanie Dufoe
- < Dora Yuknovitch
- < Mark Plamondon (Alderman, Ward 4)
- < Kathy Belknap
- < Phil O'Brien (NH DES)

EPA received one other set of written comments which were provided on behalf of the current tannery owner that were critical of the recommended cleanup approach for the Site.

Written Comments:

- < Ridgway Hall (Law firm of Crowell & Moring) & Environ (Environmental Science & Engineering Firm retained by Crowell & Moring)

### **3.1 Response to Comments**

#### **Comment 1 - Confusion And/Or Concerns Voiced About City Of Nashua's Alternative Cleanup Plan ("Plan B")**

A number of individuals who provided both verbal and written comments expressed confusion and/or concerns about what came to be known at the August 20, 2002, public hearing as the City of Nashua's alternative cleanup plan or "Plan B". Such individuals providing comments on the alternative cleanup plan included: David Gleneck (verbal comment in transcript at pg.33), Sandy Belknap (verbal comment in transcript at pg. 38), Catherine Corkery (verbal comment in transcript at pg. 43), Jim Dufoe (verbal comment in transcript at pg. 49), Mary Gorman (verbal comment in transcript at pg.51), Stephanie Dufoe (verbal comment in transcript at pg. 54, written comment at pg. 1), Kathy Belknap (verbal comment in transcript at pg. 60), Robert Power (written comment at pg. 1), and Philip J. O'Brien (verbal comment at pg. 61 and written comment at pg. 1).

The City of Nashua's plan, as clarified by George Crombie, Director of Public Works, (verbal comment in transcript starting at pg. 51) consists of getting the clean up of the

waste disposal areas at the Site (i.e., EPA's recommended cleanup approach for the NTCRA) completed without listing the tannery on EPA's National Priority List (NPL). In attempting to clarify the thought process behind this approach, Mr. Crombie identified that the City was concerned about the length of time it takes to cleanup a site when it is part of the Superfund process and the fact that the listing of a site on the NPL does not guarantee funding for the cleanup. In addition, Mr. Crombie stated that EPA has the ability to perform certain work such as a NTCRA before a site is listed.

EPA Response: The Mohawk Tannery Site was proposed for inclusion on the NPL in May of 2000 based on letters of support provided by the State of New Hampshire (Governor Jeanne Shaheen) and the City of Nashua (Mayor Bernard Streeter). In July of 2000, the City of Nashua submitted a letter to Senator Bob Smith of New Hampshire requesting that finalization of the Site on the NPL be delayed at this time. It is EPA's understanding that the City is exploring alternative means for funding the cleanup of the Site in lieu of placing the Site on the NPL. In response to the City's request, the Mohawk Tannery Superfund Site was not included in the most recent group of sites to be finalized on the NPL on September 5, 2002.

EPA has the authority to perform a NTCRA regardless of whether a site is proposed or finalized on the NPL. However, for funding purposes the distinction of whether a site is proposed or finalized on the NPL can be significant. Sites which are proposed on the NPL are only eligible to request funding for removal activities (i.e., such as the earlier Time-Critical Removal Action at the Site, the NTCRA which is proposed for the waste disposal areas, and the State-lead Remedial Investigation of other potentially impacted areas at the Site). Sites which are proposed but not finalized on the NPL, are not eligible to request funding for remedial activities. An example of remedial work which may be necessary at the tannery, is the cleanup of the groundwater or the cleanup of the Nashua River. Accordingly, EPA can request and compete for funding of the NTCRA as an NPL proposed site. However, EPA would be constrained from requesting any additional funding for the cleanup of the groundwater and/or Nashua River were this to prove necessary, unless the Site were to be finalized on the NPL.

In summary, the distinction between the City of Nashua's plan and EPA's recommended cleanup approach for the Site has to do with whether the Site is finalized on the NPL or not. The method for cleaning up the waste disposal areas at the tannery through a NTCRA, and the cleanup standards which would apply to the NTCRA are the same. EPA is aware that the City of Nashua is attempting to obtain alternative means of funding the cleanup of the Site. However, the likelihood of obtaining alternative funding may be limited.

#### **Comment 2 - Future Use Of The Mohawk Tannery Site**

State Representative David Gleneck (verbal comment in transcript at pg.33) stated that he was concerned that the cleanup of the property was being accelerated to aid a developer. Mr. Gleneck wanted to know whether there was a plan for the use of the land after it is cleaned up and whether there was information concerning such a plan which was not being shared with the local community.

Sandy Belknap (verbal comment in transcript at pg. 40) wanted to know what would happen to the Site once it was cleaned up and indicated that the surrounding community's preference for the property was that it to be used as some type of park rather than residential housing.

Alderman Paula Johnson (verbal comment in transcript at pg. 46 and written comment at pg. 1) stated that she has concerns with the future use of the Site whether it is used for housing or recreational space. Ms. Johnson stated that her concerns relate to what contamination might remain at the Site even after the cleanup is completed. Ms. Johnson wanted to know how the public might be informed about such potential risks and what sort of long-term monitoring would be used to protect the public after the Site is cleaned up.

Alderman Mark Plamondon (verbal comment in transcript at pg. 58) stated that his personal goal is to turn the property into parkland and annex it to Mine Falls Park.

EPA Response: EPA has stated previously that the determination of the most appropriate future use of the Site after it is cleaned up, is a local decision. Based on the current zoning, EPA has used residential standards to guide its proposed cleanup of the Site. However, the use of this cleanup standard is not an endorsement of any one use over another. Again, the determination of the future use of the property must be made locally.

EPA has not been privy to, nor is EPA aware of any discussions between City of Nashua Officials and a private developer concerning the future use of the property. The speed with which EPA and the NH DES have moved to implement the cleanup of this Site reflects an attempt on the part of both agencies to be as responsive as possible to the surrounding community and City of Nashua Officials. Both the community and the City have clearly expressed a preference for having the cleanup of the Site proceed as quickly as possible.

As part of the implementation of the NTCRA, EPA will take confirmation samples of the remaining soil upon the removal of the waste from the disposal areas to ensure that the risks identified by EPA as part of the Engineering Evaluation/Cost Analysis have been eliminated. In addition, upon completion of the confirmation sampling, the excavated areas would be backfilled with clean fill. In some cases, there may be as much as 15-20

feet of clean fill placed above the areas which are excavated. The clean fill will provide an additional buffer to persons living or recreating at the Site. It is also likely that there will be a need for post-excavation monitoring of the groundwater to determine what impacts the removal of the wastes have had on the groundwater. The extent and duration of such monitoring would be determined based on the results of the ongoing Remedial Investigation at the Site. Information obtained during the NTCRA as well as during any long-term monitoring would become part of the public record for Site. Such information would continue to be made available at the Nashua Public Library, the local repository for the Site.

**Comment 3 - Mohawk Tannery Site's Relationship To Brownfield's Revitalization Efforts**

State Representative David Gleneck (verbal comment in transcript at pg.33) requested clarification as to why the Mohawk Tannery Site is linked to the Brownfield's Revitalization efforts which are associated with a number of properties located along Broad Street in Nashua, New Hampshire.

Stephanie Dufoe requested clarification (written comments at pg. 1) on whether Brownfield's funding was going to be used for the cleanup of the tannery.

EPA Response: The Mohawk Tannery Site was initially mentioned as part of the Brownfield's Pilot Assessment fact sheet published by EPA on its Brownfield's Web Site in March of 1999. At the time of the fact sheet, a decision had not been reached on whether to pursue the cleanup of the Mohawk Tannery Site under EPA's Superfund program. It was not until approximately March of 2000, that EPA was requested by both the State of New Hampshire and the City of Nashua to place the tannery on the NPL. With the proposed listing on the NPL in May of 2000, the Site became eligible to use Superfund money for the cleanup. Once eligible for Superfund money, the site was no longer eligible to be part of the Brownfield's Pilot Assessment nor could the Site receive funding associated with the Brownfield's program.

**Comment 4 - Regarding The Current Use Of The Mohawk Tannery Site And The Owners Ability To Profit From The Cleanup Of The Site**

Sandy Belknap stated (verbal comment in transcript at pg. 40) that the community does not want the current property owner to continue to profit from the Site after the cleanup is completed. She also expressed concerns regarding the commercial business activities that continue to occur at the property and the associated truck traffic.

David Owen asked (written comment at pg. 1) whether the current owner of the Site will

be permitted to continue operations at the site if the EPA cleanup occurs.

EPA Response: Although the details of EPA's enforcement efforts against the current property owner are outside the scope of this public comment period, EPA intends to aggressively pursue the recovery of cleanup costs incurred at the Site from all responsible parties, including the property owner. The placement of a lien on the property is one example of the cost recovery efforts implemented by both EPA and the State of New Hampshire. The proceeds realized by the owner through the sale of the property, would have to be used to offset the cleanup costs incurred by EPA and the State of New Hampshire as a result of these liens. The costs incurred by EPA and the State are likely to be significantly higher than the value of the property after it is cleaned up. As a result, it is unlikely that the property owner will profit from the cleanup.

The appropriateness of current and future commercial use of the Site and associated truck traffic is a local zoning and enforcement issue. EPA and the NH DES will continue to work with City of Nashua Officials to monitor the Site and ensure that current commercial activities do not impact the proposed cleanup of the Site.

#### **Comment 5 - Disposition Of Wastes From The Mohawk Tannery Site**

David Owen requested clarification (written comment at pg. 1) as to how the waste from the Site will be disposed of. Mr. Owen wanted to know how the waste could be disposed of in a landfill if it was a hazardous waste.

Paula Johnson stated (verbal comment in transcript at pg. 45) that she was concerned that wastes from the tannery were going to be taken to the City landfill as part of the proposed cleanup approach for the Site.

EPA Response: In April of 2002, the NH DES completed an updated hazardous waste determination for the sludge/waste from the Site using data gathered during the EE/CA. The data and the NH DES determination support the current assumption that waste from the Site would not be considered a RCRA hazardous waste. Accordingly, the approach identified for the NTCRA is to excavate the contaminated waste found in the six unlined disposal areas at the Site and then transport the material off-site for disposal in a RCRA Subtitle D landfill (i.e., a municipal solid waste landfill). During implementation of the NTCRA, excavated waste will be segregated into stockpiles while awaiting the sampling results required by the disposal facility. The waste will be shipped to a permitted Subtitle D landfill assuming the sampling results continue to demonstrate that the waste is non-hazardous. In the event that any waste is determined to be a RCRA hazardous waste, EPA will make the appropriate arrangements to have the waste taken to a facility which is permitted to accept hazardous waste.

EPA and the NH DES did have some initial discussions with City of Nashua Officials concerning the possibility of using the City landfill for disposal of some or all of the waste from the Site. Due to a number of issues which were raised during these preliminary discussions, the use of the City landfill did not appear to be a viable alternative. The selection of the final disposal facility will be determined as part of the contractor bidding and selection process, and there will be additional opportunities before then for the public to provide input on this issue.

#### **Comment 6 - Cost Of Cleaning Up Superfund Sites**

David Owen requested information (written comment at pg. 1) on how much taxpayer money is used to clean up superfund sites.

EPA Response: As of January 2002, EPA has spent over \$124 million on sites listed on the NPL in New Hampshire. A further breakdown of the dollars spent by EPA on NPL Sites throughout New England can be found in EPA New England's 2001 Superfund Annual Report, a copy of which can be viewed at EPA's website located at: <http://www.epa.gov/ne/superfund/resource/report01/index.htm>. On a national level, in 2002, EPA expects to have spent more than \$735 million to conduct site response work and support state and tribal programs. Of this amount, \$155 million was spent for removal actions; \$272 million was spent for assessment, investigation, remedy selection and design, and state, tribal and community involvement; and \$308 million was spent for long term cleanup work (remedial actions and long-term response actions).

#### **Comment 7 - Off-Site Transportation Of Waste From The Site**

Deborah Chisholm stated (written comment at pg. 1) that she was concerned with one of the alternative routes being considered by EPA for transportation of waste from the Site to its ultimate off-site disposal location. Specifically, Ms. Chisholm was concerned about EPA using the railroad tracks to the north and east of the Site, or a path for vehicular traffic leading from the Site across Fimbel property toward Broad Street. Ms. Chisholm is concerned about the proximity of the above transportation routes to the Creative Years Development Center located on Broad Street.

EPA Response: EPA is at the very early stages of identifying potential routes and modes of transportation for taking the waste off-site. However, given the tannery's physical location, there are a limited number of options available for transporting the waste off-site. Waste can either be transported from the Site through the densely populated residential neighborhood located along Fairmount Street or to the north across the Fimbel Door commercial property which is located behind the Creative Years Development Center on Broad Street. EPA will continue to work closely with the community to determine the

safest and most appropriate way to remove the waste from the Mohawk Tannery Site and will not make a decision regarding the final route and mode of transportation until after a contractor has been selected to design and perform the actual cleanup work. The selected contractor may have additional suggestions regarding transportation options. There will be additional opportunities for the public to provide input on this issue before a final decision is reached.

**Comment 8 - No Present Health Risk At The Site And Future Use Scenario**

Ridgway Hall states in his comments (written comment at pgs. 3 and 4) that the U.S. Department of Health and Human Services performed a public health assessment for the Site and issued a report dated August 22, 2001, which concluded that the Site posed “No Apparent Health Hazard”. Mr. Hall also states that EPA and the NH DES have reached a similar conclusion but have recommended a response action based on anticipated future residential use of the property. Mr. Hall further states that it is not realistic for EPA to assume that residential housing would be built in the flood plain areas or in any of the former sludge disposal areas (Areas 1-7). Instead, Mr. Hall states that any such residential units would be built in the upland areas to the east where the groundwater is located 70 feet below the surface and where there is no historic site contamination. Accordingly, Mr. Hall states that it is highly questionable whether such future use requires the excavation of 60,000 cubic yards of soil.

EPA Response: There are several important things to note in regard to the Public Health Assessment completed by the New Hampshire Department of Health and Human Services Bureau of Environmental and Occupational Health (NH DHHS) in consultation with the Agency for Toxic Substances and Disease Registry (ATSDR) on August 22, 2001. First, the Public Health Assessment was based upon historical data gathered prior to EPA’s completion of the EE/CA and does not reflect the recent data which was made available to the public along with the release of the EE/CA in July of 2002. Overall, the sampling completed during the EE/CA was more extensive and comprehensive than the earlier investigations and there are significant differences between the earlier results and the results of the EE/CA. For example, the concentrations of dioxin detected in older data from Area 1, which was used as the basis for the conclusions drawn in the Public Health Assessment for the current use or trespassers scenario, were much lower (by at least an order of magnitude) than those found during the EE/CA. The higher concentrations identified in the EE/CA might have impacted the final conclusions drawn in the Public Health Assessment for the current use exposure pathway.

Secondly, the Mohawk Tannery Site Public Health Assessment also included the following two public health conclusions: 1) that exposure to dioxin buried in the sludges could potentially result in adverse health effects for future Site users, if the Site were to be

redeveloped; and 2) that an event, like a 100-year flood, could cause the release of contaminated sludges to the river, thereby increasing opportunities for exposure for human receptors downstream of the Site. To address these concerns, the Public Health Assessment recommended that residential or other public uses of the Site not occur until the contaminated sludges in Areas I and II and other contamination at the Site have been remediated. In addition, the Public Health Assessment further recommended that the contaminated sludges in Areas I and II should be removed in a timely manner to prevent a release of contaminants following a catastrophic event such as a major flood. In summary, the recommendations provided in the Mohawk Tannery Site Public Health Assessment reach the same overall conclusion as identified by EPA in the EE/CA, that potential future risks at the Site support a Non-Time-Critical Removal Action.

EPA does not agree with the premise that there would be no potential for exposure or contact by persons living at the Site with the waste located in the floodplain or in any of the former sludge disposal areas because it is unlikely that residential development would take place in any of these areas. EPA believes that persons living at or frequenting the Site would have the potential to be exposed to unacceptable risks whether or not development physically takes place in the waste disposal areas. Although several of the waste disposal areas have been covered with fill, the thickness of the fill as well as its ability to limit human exposure and migration of contaminants in the future is certainly questionable.

It should be noted that any consideration for leaving the waste at the Site would require that all waste located below the water table be removed, treated, or contained either on-site or off-site in accordance with State regulations. Approximately 50 percent of the waste placed in Areas 1 and 2, the two largest disposal areas at the Site, is located below the water table. Thus, State requirements would not be satisfied by leaving the waste in place and covering the material with fill because State regulations do not allow waste below the water table to be left in place.

In effect, the approach and the requirements for leaving any waste in place at the Site would be similar to what EPA has identified as Alternative 2 in the EE/CA (e.g., excavation and on-site disposal in a landfill). As explained in greater detail in the EE/CA, an on-site landfill, although protective of human health and the environment, was not selected for the Site because of the long term operation and maintenance required to ensure its protectiveness and because it places greater restrictions on the future use of the property.

#### **Comment 9 - The Sludge Is Not A RCRA Hazardous Waste**

Ridgway Hall states in his comments (written comment at pgs. 4 - 6) that EPA and Tetra

Tech have correctly determined that the sludge and contaminated soil at the Site are not “RCRA hazardous” and therefore can be properly disposed of at a municipal solid waste landfill. In Mr. Hall’s ensuing discussion, he provides additional details affirming his belief that the waste is not hazardous and explains why it would be legally unsound for the EPA and the NH DES to base a finding of “reactivity” within the regulatory definition based upon guidance which EPA has withdrawn and which therefore has no legal or regulatory force or effect whatsoever.

EPA Response: Sampling data and the results of the NH DES waste determination support the conclusion that it is appropriate to dispose of the waste from the Site as a non-hazardous waste. However, this conclusion will be confirmed through a waste characterization sampling program that will be put into place during implementation of the NTCRA. Excavated waste will be segregated into stockpiles and tested for a number of different parameters including the Resource Conservation and Recovery Act (RCRA) hazardous waste characteristics.

The withdrawal of the cyanide and sulfide guidelines for determining the RCRA hazardous waste characteristic of reactivity, will likely mean that EPA and the NH DES will have to base a future determination for reactivity on the regulatory criteria identified in 40 CFR Part 261.23. This section of the regulations states that a solid waste exhibits the characteristic of reactivity if a waste, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in quantities sufficient to present a danger to human health or the environment.

#### **Comment 10 - There Are No Impacts From the Site To Off-Site Receptors**

Ridgway Hall states in his comments (written comment at pg. 6) that the EE/CA report in its ecological effects assessment appears to express some concern for benthic organisms, river sediment and aquatic receptors which could only be exposed to contamination from the Site if there was ongoing migration of surface water or groundwater to the river or other off-site receptors. Mr. Hall questions whether there is any evidence of such impact from the Site to off-site receptors.

Environ in its comments (written comment at pg. 2) states that the streamlined ecological risk evaluation was a screening-level analysis that identified only the potential for adverse ecological effects. Therefore, Environ states that the streamlined ecological risk evaluation may indicate that a more detailed ecological assessment is warranted but it does not demonstrate that a removal action is warranted.

EPA Response: The streamlined ecological risk evaluation completed during the EE/CA did not attempt to quantify potential impacts to off-site receptors from factors including:

the direct discharge of wastewater from the tannery into the Nashua River over its many years of operation; the migration of contamination from the waste into the groundwater; and the catastrophic release of wastes from the Site into the Nashua River in the event of a flood. Such risks will be considered during the Remedial Investigation (RI) which is being completed separately from the NTCRA. There is clearly a need for such an investigation, given the proximity of the waste disposal areas to the Nashua River and the groundwater, and the operational history of the tannery during which hundreds of millions of gallons of wastewater, both treated and untreated, were discharged into the Nashua River.

Instead, the streamlined ecological risk evaluation completed during the EE/CA focused on the current and future impacts of the waste disposal areas at the Site to on-site ecological receptors. This screening-level evaluation used conservative screening values to identify all contaminants which might pose an ecological risk. Contaminant concentrations were compared against screening values to identify contaminants of potential concern (COPCs). COPCs do not necessarily pose a risk to ecological receptors, but rather indicate a potential risk that might warrant further investigation.

The ecological risk evaluation identified potential risks to ecological receptors from exposure to wet sludge and surface water in Area 1 and surface soils in Areas 2 through 7. These exposure pathways exist for ecological receptors that are likely to be currently using the Site. Such receptors include: red-tailed hawks, crows, bluejays, white-tailed deer, woodchuck, raccoon, beaver, rabbit, and rodent sized mammals. Sightings of wildlife within the Area 1 disposal area, an open lagoon containing up to several feet of standing water, include painted turtles, bull frogs, green frogs, mallards, and Canada geese. The results of the ecological evaluation indicate that, based upon the magnitude by which several contaminants exceed their respective screening level benchmarks, that contaminants at the Site pose a real concern for ecological receptors. The conclusions of the streamlined ecological risk evaluation also discusses the need for performing a more in-depth ecological risk assessment for the Site in the future, but suggests that if there is insufficient time to perform such an assessment, that the removal of tannery waste is justified based on the current ecological screening results.

Although the scenario of potential impacts to off-site receptors was not addressed as part of the streamlined human and ecological risk evaluations, a catastrophic event such as a flood could release tens of thousands of cubic yards of waste into the Nashua River. The Nashua River is an important component of the regional wildlife habitat. In addition, there is a drinking water intake located approximately 14 miles downstream on the Merrimack River which serves a population of over 100,000. Accordingly, there could be increased opportunities for human and ecological exposures downstream of the tannery to contaminants from the Site in the event of a future release.

### **Comment 11 - Potential Impacts on Groundwater Quality**

Ridgway Hall notes in his comments (written comment at pg. 6) that the groundwater beneath the Site is not used for drinking water and refers to a statement made in the EE/CA concerning the sampling of two residential wells located approximately one-half mile southeast of the Site as further proof that there isn't any site-related impact to the groundwater. The EE/CA identifies that the two residential wells were sampled for volatile organic compounds and metals by the NH DES in October 1994 and that there was no evidence of contamination related to the Site.

Environ in its comments (written comment at pgs. 2 - 3) states that the results of the EE/CA investigation do not demonstrate that migration of contaminants from the Site to the groundwater has adversely affected (or has the potential to affect) drinking water supplies or the Nashua River. Environ refers to the groundwater monitoring data obtained by the NH DES (2001), which Environ states was not reported in the EE/CA, as further proof that the Site is not having an adverse effect on groundwater.

EPA Response: The streamlined human health risk evaluation contained in the EE/CA focused on the risks posed to human health by the Site in its current abandoned condition, as well as in the future for residents if the property is developed in accordance with the current residential zoning. As discussed in Section 2.4 of the EE/CA, the purpose of the streamlined evaluation is to evaluate the exposure scenarios associated with the media of concern that could pose the greatest potential risks. As a result, the streamlined risk evaluation did not investigate or quantify potential risks associated with any groundwater exposure pathways. The groundwater exposure pathways and associated risks will be studied during the RI at the Site which is expected to begin during the Spring of 2003.

It should be noted that a brief discussion of the NH DES groundwater sampling event (May of 2001) is provided in the last paragraph of Section 2.3 (pg. 2-36) of the EE/CA. The groundwater sampling results indicate the presence of several contaminants in the groundwater, which were also found associated with the tannery waste, at concentrations above State of New Hampshire Ambient Groundwater Quality Standards. In summary, EPA believes that the risks identified in the EE/CA for future residents are sufficient to support the NTCRA. The potential for past waste disposal practices to have also impacted the groundwater supports the need for future investigation of this media as well.

### **Comment 12 - The Site Does Not Qualify For The NPL**

Ridgway Hall in his comments (written comment at pg.7) questions whether a hazard ranking score in excess of the cut-off level of 28.5 is warranted for the Site based on the current factual status of the Site including the completion of a removal action at the Site

by EPA in January, 2001.

EPA Response: This comment addresses matters which are not the subject of the public comment period for the EE/CA and EPA's proposed cleanup plan for the Site. Comments concerning the listing of the Site on the NPL, which were submitted to EPA during the May 2000 public comment period for the proposed listing of the Site, will be responded to by EPA Headquarters as part of the Mohawk Tannery NPL Comment Response Package.

### **Comment 13 - Potential Impact of Flooding Events**

Environ in its comments (written comments at pgs. 3 - 4) states that all of the disposal areas with the exception of Area 1 have soil covers that are generally several feet thick, are essentially uncontaminated, and are vegetated so that there is no reasonable potential for overland migration of waste during normal precipitation events. Environ acknowledges that preventing sludge in Area 1 from entering the Nashua River in the event of a severe flood is an appropriate objective for remedial actions at the Site. However, Environ states that the EE/CA did not evaluate the effectiveness of the existing berm for achieving this objective or consider measures short of complete sludge removal that might be more appropriate (such as closing the lagoon in place with a soil cover, perhaps after removal of the uppermost portion of the sludge).

EPA Response: As discussed in the EE/CA, a majority of the waste contained in Area 2 (estimated volume of approximately 30,000 cubic yards) is located within the 100-year floodplain of the Nashua River. The Area 1 lagoon is not located within the 100-year floodplain due to the elevation of the earthen berm that has been constructed around its perimeter. If the berm were ever breached during a 100-year flood event, then the contents of the lagoon, approximately 25,000 cubic yards of waste which are located below the 100-year flood elevation, could be released into the river. Neither the soil cover over the waste in Area 2 nor the earthen berm surrounding Area 1 were evaluated for their effectiveness in meeting a 100-year flood event as part of the EE/CA. However, it is clear from the physical condition of both and an earlier documented release from Area 1 into the Nashua River in 1987, that they have not been designed and constructed to prevent the washout of hazardous substances.

It should also be noted that the implication that the long-term risks at the Site would be eliminated and that all of the regulatory requirements would be met by removing the uppermost portion of the waste and covering the remainder with fill is not correct. Under NH DES regulations, all waste located below the water table would have to be removed, treated, or contained either on-site or off-site in accordance with State regulations. Thus, State requirements would not be satisfied by leaving the waste in place and covering it with fill.

**Comment 14 - Appropriateness Of Data Used To Evaluate Potential Exposures For Current Trespassers and Future Residents**

Environ in its comments (written comments at pgs. 4 - 5) states that the evaluation in the EE/CA of potential exposures for current trespassers to surface material which extends to depths greater than 2 feet below ground surface (bgs), and in the future for residents exposed to soil and sludge in Areas 1 to 7 from depth to 10 feet bgs, is unrealistic and inappropriate. Environ states that if the evaluation of potential exposures of trespassers and future residents to surface material were instead based on the surface soil data for Area 2 to Area 7, the estimates of site-related cancer and non-cancer risks for these areas likely would not exceed a cancer risk of  $10^{-4}$  or a non-cancer hazard index (HI) of 1, respectively.

EPA Response: All of the waste disposal areas, with the exception of Area 1, have been covered to some extent with fill material ranging from 2 to 4 feet in thickness. The surface soil and waste samples obtained from Areas 2 to 7 during the EE/CA attempted to characterize the chemical characteristics of the surface/fill material over its entire depth. A similar approach was taken for obtaining representative samples from Area 1, the open lagoon, during the EE/CA. Since there is no fill material over the waste in Area 1, composite samples were taken from the surface down to the base of the waste material found in this lagoon which was approximately 10-12 bgs.

The results used by EPA to determine the potential risks posed to current trespassers from surface/fill material in Areas 2 to 7 and waste material in Area 1 did extend to depths greater than two feet. However, EPA believes that due to the relatively homogeneous nature of the surface/fill and waste material, that the evaluation of potential trespasser exposures was based on appropriate soil and waste characterization data. In addition, through this approach, EPA was able to maximize the usefulness of the sampling information gathered and thereby address additional data quality needs at no additional cost (e.g., such as determining whether surface/fill material was sufficiently clean to be used as backfill at the Site).

EPA also believes that the evaluation of potential future residential exposure to soil and waste in Areas 1 to 7 at depths of up to 10 feet bgs was based on appropriate soil and waste characterization data. EPA guidance for conducting risk assessments in New England clearly states that subsurface soil exposures are assessed using soil/waste data from 0 to 10 feet bgs. This definition of subsurface soil is based on the general depth of frost penetration in New England soil and the typical depth of excavation for home construction in the region. Typically, soil is excavated to the depth of frost penetration or deeper when constructing a foundation for a house. Mixing of soil occurs due to frost

heaving and also due to excavation. EPA assumes that the excavated soil is used as grade material; hence, exposures to soil composited from 0 to 10 feet are assessed under a future land use scenario. In several of the waste disposal areas, wastes were encountered at depths below 10 feet bgs. As a result, some composite samples of the waste in these areas extended to depths greater than 10 feet bgs. EPA believes that due to the relatively homogeneous nature of the waste material contained in these areas such an approach was appropriate.

EPA as part of the streamlined human health risk evaluation did evaluate the potential exposure of a trespasser to soil from Areas 2 to 7 (see Tables 2-25.2a and 2-26.2a attached to the responsiveness summary). The results of the evaluation indicate that the estimates of site-related cancer and non-cancer risks for these areas likely would not exceed a cancer risk of  $10^{-4}$  or a non-cancer hazard index (HI) of 1, respectively. Thus, EPA did not identify in the EE/CA that such a potential trespasser exposure to soil from Areas 2 to 7 would be outside of EPA's acceptable cancer and non-cancer risk values.

For the potential future residential exposure pathway, EPA evaluated soil and waste data from Areas 1 to 7. EPA felt that it was appropriate to include the data from all waste disposal areas, including the open Area 1 lagoon, as part of the potential residential exposure pathway. As discussed above, for a residential exposure scenario EPA assumes that mixing of soil occurs due to frost heaving and excavation. Accordingly, it is appropriate to include the results of the soil column from 0 to 10 feet for exposure calculations as was done for Areas 2 to 7. In the case of Area 1, EPA cannot predict or determine what the ultimate result of mixing Area 1 waste with fill material might be, if fill were to be placed over this area in the future. As a result, EPA has assumed that future residents could potentially be exposed to Area 1 waste (at current concentrations). EPA still believes that the assumption is appropriate given the lack of alternative data. The results of the future residential exposure calculations, which are included in Tables 2.25.3 and 2-26.3 attached to the responsiveness summary, demonstrate that the estimates of site-related cancer and non-cancer risks for these areas exceeds EPA's acceptable cancer and non-cancer risk values (i.e., cancer risk of  $10^{-4}$  and a non-cancer HI of 1, respectively). Thus, EPA believes that an unacceptable cancer and non-cancer risk could exist for potential future residents living at the Site.

**Comment 15 - Background Levels of Metals Should Be Accounted For In Risk Identified At the Site**

Environ in its comments (written comments at pg. 5) makes several statements about the risks from various metals detected in soil at the Site and questions whether the metals found are related to waste disposal activities at the Site. Environ suggests that the concentrations of some metals (antimony, arsenic, chromium, mercury) may be

representative of natural background conditions and bases this statement on comparisons of soil and waste from the Site to a range of concentrations found in the Eastern United States (reference provided by Environ is Dragun and Chiasson, 1991).

EPA Response: EPA compared metal concentrations found in soil and waste at the Site with the state-wide background concentration values identified by the NH DES in the Risk Characterization and Management Policy (NH RCMP). In the absence of site-specific background metal concentrations, these background values were determined to be the most appropriate values to use for the Site as discussed further in Section 2.1.1 and 2.1.2 of the EE/CA. In terms of the general importance and use of background concentrations in the Superfund cleanup process, it is important to note that such concentrations are used by EPA to help with the selection of cleanup goals rather than as a comparison value to be used to eliminate contaminants of potential concern (COPCs) from risk calculations.

The concentrations of arsenic detected in the overlying or surface soils in Areas 2 through 7 were less than the background value identified in the NH RCMP for this compound. Therefore, the arsenic concentrations found in these areas may be representative of background conditions. However, it should be noted that the risk calculations for arsenic in Areas 2 through 7 did not exceed the acceptable values identified by EPA for cancer and non-cancer risks.

Antimony, chromium, and mercury concentrations in one or more of the overlying soil samples analyzed from Areas 2 through 7 exceeded their respective NH RCMP background values. As such, the risks associated with these compounds may be attributable to tannery operations at the Site. However, risk calculations in the overlying soils from Areas 2 through 7 for these metals did not exceed the acceptable values identified by EPA for cancer and non-cancer risks.

**Comment 16 - Potential Trespasser Exposure Pathway For Area 1 Did Not Account For Actual Physical Conditions Of Open Lagoon**

Environ in its comments (written comments at pg. 6) states that the potential exposure of trespassers to sludge at Area 1 is apparently based on a scenario that ignores the fact that the sludge is submerged under approximately 6 inches of water. Because the sludge is underwater, the degree of a trespasser's contact with sludge would be minimized by the tendency for the water to wash sediment off a trespasser who might wade into the lagoon. Environ does acknowledge that it is at least theoretically possible that a trespasser could be exposed to near-shore, surficial sludge in Area 1. However, the risk evaluation does not explain why it is assumed that the Area 1 sludge data from the borings locations that had to be accessed from a floating platform represent near-shore conditions.

EPA Response: The amount of water covering the waste contained in Area 1 is weather dependent. During the wetter months of the year (spring and fall) the depth of water as well as the extent of sludge covered by the water increases. Conversely, during the dryer months (summer), when it is most likely that adolescent trespassers might be entering the Site, more of the waste is exposed. Even during the wetter seasons there is a significant amount of waste exposed around the periphery of this open lagoon, and during an extremely dry year, such as the drought that existed this summer in much of New England, less than approximately 50 percent of the waste is covered by water.

The most likely scenario for the potential exposure of an adolescent trespasser to waste in Area 1 is through teenagers playing or walking around the edges of the lagoon in direct contact with the waste rather than wading through the water. Given the high organic content and finely grained, wet, cohesive nature of the waste, it acts more like a mud rather than a sediment. Trespassers who come in contact with the waste are likely to be exposed to higher sediment ingestion and dermal loading rates, and hence higher risk estimates, as a result of the mud-like properties of the waste.

Earlier investigations of Area 1 focused primarily on the waste located around the periphery of the open lagoon since these were the areas most easily accessible. In order to better characterize other less accessible portions of the disposal area, EPA's contractor, Tetra Tech NUS, Inc., focused its investigation during the EE/CA on the central portions of the disposal area. Access to the central portions was obtained using a floating platform due to the standing water which was present in that portion of Area 1. Based upon the comparison of sampling results and boring logs from the EE/CA to earlier investigations of Area 1, it appears that the waste encountered throughout Area 1 has similar physical and chemical properties. Thus, the data obtained from the central submerged portion of the Area 1 lagoon is representative of the chemical concentrations and texture found in the near-shore area.

**Comment 17 - The Risk Estimates For Potential Trespasser Exposures To Area 1 Were Derived Incorrectly**

Environ in its comments (written comments at pg. 6) states that the risk calculations for the trespasser exposure scenario for Area 1 are incorrect for a number of reasons including: 1) exposure point concentrations were incorrectly based on what appears to be dry weight concentrations when they should have been calculated on wet weight basis; 2) the sludge-to-skin soil adherence factor of 231mg/cm<sup>2</sup> used in the risk evaluation is inappropriately high and a value of 21 mg/cm<sup>2</sup> should have been used; and 3) the dermal absorption factor used in the children-in-mud scenario is overly conservative.

EPA Response: The exposure point concentrations for the trespasser exposure scenario for Area 1 should have been calculated on a wet weight basis as identified by Environ. Tables 2-25.1 and 2-26.1 in the EE/CA were recalculated to include the average percent solids value in the non-cancer and cancer risk calculations. The revised risk tables are attached to the responsiveness summary.

EPA selected the 95<sup>th</sup> percentile soil adherence factor to combine the high end adherence factor (231mg/cm<sup>2</sup>) with a typical activity (“children-in-mud”) for the Area 1 disposal area, so as to achieve a “high end of a mean” as supported by the EPA Supplemental Guidance for Dermal Risk Assessment (2001). In retrospect this approach may have been overly conservative. Therefore, EPA has recalculated the trespasser exposure scenario for Area 1 using the 50<sup>th</sup> percentile soil adherence factor of 21 mg/cm<sup>2</sup>. The revised risk tables (Tables 2-25.1 and 2-26.1) are attached to the responsiveness summary.

The dermal absorption factors used in the streamlined human health risk evaluation in the EE/CA are those recommended in the EPA Supplemental Guidance for Dermal Risk Assessment (2001). Based on that guidance, the absolute effect of soil loading on soil-to-skin adherence values and dermal absorption values is not sufficiently understood to warrant adjustment of the experimentally determined values. As a result, no changes were made to the dermal absorption factors used in the EE/CA risk evaluation.

**Comment 18 - The Risk Estimates For Potential Trespasser Exposures To Areas 2 to 7 Were Derived Incorrectly**

Environ in its comments (written comment at pg. 8) states that the risk calculation for the trespasser exposure scenario for Areas 2 to 7 is incorrect because the soil adherence factor of 0.4 mg/cm<sup>2</sup> used is inappropriately high.

EPA Response: The EPA Supplemental Guidance for Dermal Risk Assessment (2001) states that two options exist for selecting soil-to-skin adherence factors. Either a 50<sup>th</sup> percentile soil-to-skin adherence factor may be used with a high-end activity, or a 95<sup>th</sup> percentile soil-to-skin adherence factor may be used with a typical activity to achieve a “high-end of a mean”. The 0.4 mg/cm<sup>2</sup> soil-to-skin adherence value selected for the trespasser contacting soils in Areas 2 through 7 is the 95<sup>th</sup> percentile value for children playing in dry soil, a central tendency or typical activity. As a result, no changes were made to the soil adherence factor used in the EE/CA for the trespasser exposure risk calculations for Areas 2 to 7.

**Comment 19 - Approach To Evaluating Ingestion Exposures For Trespasser and Residential Scenarios Is Incorrect**

Environ in its comments (written comment at pg. 8) states that the adjustment of oral reference dose (RfD) values to account for gastrointestinal (GI) absorption in evaluating ingestion exposures appears to be incorrect for both the trespasser and residential scenarios.

EPA Response: The appropriate methodology was used by EPA for determining ingestion risks associated with the trespasser and residential scenarios. Where available, oral absorption factors for specific contaminants in soil should be included in the estimation of the dose and that dose should be combined with RfD or CSF values that have been adjusted to account for gastrointestinal absorption. Unfortunately, there are very few chemicals for which oral absorption values from soil are available. Therefore, no adjustment to the methodology used by EPA is warranted. It should be noted that an error was identified in the spreadsheets used to calculate non-cancer risks (Tables 2-25.1, 2-25.2a, 2-25.2b, and 2-25.3). The error, which involved the inadvertent use of the “RfDabsorbed” values instead of the “RfDadministered” values to calculate the non-cancer ingestion risks, resulted in the over-calculation of non-cancer ingestion risks for selected metals. Revised tables correcting this error are attached to the responsiveness summary.

**Comment 20 - Computation Of Exposure Point Concentrations Uses An Outdated Methodology For Calculating 95% Upper Confidence Limits**

Environ in its comments (written comments at pgs. 8-10) states that the computation of exposure point concentrations used a method that follows outdated EPA guidance for computing 95% upper confidence limit (UCLs) for lognormally distributed data. As a result, the calculated 95% UCLs in the EE/CA are usually higher than the maximum detected concentrations, so that maximum concentrations were used as exposure point concentrations. This resulted in the EE/CA overstating actual exposure point concentrations. Environ also states that data sets that were determined to not follow either a normal or lognormal distribution should not have been assumed to follow a lognormal distribution and instead the 95% UCLs for these data sets should have been calculated using a nonparametric method such as the bootstrap method.

EPA Response: The methodology for determining the 95% UCL in the EE/CA was calculated in accordance with EPA Region I Risk Update No. 2 (August, 1994), consistent with the current EPA New England practice. The Region I Risk Update recommends that the 95% UCL be calculated according to EPA Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Publ. 9285.7-081, 1992. This guidance also recommends that the maximum concentration be used as the exposure point concentration if the 95% UCL is greater than the maximum, noting that the true mean still may be higher than this maximum value. With regard to the use of probabilistic methods such as bootstrapping, such procedures are appropriate only for randomly sampled data

that is not focused on contamination hot spots. Sampling for the EE/CA was not necessarily random; in some areas the sampling was directed to locations more likely to be contacted by humans. Therefore, bootstrapping is not appropriate.

**Comment 21 - Basis For EPA Not Computing 95% Upper Confidence Limits For Sample Sets Consisting Of Less Than Ten Samples**

Environ in its comments (written comment at pg.10) questions the basis for EPA using the maximum concentrations for data sets consisting of 10 samples or less instead of computing the 95% upper confidence limit (UCLs) for the data set.

EPA Response: EPA did not calculate 95% UCLs for data sets with 10 samples or less because EPA guidance (EPA Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Publ. 9285.7-081, 1992) states that small data sets provide poor estimates of the mean concentration. It is standard practice within EPA New England to assume that data sets of 10 samples or less are “small” and contain insufficient data for estimating the mean concentration. Therefore, EPA used the maximum concentration as an estimate of the exposure point concentration for data sets with 10 samples or less.

**Comment 22 - Soil/Sludge Ingestion Rate For Trespassers Should Have Been Applied With a Fraction Ingested Term Of Less Than One**

Environ in its comments (written comment at pg. 10) states that the soil/sludge ingestion rate for trespassers should have been applied with a fraction ingested (FI) term of less than one, because trespassers were assumed to be at the Site for only 4 hours/day and the assumed ingestion rates are based on a full day (16 hours) of soil contact.

EPA Response: For this exposure scenario, EPA has assumed that an adolescent represents the most likely trespasser to the Site. EPA has also assumed that the 4 hours/day that the teenager spends at the Site represents their full daily allotment of soil intake (i.e., during the remainder of the day the teenager is indoors). EPA believes that it is reasonable to assume that an adolescent, given the higher level of play activity they are likely to exhibit, could ingest a similar amount of soil at the Site during those four hours of exposure as an adult could ingest in a full day of outdoor exposure. Thus, EPA believes that an appropriate fraction ingested term was applied to the trespasser exposure scenario.

**Comment 23 - Hazard Index Values that Exceed 1 Should be Re-evaluated And Segregated According To The Mechanism Of Toxicity**

Environ in its comment (written comment at pg.10) states that Hazard Index (HI) values

that exceed 1 should be re-evaluated and segregated according to mechanism of toxicity.

EPA Response: In a streamlined risk evaluation, it is standard practice to segregate non-cancer risks as identified by their respective hazard indices by organ-specific toxicity only when hazard indices are slightly above 1 and no hazard indices for individual contaminants exceed 1. After the recalculation of the non-cancer risks as discussed previously in EPA Comment Responses # 17 and #19, the revised non-cancer risk results, which are attached to the responsiveness summary, were evaluated to see if there was a need to segregate hazard indices by organ-specific toxicity. The results are as follows:

- C Trespassers exposed to waste in Area 1 have a HI of 1. The principle contaminant contributing to the non-cancer risk associated with the waste in Area 1 is 4-methylphenol, with a HI value of 1. The primary target organ for 4-methylphenol is the Central Nervous System (CNS). Manganese also effects the CNS, however its contribution to the total HI is minor.
- C Trespassers exposed to surface soil/waste in Areas 2 through 7 have a HI of less than 1, thus there is no need to segregate hazard indices by organ-specific toxicity.
- C Future residents exposed to surface soil/waste in Areas 2 through 7 have a HI of slightly greater than 1. No individual contaminant HI exceeds 1. The primary target organ for both arsenic and Aroclor 1242 is the skin. However, when added together, the HI's for these two contaminants do not exceed 1. None of the other contaminants when grouped by organ-specific toxicity have an HI which exceeds 1.
- C Future residents exposed to all surface soil/waste from Areas 1 through 7 have an HI of 10. Antimony and 4-methylphenol have an HI of greater than 1, with values of 7 and 2, respectively. The primary target organism for antimony is the blood. None of the other contaminants affect the blood. The primary target organ for 4-methylphenol is the CNS. Manganese also effects the CNS, however its contribution to the total HI is minor. None of the other organ-specific HI's exceed 1.

**Comment 24 - Number Of Significant Digits Expressed In Risk Assessment Results Should Reflect Uncertainty Associated With Assumptions**

Environ in its comment (written comment at pg.10) states that HI estimates (as well as cancer risk estimates) should be expressed with only one significant digit because the assumptions on which these estimates are based (e.g., toxicity values) are not sufficiently precise to warrant the use of more significant digits.

EPA Response: EPA typically retains more than one significant digit when adding up risks in the supporting tables so that the reader can reproduce the calculation results and so that intermediate risks are not rounded prematurely. EPA has included the results of the hazard index and cancer risk estimates expressed with only one significant digit in the revised Summary of Receptor Risks and Hazards Table (Table 2-27) which is attached to the responsiveness summary.

**ATTACHMENT A**

◊

**Written Comments Provided to EPA During the Public Comment Period**



State of New Hampshire  
DEPARTMENT OF ENVIRONMENTAL SERVICES

6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095  
(603) 271-3644 FAX (603) 271-2181



August 29, 2002

Mr. Neil Handler  
Project Manager  
U.S. Environmental Protection Agency  
One Congress Street, Suite 1100 (HBO)  
Boston, MA 02114-2023

**SUBJECT: Nashua, Mohawk Tannery, Engineering Evaluation/Cost Analysis –  
Comments**

Dear Mr. Handler,

The Department of Environmental Services (Department) commends EPA on their presentations and your forthright response to questions at the August 7, 2002 Information Meeting and the August 20, 2002 Public Hearing. The two meetings were informative and initiated substantive discussions with the public. In response to those discussions the Department has several questions.

1. NPL Listing Status - Effect on Removal Funding Priority. Currently the Mohawk Tannery Site is proposed for NPL listing and is under consideration to receive final NPL listing. There was considerable discussion at the August 20, 2002 public hearing about whether to proceed with NPL listing for the site. Our understanding is that upon completion of the Action Memo the project will compete for funding to remove the tannery wastewater sludge as a Non Time Removal Action within the Superfund program.

If a decision is made to no longer proceed with NPL listing, what is the potential effect on the priority to receive the funding to implement the recommended alternative of the Engineering Evaluation/ Cost Analysis (EE/CA)? Specifically, if the NPL listing process stops, does that action change the priority to obtain the needed funding?

2. NPL Listing Status – Effect on Remedial Investigation Funding. The Department is proceeding with the Remedial Investigation (RI). With the available funding the RI is focused on the impacts surrounding the main operational areas of the former tannery. At this time there is not sufficient funding to investigate potential impacts on the Nashua River and there may be a need for additional funding to complete investigations around the building areas. The existing cooperative agreement does not provide money to perform the Feasibility Study (FS) The FS evaluates potential remedial alternatives to address any risks to public health and the environment that are identified in the RI. If NPL listing does not proceed what will be the impact of the ongoing RI work and what is the impact on obtaining additional funding to investigate the Nashua River and complete the Feasibility Study?

Neil Handler  
Nashua –Mohawk Tannery  
August 29, 2002  
Page 2 of 2

The Department has enjoyed working with EPA and City officials on this project and is hopeful that funding can be obtained to remove the sludge as recommended in the EE/CA. The Department appreciates your hard work on the EE/CA. Please do not hesitate to contact John Regan or me if you have questions regarding our comments.

Sincerely

A handwritten signature in black ink, appearing to read "Philip J. O'Brien", written over a horizontal line.

Philip J. O' Brien Ph.D., Director  
Waste Management Division

L:\HWRB\Admin\JRegan\mohawkeecommentsrev1.doc

cc: file  
Michael Jasinski, USEPA  
Eve Vaudo, USEPA  
Angela Bonarigo, USEPA  
Peter Roth, AGO  
George Crombie, Nashua DPW  
Carl Baxter, NHDES via e-mail  
Richard Pease, NHDES via e-mail  
John Splendore, NHDES via e-mail  
Thomas Andrews, NHDES via e-mail  
Warren Keane



"Chisholm, Deborah"  
<ChisholmD@ttnus.com>

08/29/2002 05:38 PM

To: Neil Handler/R1/USEPA/US@EPA  
cc:  
Subject: Mohawk Tannery Formal Comments

Mr. Neil Handler  
Project Manager  
US EPA  
Suite 1100 (HBO)  
1 Congress St  
Boston, MA 02114

Dear Neil,

This letter serves as my formal written comments regarding the proposed cleanup plan for the Mohawk Tannery Site waste disposal areas. I concur that the EPA's proposed alternative (excavation and transportation of waste off-site to a permitted facility for disposal and backfilling with clean fill) is the best alternative for this site.

EPA has strongly suggested to local residents that an alternative to Fairmount Street as a route for transporting wastes off-site will be used. The two alternatives currently being considered include the railroad tracks located north and east of the site, as well as a path leading from the site, across the Fimbel property toward Broad Street. I am opposed to either of these routes, and I urge EPA to use the existing Fairmount Street as the transportation route for all vehicles entering and exiting the site.

As a parent of children attending Creative Years Development Center on Broad Street, I oppose using any northerly route to enter or exit the site because a truck or rail route in that direction would pass directly behind Creative Years. Increased rail or truck traffic in that area would adversely impact the ability to conduct classes, and transportation of hazardous excavated materials would present a danger, be it real or perceived, to the 165 children, their parents, and staff of the facility.

Additionally, the distance between the railroad tracks as they cross Broad Street, and the building which houses Nashua Outdoor Power would preclude construction of a road wide enough to safely accommodate trucks, while still allowing vehicle traffic in and out of the parking lot of Nashua Outdoor Power. This would place an undue hardship on this business.

In closing, I submit that any alternative northerly route would have more of an adverse impact on the local community than the use of the existing Fairmount Street. I urge EPA to continue to keep the community involved in the cleanup process.

Regards,

Deb Chisholm  
15 Shelburne Road  
Nashua, NH 03063



Robert Power  
<powerr@nashua.edu  
>

08/23/2002 01:57 PM

To: Neil Handler/R1/USEPA/US@EPA  
cc: "roopow@earthlink.net" <roopow@earthlink.net>, Robert Power  
<powerr@nashua.edu>  
Subject: Mohawk Tannery Meeting

Dear Neil,

I was in attendance for the first time the other night in Nashua regarding the Mohawk Tannery so my knowledge of this situation is just beginning. I reside at 14 Orlando Street in Nashua and I am a fairly new resident of Nashua(3 years)

It was an interesting meeting and I learned a lot. The EPA proposed alternative seems to make sense in theory and I endorse it. It just seems that the EPA has the most experience in this matter. It was, however, very confusing following the comments from the city. Supposedly the city has another plan, but the plan was not clearly articulated. Instead, it seemed to me the city representatives merely gave reasons why the EPA proposal should not include the Superfund. These reasons may be extremely valid, but I was confused by the method the city would use to actually clean-up the site, which remains the heart of the issue. As a result, when I left the meeting at 8:45PM I had an understanding of the EPA alternative(PLAN A), an understanding of city's criticism of this plan, but a feeling that there was no real PLAN B. Specifically, if the city were to do the job, who would do the work? Would the EPA still manage the project? If so where would the money come from? In addition, why could the city do the job for 7 million while PLAN A would cost 15 -22 million?

I think the meeting suffered from a lack of a planned agenda. The EPA presentation was succinct and clear. Then it was like trying to follow my fifteen month old son around. There was a lot of rambling topics to grasp. In the future, I would prefer to stick with one topic at a time, such as how will the site be cleaned up and when will it be cleaned up? As a resident, I want the most comprehensive and thorough cleanup possible. That should be the goal. Period. Keep the main thing the main thing.

Sincerely,

Rob Power



Owen David  
<muddyfox007@yahoo.com>

To: Neil Handler/R1/USEPA/US@EPA  
cc:  
Subject:

08/22/2002 07:02 AM

I would like to thank the EPA for it's recent public hearing on the Mohawk Tannery Site in Nashua, NH.

Please accept my written comments below.

Exactly how will the waste from this site be disposed of? If it is hazardous waste how can it be disposed of in a landfill? Is this not just shifting the hazard to another community as landfills by their nature leak and many have become superfund sites as well? Have other alternatives to land-filling the waste been looked into and if so what are the other options?

If the site gets superfund funding will the current resident of the site be permitted to continue operations on the site?

Will the EPA please provide a list of superfund sites showing exactly how much taxpayer money is used to clean-up these sites since the superfund tax has been cancelled by the current administration?

Thank you.

Owen David  
180 N. Main St D-1  
Boscawen, NH 03303

---

Do You Yahoo!?  
HotJobs - Search Thousands of New Jobs  
<http://www.hotjobs.com>



Pij53@aol.com

08/08/2002 12:40 AM

To: Neil Handler/R1/USEPA/US@EPA

cc:

Subject: (no subject)

Thank you for coming to Nashua and discussing the Mohawk Tannery Site issues and updating/listening to the public.

I have concerns with the toxicity of the clean up area when done. I hope that either the Fed's or the State would consider monitoring the area over a long period of time whether we use this site for housing, recreational space, etc.. People have the right to know what previously existed in this area.

I hope that the Fed's fund this project; the people who have been living in this area need to finally get relief and closure to this mess.

Please thank Angela for a well organized presentation. Neil you did a great job giving us the facts with the timeline, which the public could understand.

Paula Johnson  
Alderman-at-Large



Dufoe1@aol.com  
08/29/2002 11:08 PM

To: Neil Handler/R1/USEPA/US@EPA  
cc:  
Subject: Mohawk Tannery Site

I am very concerned about The Mohawk Tannery Site being taken off the EPA's National Priority List. Our New Hampshire politicians Senator Bob Smith and Mayor of Nashua Bernie Streeter have conceived a plan to have the site cleaned up by private contractors quickly and less expensively. No one knows better than a neighbor of The Mohawk Tannery how dangerous those plans are. A few concerns are:

1. What if Senator Bob Smith does not get reelected in early November? Will Bob Smith still be able to acquire the funds necessary to cleanup the Site.
2. Quickly and less expensively -- translates to improperly, haphazardly and more dangerously. More dangerously to those removing the waste as well as those living in the area. If the private contractors find unidentified chemicals or waste, will they just remove it? Will their contractors be wearing the proper gear? Will the neighborhood be evacuated or even warned if necessary?

We would rather have the United States Department of Environmental Services monitor, be in charge of, and cleanup The Tannery's hazardous waste site. We will feel confident that the cleanup is proceeding in the safest and proper manner. We are not in a rush to get this site cleaned up. We just want to feel safe while it is being done. We want to make sure that the waste is disposed of safely and legally. With private contractors in control, the waste could end up anywhere -- I'll let you good people use your imagination.

I can just imagine some beautiful weekday or even weekend -- perhaps night -- these private contractors working away and we are hearing their heavy equipment, their floodlights, the odor ruining our sleep, ruining our playtime, ruining our get-togethers. No control. Everything is out of our control. No one will listen. There is no one around to answer the phones. No one cares about us. That's how its always been.

Unfortunately, our City is run by the developers. We're pleading with you please, do not take us off the EPA's National Priority List. After August 20th's Public Hearing, Mayor Streeter and I continued to argue. I was trying to tell him about all we've been through and he refused to listen. Whenever I told him a piece of history/fact about our previous fights with The City, prior to the EPA's involvement, Mr. Streeter would say, "I don't know anything about that; I wasn't here then." What more can I say. He didn't even bother to read up on the history between The Mohawk Tannery/Granite State Leather before he wrote to the EPA and asked to be taken off of National Priority List.

3. Is Senator Bob Smith using Brownfield's Funds to cleanup The Tannery Site? If so, does that Act allow the owner of the offending property any rights? Any rights to ownership? -- Free and clear after the work is done?

I wrote to Senator Bob Smith regarding The Brownfield's Act and Our Superfund Site and he responded by putting me on his mailing list. I never received a return email about my concerns, a letter, note or phone call. But I'm on his mailing list.  
This is the email:

Subj: Re: SMITH APPLAUDS SENATE PASSAGE OF BROWNFIELDS REVITALIZATION  
Date: 6/20/01 11:46:05 AM Eastern Daylight Time  
From: Dufoe1  
To: smith\_bob@SMITH.SENATE.GOV

The Mohawk Tannery/Granite State Leathers in Nashua is being cleaned up by the EPA right now. Warren Keane owner of this Tannery site has not paid taxes to the City in about 15 years. The City says it is afraid to take the property for back taxes because of the liability they might incur. The City and the Federal Government says he does not have any money to put towards the cleanup. I do know that he owns his own real estate firm, rental property on my street, Hughey Street, Nashua -- along with other real estate holdings that I know nothing about. He has rented the Mohawk site ever since the Tannery closed down til the present time -- while the cleanup is going on -- to a landscaping company, a construction company, a limousine service, and home contractor -- and that is all that I know about. The City has ordered Warren Keane to evict all tenants, but he blatantly ignores the order and the EPA also is waving that demand. Therefore, it looks like the federal government is cleaning the property for free and Warren Keane will become a billionaire developing the property. The new fear that your proposal brings -- is that Warren Keane will use your protection laws to reclaim this property, liability free, under another business name or alliance.

I believe your proposal may make wealthy murderers of the environment and who knows how many people they have made ill or die, billionaires. I would hope your language would strongly take every cent away from these people, relinquish their rights to ever own property again and put a claim against any further income that they earn.

Stephanie A. Dufoe

Thank you, any of you that have taken the time to read this letter. Our neighborhood is so happy to have The U.S. Environmental Services involved and working towards the ever so important cleanup of this superfund site. Please again, if you have any control, do not allow The City of Nashua to convince you that private contractors can and will do right by the residents abutting The Mohawk/Granite Leather site.

Kindest Regards,  
Stephanie Dufoe

P.S. My husband and I walked the path that begins at the west end of Hughey Street to the Nashua River a few days ago. This path took us to a swimming hole directly aside of the Mohawk Site. If you follow this path you will see the evidence that people/children do currently swim in the river -- downriver -- right aside of The Superfund Site.



Ridgway M. Hall, Jr.  
202-624-2620  
rhall@crowell.com

August 29, 2002

Mr. Neil Handler  
Project Manager  
U.S. Environmental Protection Agency –  
Region 1  
1 Congress Street, Suite 1100 (HBO)  
Boston, MA 02114-2023

Re: Mohawk Tannery Site  
Nashua, New Hampshire

Dear Mr. Handler:

These comments are submitted on behalf of the Chester Realty Trust, owner of the Mohawk Tannery site in Nashua, New Hampshire, in response to EPA's proposed Non-Time-Critical Removal Action ("NTCRA") and the Engineering Evaluation/Cost Analysis ("EE/CA") report prepared by Tetra Tech NUS, Inc. for EPA Region 1 in support of the proposed NTCRA. As you know from prior submissions by the Chester Realty Trust ("CRT"), the Trust has very limited assets and, indeed, its only substantial asset is the Mohawk Tannery site property itself, consisting of approximately 30 acres located along the banks of the Nashua River. Although CRT lacks the means to contribute financially to a proposed NTCRA, CRT and its Trustee, Warren W. Kean, have from the outset adopted a policy of full cooperation with EPA and the New Hampshire Department of Environmental Services with respect to the site, and will continue to do so. This includes among other things providing site security and also providing ready access to the site for EPA and the state and their contractors. In addition, in July 2001, at the request of the state, the owner arranged for the removal of some oily waste materials from the site at a cost of approximately \$5,000.

With respect to the proposed NTCRA, CRT's position is that whatever response action EPA decides to take at the site should be based upon sound science, reliable facts, and a demonstrated need. Based primarily on the EE/CA report, EPA is proposing that "approximately 60,000 cubic yards of contaminated waste", consisting of soil and sludge, be excavated from the site and disposed of at an off-site landfill at an estimated cost of between \$15 million and \$22 million.

Mr. Neil Handler  
August 29, 2002  
Page 2

The proposal is more fully described in the *Mohawk Tannery Site Fact Sheet* issued by EPA and the New Hampshire Department of Environmental Services "NHDES") in July, 2002. It was also described in the presentation which you made on behalf of EPA at the public hearing in Nashua on August 7, 2002, as well as in the EE/CA report itself.

The EE/CA report describes the results of field investigations at the site, consisting primarily of the sampling of surface water in Area 1, soil and sludge in Areas 1 through 7, and consideration of historical site monitoring data gathered at various locations on the site during previous studies. Using these data, Tetra Tech conducted an exposure assessment and a "Streamlined Human Health and Ecological Risk Evaluation". Because the data evaluation is at the heart of the proposed removal action, this is the part of the EE/CA which in our view requires the closest scrutiny to be sure that the methods, procedures and assumptions are sound, and that the conclusions and recommendations based thereon are well grounded and reasonable.

Because the performance of exposure assessments and human health and ecological risk evaluations require special expertise and training, CRT retained the environmental science and engineering firm of Environ International Corporation to conduct a focused review of the EE/CA report. Environ is an international firm which is widely respected and possesses extensive experience and expertise in precisely the disciplines which are at issue in this matter, including exposure assessment, risk evaluation, the selection of response measures, and associate costs. These are the areas of the EE/CA report and the proposed NTCRA on which Environ has focused its analysis. The result of this analysis is set forth in the attached report by Environ entitled *Comments On Risk Evaluations In EPA's Engineering Evaluation / Cost Analysis (EE/CA) For The Mohawk Tannery Site, Nashua, New Hampshire*. The lead authors of the report are Stephen Song, Ph.D., and Stephen T. Washburn, both Principals in Environ's Princeton, New Jersey, office. Their *curriculum vitae* are attached as an Appendix to this report.

*The Environ Analysis of Tetra Tech's Risk  
Evaluations and EE/CA Conclusions*

As more fully set forth in the enclosed report, the Environ analysis of the EE/CA demonstrates that Tetra Tech's human health risk evaluation for trespassers and future residents utilized approaches and assumptions which are technically flawed, inconsistent with current EPA guidance and significantly overestimated potential exposures and risks. Revising the risk evaluation consistent with accepted risk assessment principles and current EPA guidance and risk thresholds for response actions under CERCLA would demonstrate that potential risks associated with reasonable maximum exposures under current and expected

future activities at the site do not support the proposed removal action. At most, removal of the liquid contents and several feet of sludge from Area 1, followed by appropriate cover, might be warranted. Similarly, the streamlined ecological risk evaluation provides no basis for a removal action.

In addition, the results of the EE/CA do not demonstrate that migration of contaminants from the site to groundwater has adversely affected, or has the potential to affect, either drinking water supplies or the Nashua River. This is consistent with historical monitoring data gathered by NHDES in October, 1994, and again in February, 2001, (the former were reported by Tetra Tech and are discussed below; the latter were not, and are discussed in the Environ report).

The Environ report demonstrates that in its EE/CA Tetra Tech significantly overstated the potential human and ecological risks posed by current and anticipated future conditions, and exposures, at the site. As a result, the EE/CA does not demonstrate that the risks posed by the site warrant a removal action under 40 C.F.R. §300.415, and certainly not the need for the large-scale excavation proposed by EPA. In fact, the traffic risk created by EPA's proposal to transport the excavated material along local roads may well off-set any theoretical risk reduction offered by the proposed removal.

We urge EPA to revise its risk evaluations, including exposure assumptions, consistent with the Environ report. Properly conducted human health risk and ecological risk evaluations, based on current EPA guidance and risk assessment principles and practices generally accepted in the profession, will vastly reduce the scope of any removal action which might be necessary. This in turn will result in a substantial reduction in cost.

#### *No Present Health Risk at the Site*

While our most important points are set forth in the Environ report, CRT wishes to provide several additional comments. First, the U.S. Department of Health and Human Services performed a public health assessment for this site and issued its report dated August 22, 2001 (AR32897).<sup>1</sup> In that report the U.S. Department of Health and Human Services concluded that the site posed "No Apparent Public Health Hazard" (pp.2 and 41). EPA and NHDES have reached a similar conclusion (e.g., AR32978, letter from Philip Trowbridge, N.H. Dept. of

---

<sup>1</sup> "AR\_\_" references are documents which are in the Supplemental Engineering Evaluation/Cost Analysis administrative record file compiled as of July 30, 2002, and placed by EPA in the Nashua, New Hampshire, public library, as well as in its own document center in Boston.

Mr. Neil Handler  
August 29, 2002  
Page 4

Health and Human Services to Neil Handler, March 13, 2001), but have recommended response action based on anticipated future use of the property, including possible residential use by people, including children, over the long term.

#### Future Use Scenario

Any response action must be predicated on realistic exposure assessments and scientifically sound risk evaluations. Realistically, any future residential housing will not be built in the flood plain areas or in any of the former sludge disposal areas (Areas 1-7). Instead, any such residential units will be built on the upland areas to the east, where Tetra Tech's own data shows that groundwater is 70 feet below the surface (EE/CA Report p.1-2), and where there is no historic site contamination. While EPA may determine that some contaminated soil should be removed and disposed of off-site, any future use of the property would include cover and revegetation with respect to the Areas 1 through 7, rendering them safe for those who may in the future walk about and generally enjoy the land. For the reasons set forth in the Environ report, it is highly questionable whether such future use requires the excavation and removal of anything close to 60,000 cubic yards of soil.

#### The Sludge Is Not RCRA Hazardous

Next, EPA and Tetra Tech have correctly determined that the sludge and contaminated soil at the site are not "RCRA hazardous" and therefore can be properly disposed of at a municipal solid waste landfill. The Tetra Tech report raises the possibility that a portion of the waste in Area 1 could be considered hazardous because of the presence of sulfide, but appears to correctly reject that conclusion. However, because the Tetra Tech report appears to leave open the possibility that that conclusion might be reconsidered, we address it as follows. The EE/CA report at p.4-2 states as follows:

As noted in Section 3.7.3, based on site data and an April 2002 hazardous waste determination for site sludge/waste completed by NHDES, it does not appear likely that the sludge/waste will be classified as RCRA hazardous. However, based on the reactive sulfide concentrations found in Area 1 during the EE/CA investigation, it is possible that sludge/waste may be encountered in Area 1 during implementation of the NTCRA that could cause the material to be considered hazardous.

Mr. Neil Handler  
August 29, 2002  
Page 5

The issue specifically involves whether one or two samples of waste taken in Area 1 would cause the waste to be regarded as hazardous by virtue of reactivity. As the EE/CA noted, a classification of the waste as RCRA hazardous "could have considerable impacts on the implementability and cost of the removal action." (*Id.*)

This issue was addressed in an exchange of letters between EPA and NHDES earlier this year, specifically a letter from Neil Handler to John Splendore, NHDES, dated March 20, 2002 (AR32961), enclosing sampling data, and a reply from David Bowen, hydrogeologist in the Hazardous Waste Remediation Bureau of NHDES to Mr. Handler dated April 10, 2002 (AR32960). EPA's March 20 letter noted that with respect to reactivity, there was a "regulatory guidance threshold of 500 mg/kg for sulfide reactivity" and said that the only sample on the long list of data provided which exceeded this was one sample in the Area 1 lagoon where sulfide reactivity concentrations were detected at around 694 mg/kg." The regulatory guidance in question was dated July 1985 and was withdrawn by EPA on April 21, 1998, as noted in the EPA letter. Thus, the EPA letter states:

Given the current uncertainty of how the regulatory guidance threshold for sulfide reactivity should be applied and/or interpreted as discussed in the EPA memorandum dated April 21, 1998 (*Withdrawal of Cyanide and Sulfide Reactivity Guidance*), it appears unlikely that at these concentrations Area 1 would exhibit the RCRA characteristic for sulfide reactivity. We would welcome your agencies thoughts on this matter.

The NHDES reply first addresses dioxin issues and states that the low-level presence of dioxin in the soil/sludge "is not classified as a hazardous waste . . . and may be disposed of at an approved solid waste landfill." Turning to the sulfide issue, NHDES notes that the average sulfide concentrations in the sampling are "89.1 ppm, well below the 500 ppm level", and concludes:

The Department concludes that the excavated soil/sludge when managed as proposed by EPA is not regulated as a reactive hazardous waste (D003). As such, the Department would allow the disposal of the consolidated soil/sludge at an approved solid waste landfill.

Furthermore, it would be legally unsound for EPA or NHDES to base a finding of "reactivity" within the regulatory definition based upon guidance which EPA has withdrawn and which therefore has no legal or regulatory force or effect whatsoever. The regulatory (and therefore the legal) definition of reactivity is set forth at 40 C.F.R. §261.23 (2001). This contains no sulfide test or other reference to sulfide. Accordingly, the conclusions reached in the correspondence cited above

are sound not only on the merits as set forth in the NHDES letter, but because a determination of RCRA hazardousness cannot lawfully be made based on a guidance document which EPA revoked in 1998.<sup>2</sup>

*There Are No Impacts From The Site On Off-Site Receptors*

The EE/CA report in its ecological effects assessment appears to express some concern for benthic organisms, river sediment and aquatic receptors (*e.g.*, p.2-75), which could only be exposed to contamination from the site if there were ongoing migration of surface water or groundwater to the river or other off-site receptors. The groundwater flow at the site is generally to the west or southwest (*Id.*, p.2-34). However, no evidence is presented that any such exposure exists. Given the fact that the site was operated as a tannery for 60 years prior to 1984, if there were migration of contaminants to the river or off-site groundwater, there would be evidence of that in the Nashua River, which there is not. Also of importance, the EE/CA notes that groundwater beneath the site is not used as drinking water. The report notes that two residential wells approximately 30 feet deep are reported to be located one-half mile southwest of the site, that these were sampled by NHDES for VOCs and metals in October, 1994, and that no evidence of contamination related to the site was found (EE/CA report at p.2-34). Thus, the site does not appear to be impacting any off-site receptors.<sup>3</sup>

---

<sup>2</sup> See also letter from John Splendore to Neil Handler of February 27, 2001, stating that the sludge is "not classified as hazardous according to the TCLP" (AR32959).

<sup>3</sup> The preceding statement is inconsistent with a subsequent statement in Section 3.2, in which Tetra Tech is formulating removal action objectives. Tetra Tech states there that sludge in Areas 1 and 2 extends as much as 6 and 9 feet, respectively, below the water table. Tetra Tech adds "the presence of contaminated sludge below the water table and the usage of the groundwater as a drinking water supply for populations nearby the site provides the potential for contamination of an important drinking water supply." (p.3-2). Tetra Tech adds that in the past sludge and waste from the site was discharged to the river, and that these contaminations will be addressed as part of the "ensuing site-wide remedial investigation." However, as Tetra Tech notes earlier, the groundwater is not used as a drinking water supply. Nor is there any present evidence of adverse impacts resulting from discharges long ago to the Nashua River. Therefore, not only are these statements irrelevant to the contemplated removal action, but it is hard to see a need for remedial investigation either.

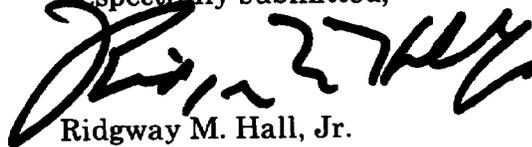
Mr. Neil Handler  
August 29, 2002  
Page 7

*The Site Does Not Qualify For The NPL*

Finally, EPA has maintained that a Superfund hazard ranking scoring in excess of the cut-off level of 28.5 is warranted for this site. However, EPA has declined to base that scoring on the current factual status of the site, including the fact that in a removal action carried out by EPA between September, 2000, and January, 2001, principal drivers of EPA's HRS score were removed from the site. Specifically, during that removal action, EPA removed 42 drums of waste material, a large above-ground storage tank and its contents, and a large clarifier tank and its contents, as well as approximately 110 empty drums and 360 laboratory-type containers and some asbestos containing material from the old tannery building (See EE/CA Report at 1-5). As we have previously pointed out, if a proper HRS scoring were done on this site using the current state of facts at the site, the HRS score would be substantially below the cut-off point of 28.5.<sup>4</sup> This is consistent with the fact that a properly conducted exposure analysis, and a properly conducted risk evaluation, do not support the need for a removal action of the magnitude and cost proposed by EPA.

We appreciate the opportunity to provide the foregoing comments, and in particular the expert analysis by Environ in the enclosed report. We urge EPA to give these matters careful consideration.

Respectfully submitted,



Ridgway M. Hall, Jr.  
Counsel to  
CHESTER REALTY TRUST

Enclosure

cc: John M. Regan, NHDES  
Eve Vaudo, EPA

1935092

---

<sup>4</sup> See Comments submitted on behalf of Warren W. Kean in response to EPA's proposed addition of the Mohawk Tannery Site to the National Priorities List dated July 10, 2000, and Supplemental Comments dated July 19, 2000, including report of Vertex Engineering Services, Inc. In light of the removal action which took place after the submission of these comments, the HRS score should be far lower.

**Comments on Risk Evaluations in  
EPA's Engineering Evaluation/Cost Analysis (EE/CA) for the  
Mohawk Tannery Site in Nashua, New Hampshire**

At the request of Crowell & Moring, ENVIRON International Corporation (ENVIRON) has reviewed the United States Environmental Protection Agency's (EPA) Engineering Evaluation/Cost Analysis (EE/CA) for the Mohawk Tannery Site in Nashua, New Hampshire dated July 2002. The EE/CA was prepared for EPA by Tetra Tech NUS, Inc. The EE/CA included "streamlined" human health and ecological risk evaluations in support of a proposed removal action at the Site. ENVIRON's comments on these risk evaluations are presented in four sections:

- Section I, which summarizes the overall findings of ENVIRON's review.
- Section II, which provides detailed comments on the technical approaches and assumptions used by EPA to evaluate the trespasser and future residential scenarios.
- Section III, which illustrates how some of the results of the trespasser and future residential scenarios would be affected by making the changes described in Section II.
- Section IV, which provides our overall conclusions.

References are presented in Section V. The curriculum vitae of the two principal authors of these comments, Dr. Stephen Song and Mr. Stephen Washburn, are included as an attachment.

**I. Summary of Overall Findings**

The EE/CA investigation and streamlined risk evaluations have not demonstrated that site conditions warrant removal action under 40 CFR 300.415, and do not support the large-scale excavation proposed by EPA. This overall conclusion is based on the following findings:

### Potential Exposures of Trespassers, Future Residents, and Ecological Species

- The results of the streamlined human health risk evaluation for trespassers and future residents are based on approaches and assumptions that are technically flawed, inconsistent with current EPA guidance, and significantly overestimate potential exposures and risks. Certain key aspects of the streamlined human health risk evaluation should be revised to use appropriate assumptions and methodology that are consistent with accepted risk assessment principles and current EPA guidance. Such a revision of the risk evaluation would almost certainly show that potential risks associated with reasonable maximum exposures under current and expected future land use at the Site do not warrant a removal action based on EPA's risk thresholds for action under CERCLA.
- The streamlined ecological risk evaluation was a screening-level analysis that identified only the potential for adverse ecological effects. According to current USEPA (1997a) guidance, the results of such a screening-level ecological analysis can be used to conclude only that one of the following courses of action is appropriate:
  - 1) There is adequate information to conclude that ecological risks are negligible and therefore there is no need for remediation on the basis of ecological risk;
  - 2) Available information is not adequate to make a decision on the basis of the screening-level analysis, and the ecological risk assessment process should continue;  
or
  - 3) Available information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

Therefore, the streamlined ecological risk evaluation may indicate that a more detailed ecological assessment is warranted, but it does not demonstrate that a removal action is warranted.

### Potential Impacts on Groundwater Quality

- The results of the EE/CA investigation do not demonstrate that migration of contaminants from the Site to ground water has adversely affected (or has the potential to affect) drinking supplies or the Nashua River. Specifically:
  - 1) As noted in the EE/CA, groundwater underlying the Site does not migrate toward any public or private drinking water wells;

- 2) Data from soil underlying the sludge disposal areas suggest that sludge constituents have not migrated into the underlying soil at significant concentrations, which is why the EE/CA report does not propose removal action for this underlying soil; and
  - 3) Available groundwater data from the Site, collected by the New Hampshire Department of Environmental Services (NHDES 2001), do not demonstrate that sludge constituents are migrating toward the Nashua River in significant concentrations, as discussed below.
- Groundwater monitoring data obtained by NHDES (2001) indicate that the Site is not having an adverse effect on groundwater quality. (The EE/CA report fails to report these data.) The NHDES report includes groundwater monitoring data from two downgradient wells located between the Nashua River and Areas 1 and 2, where sludge appears to extend into the groundwater table. Data from these two monitoring wells (wells GZ-6 and GZ-9) indicate only low levels of volatile and semi-volatile organic compounds in the groundwater. In fact, none of the organics that are identified in the sludge as chemicals of potential concern (COPCs) warranting removal action were even detected in the groundwater samples from wells GZ-6 and GZ-9. Metals detected in these wells were at concentrations below drinking water standards, except for arsenic. Arsenic concentrations in wells GZ-6 and GZ-9, while above drinking water standards, appear to be unrelated to the sludge at Areas 1 and 2, since sludge characterization data for these areas (Tables 2-1 and 2-4) show that arsenic is present in the sludge only at concentrations that are within the range of natural background levels. Consistent with these data, arsenic was not detected in the TCLP analysis of the sludge samples from either Area 1 or Area 2 (Tables 2-2 and 2-5).

#### Potential Impact of Flooding Events

- Except for Area 1 (the open lagoon), all other areas have soil covers that are generally several feet thick, are essentially uncontaminated, and are vegetated so that there is no reasonable potential for overland migration of sludge or sludge constituents during normal precipitation events. Even under most flooding events, significant runoff into the Nashua River would not be anticipated because almost the entire Site, with the exception of Area 2, is outside the 100-year floodplain.
- Preventing sludge in Area 1 from entering the Nashua River in the event of a severe flood is an appropriate objective for remedial actions at the Site. However, the EE/CA did not evaluate the effectiveness of the existing berm for achieving this objective or consider

measures short of complete sludge removal that might be more appropriate (such as closing the lagoon in place with a soil cover, perhaps after removal of the uppermost portion of the sludge). Reducing the amount of sludge that would need to be removed to achieve this objective would also reduce the amount of material that would need to be transported along local roads, and the potential for odors.

## **II. Detailed Comments on the Trespasser and Future Residential Scenarios**

1. The evaluation of potential exposures of current trespassers to surface materials was based on inappropriate soil and sludge characterization data. The evaluation used data from composite samples that extended to depths where the potential trespasser exposures would not be reasonably expected (i.e., deeper than 2 ft below ground surface [bgs], including many samples deeper than 10 ft bgs), as discussed in Section 2.4.2.1. Instead, the evaluation should have been based on only the characterization data for the overlying soil in each Area (except Area 1 which has no overlying soil), because these data best represent the concentrations to which these receptors would be exposed.
2. The evaluation of potential future residential exposure to soil and sludge at Areas 1 to 7 from depth to 10 ft bgs is unrealistic and used inappropriate exposure point concentrations. First, the assumption that soil from as deep as 10 ft bgs would be brought to the surface and left for residential contact is unrealistic, particularly around Area 1 and Area 2 where the depth to groundwater is relatively shallow (e.g., potentially less than 10 ft bgs at some locations) so that excavation of subsurface soil for construction of residences with basements is unlikely. Second, even if the assumed scenario were to occur, the concentration data used for this evaluation include many samples that extend beyond 10 ft bgs. Third, the construction of residences in the 100-yr floodplain, if this is even realistic, would require about 1 to 2 ft of soil to be added to raise the ground surface above the floodplain, which would essentially eliminate exposure of residents to any surface contamination. Even the EE/CA report acknowledges that soil would have to be placed on top of the sludge in at least Area 1 (see Section 2.4.3.3). However, the exposure point concentrations in Table 2-23.3 do not account for mixing of the sludge with this overlying soil in the unlikely event that sludge were to be excavated from under the soil and left on the ground. Accounting for such mixing would lower the concentrations to which residents may be exposed, resulting in correspondingly lower estimates of risk.

3. If the evaluation of potential exposures of trespasser and future residents to surface materials were instead based on the surface soil data for Area 2 to Area 7, the estimates of site-related cancer and noncancer risks for these Areas likely would not exceed a cancer risk of  $10^{-4}$  or a non-cancer hazard index (HI) of 1, respectively. This can be seen from the comparison of the characterization data for the overlying soil with the screening criteria for identifying COPCs in the EE/CA report, as shown in Table 2-10 and Table 2-16. The comparisons in these tables show that no volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), or pesticides/PCBs were detected in surface soils at concentrations exceeding screening criteria. Although the tables indicate that a few chemicals were detected at concentrations that exceed one or more screening criteria, a closer evaluation demonstrates that these concentrations do not represent significant contamination. Specifically:
- a. The dioxin concentrations, expressed in toxic equivalents (TEQs), are all much lower than the 1,000 nanogram per kilogram (ng/kg) cleanup level proposed by EPA for the Site.
  - b. The antimony concentrations are within the range of background concentrations in the eastern U. S. (< 1 milligram per kilogram [mg/kg] to 8.8 mg/kg, Dragun and Chiasson 1991), except at Area 4 where the site-related antimony concentration corresponds to a hazard quotient (HQ) of only approximately 0.4.
  - c. Although certain arsenic concentrations are higher than the screening criteria based on the Region 9 preliminary remediation goals (PRGs), these concentrations are all within the range of natural background levels.
  - d. Although some of the chromium ( $\text{Cr}^{+3}$ ) concentrations are higher than the NHDES non-risk-based ceiling of 1,000 mg/kg screening criterion, they are all lower than the NHDES S-1 risk-based criterion of 44,300 mg/kg and the Region 9 PRG of 12,000 mg/kg.
  - e. The manganese concentration detected at Area 4 is higher than the screening criterion, but corresponds to a HQ of only 0.1.
  - f. Although mercury was detected at levels exceeding typical background levels at some locations, all of the mercury concentrations are lower than the risk-based screening criteria.

4. The evaluation for potential exposure of trespassers to sludge at Area 1 is apparently based on a scenario that ignores the fact that the sludge is submerged under approximately 6 inches of water (as shown in the boring logs in Appendix D). Because the sludge is underwater, the degree of trespassers contact with sludge would be minimized by the tendency for the water to wash sediment off a trespasser who might wade into the lagoon. Making the scenario consistent with actual conditions at the lagoon would lead to lower sediment ingestion rates and dermal loading rates, and hence, lower risk estimates.
5. It is at least theoretically possible that a trespasser could be exposed to near-shore, surficial sludge in Area 1. However, the risk evaluation does not explain why it is assumed that the Area 1 sludge data from the boring locations that had to be accessed from a floating platform represent near-shore conditions. It also does not explain why data from the full-depth sludge cores (which extend to depths of 10 to 12 ft bgs) would be representative of the surficial sludge.
6. Even if one were to accept the trespasser exposure scenario for Area 1 as described in the EE/CA report, the risk estimates for such potential exposures were derived incorrectly and in a manner that is inconsistent with current guidance, such as EPA's *Risk Assessment Guidance for Superfund* (RAGS, 2001), as discussed below:
  - a. The exposure point concentrations were incorrectly based on what appear to be dry weight concentrations. Instead, the concentrations should have been calculated on a wet weight basis because the soil adherence factors are based on wet weight (EPA 2001). This apparent oversight is significant for the sludge at Area 1, which has an average of only 26% solids according to the EE/CA report. This means the risk estimates presented in Table 2-25.1 are approximately 4-fold too high, for this reason alone.
  - b. The sludge-to-skin adherence factor of 231 mg/cm<sup>2</sup> used in the risk evaluation is inappropriately high and the use of this value is inconsistent with the recommendations provided in the EPA (2001) guidance that is cited as the source for this value. According to EPA (2001), the 95<sup>th</sup> percentile value of 231 mg/cm<sup>2</sup> for the "children-in-mud" scenario, which was used in the EE/CA, should not be used in quantitative risk assessments. Specifically, footnote 5 of Exhibit 3-3 in EPA (2001) states the following:

*Information on the soil adherence values for the children-in-mud scenario is provided to illustrate the range of values for this type of activity. However, the application of these data to the dermal dose equations in this guidance may result in a significant overestimation of dermal risk. Therefore, it is recommended that the 95<sup>th</sup> percentile AF [adherence factor] values **not** be used in a quantitative dermal risk assessment [Emphasis added].*

EPA (2001) further explains, “It is **not** recommended that a high-end soil contact activity be used with a high-end weighted AF for that activity, as this use would **not** be consistent with the use of a reasonable maximum exposure (RME) scenario” [Emphasis added]. Instead the guidance recommends the use of a central tendency weighted adherence factor (e.g., 50<sup>th</sup> percentile) when a high-end activity is being evaluated.

If the children-in-mud scenario is to be evaluated, the 50<sup>th</sup> percentile adherence factor of 21 mg/cm<sup>2</sup> should be used, consistent with EPA (2001) recommendations. This means the dermal risk estimates in Table 2-25.1 are 11-fold higher than they should have been for this reason alone. When combined with the incorrect use of dry weights instead of wet weights, the inappropriate use of the 95<sup>th</sup> percentile adherence factor caused the dermal HI estimates in Table 2-25.1 to be approximately 42 times higher than they should have been. This means that the dermal HI of approximately 42 shown in Table 2-25.1 should have been essentially 1, even assuming that the children-in-mud scenario is a reasonable one in the first place.

- c. The dermal absorption factor used in the children-in-mud scenario is also overly-conservative. As explained in EPA (2001), the fraction of chemicals absorbed from soil or sediment into the skin remains constant as soil loading increases to a level at which the skin surface is uniformly covered, and then decreases with increasing loading. Because the sludge in the Area 1 lagoon appears to be relatively fine-grained, the absorption fractions used in the risk evaluation may be as much as 2 to 3 times too high. Correcting for these apparent errors in the dermal calculations would result in an HI that does not exceed 1, even under the highly conservative assumption of a child trespasser playing in mud.

For similar reasons, the dermal cancer risk estimates on Table 2-26.1 should be at least 42 times lower, which would make the cumulative cancer risk estimate for the trespasser scenario no higher than approximately  $4 \times 10^{-5}$ . This means that both the noncancer and

cancer risk estimates for this scenario should have been below a HI of 1 and a cumulative cancer risk of  $10^{-4}$ , respectively, which are the EPA thresholds for action.

7. For the reasons discussed above, the soil adherence factor of  $0.4 \text{ mg/cm}^2$  used in the risk evaluation for trespasser contact with soil in Areas 2 to 7 is also inappropriately high. This value is a 95<sup>th</sup> percentile value and should not have been used. For the scenario of children playing in dry soil, the appropriate adherence factor should have been  $0.04 \text{ mg/cm}^2$ , which is the 50<sup>th</sup> percentile value recommended in EPA (2001). This means that the dermal HI and cancer risk estimates in Tables 2-25.2a and 2-26.2a are 10-fold higher than they should have been. The noncancer and cancer risk estimates on these tables are already lower than the EPA thresholds for action, so correcting this error would have no material effect on the outcome of the risk evaluation.
8. The adjustment of oral reference dose (RfD) values to account for gastrointestinal (GI) absorption in evaluating ingestion exposures, as discussed in Section 2.4.4.1, appears to be incorrect for both the trespasser and resident scenarios. This adjustment is not necessary because such an adjustment should have been offset by an equal adjustment of the administered dose to an absorbed dose. By adjusting only the RfDs and not making the corresponding adjustments to the ingestion dose estimates, the risk evaluation gave ingestion HQ values that are higher than they should have been. For all cases where this calculation was done incorrectly (where a GI absorption of less than 1 was used), the ingestion HQ estimates can be multiplied by the GI absorption values used in the calculations to obtain corrected HQ estimates. This error is particularly significant for the ingestion HQ estimates in Table 2-25.2b, which are higher than 1 for antimony and cadmium. For antimony, the incorrect HQ of 4 should be multiplied by the GI absorption of 0.15 to obtain the correct HQ of 0.6. For cadmium, the incorrect HQ of 7 should be multiplied by the GI absorption of 0.025 to obtain the correct HQ of 0.2. The HQs on Table 2-25.2b for barium and manganese also require similar corrections, resulting in an ingestion HI of approximately 0.8.
9. In the EE/CA report, the computation of exposure point concentrations used a method that follows outdated EPA guidance for computing 95% upper confidence limit (UCLs) for lognormally distributed data. More recent EPA guidance recognizes that the method used in the EE/CA report for lognormal distributions (see Section 2.4.2.2) tends to produce inappropriately high 95% UCLs that are unreliable for risk assessment (EPA 1997b). As a result of using the outdated method, the calculated 95% UCLs in the EE/CA are usually higher than the maximum detected concentrations, so that maximum concentrations were

used as exposure point concentrations. This use of maximum concentrations in the EE/CA overstated actual exposure point concentrations. Instead, consistent with EPA (1997b) guidance, probabilistic methods such as bootstrap methods should have been used to calculate more reliable 95% UCLs that represent more realistic exposure point concentrations. For example, the exposure point concentrations for 4-methylphenol, antimony, and chromium on Table 2-23.3 would have been significantly lower if calculated using more appropriate nonparametric bootstrap methods. Using the nonparametric bootstrap method known as the BCa (bias-corrected and accelerated) method, the 95% UCLs for these chemicals are as shown below, along with the exposure point concentrations (EPCs) from Table 2-23.3 and the ratio of the two sets of concentrations:

	<b>Bootstrap UCLs</b>	<b>Table 2-23.3 EPCs</b>	<b>Ratio</b>
4-Methylphenol	430 mg/kg	1,300 mg/kg	0.33
Antimony	100 mg/kg	506 mg/kg	0.20
Chromium	14,400 mg/kg	67,800 mg/kg	0.21

These bootstrap UCLs for the “all soil/sludge” scenario were calculated using all the soil and sludge data provided in the EE/CA report for Areas 1 to 7.

Using the above bootstrap 95% UCLs for 4-methylphenol would reduce the ingestion HQ on Table 2-25.3 from 1.4 to approximately 0.5. For antimony, using the above bootstrap 95% UCL and correcting the GI absorption calculation error (as discussed above) would reduce the ingestion HQ on Table 2-25.3 from 46 to approximately 1. For chromium, using the above bootstrap 95% UCL and correcting the GI absorption calculation error would reduce the ingestion HQ on Table 2-25.3 from 19 to approximately 0.05. With these changes, the only ingestion HQ higher than 1 on Table 2-25.3 is that for manganese, which should be corrected for the GI absorption calculation error so that it would drop from 3.5 to approximately 0.1. This means that there would be no ingestion HQ or dermal HQ values higher than 1 on Table 2-25.3.

10. Data sets that were determined to not follow either a normal or lognormal distribution should not have been assumed to follow a lognormal distribution and 95% UCLs calculated using this assumption. Instead, consistent with EPA (1997b) guidance, the 95% UCLs for these data sets should have been calculated using a nonparametric method, which does not rely on assumptions about the shape of the data distribution. For example, the risk evaluation did not need to use the maximum concentration as the exposure point concentration for dioxin TEQ on Table 2-23.3. The dioxin TEQ data set is neither

normally distributed nor log-normally distributed, so the exposure point concentration should have been calculated using a nonparametric method. Using the nonparametric BCa bootstrap method, the 95% UCL for dioxin TEQ would be approximately 800 ng/kg, which is lower than the proposed PRG of 1,000 ng/kg. Using this 95% UCL instead of the maximum concentration of 2,600 ng/kg would reduce the total cancer risk for dioxin TEQ in Table 2-26.3 from  $1.6 \times 10^{-4}$  to approximately  $5 \times 10^{-5}$ . This means the cumulative cancer risk estimate for this scenario would not exceed EPA's  $10^{-4}$  risk threshold for action.

11. The EE/CA report says that 95% UCLs were not computed for data sets that consist of 10 samples or less; the maximum concentrations were used as instead (see Section 2.4.2.2). There is no apparent statistical reason for not being able to calculate 95% UCLs for such data sets in general, and the EE/CA provides no technical basis and cites no EPA guidance for this approach. As noted above in Section II.9, the use of maximum concentrations generally overstates actual exposure point concentrations.
12. The soil/sludge ingestion rate for trespassers should have been applied with a fraction ingested (FI) term of less than one, because the trespassers were assumed to be at the Site for only 4 hours/day and the assumed ingestion rates are based on a full day (16 hours) of soil contact. A more appropriate FI value of 0.25 would reduce all the trespasser cancer and noncancer risk estimates for the ingestion route by a factor of 4. The noncancer and cancer risk estimates for this scenario as presented in the EE/CA (see Tables 2-25.2a and 2-26.2a) are already below the EPA thresholds for action, so correcting this assumption would not materially affect the outcome of the risk evaluation.
13. Consistent with EPA guidance, as expressed in RAGS, HI values that exceed 1 should be re-evaluated and segregated according to mechanism of toxicity. This issue becomes increasingly important as the corrections identified above are made and the overall HI values are reduced to values near 1. Cancer and non-cancer risks that are not site-related, such those associated with exposure to "background" levels of arsenic, should also be discussed and segregated from the site-related risk estimates.
14. EPA risk assessment guidance explains that HI estimates (as well as cancer risk estimates) should be expressed with only one significant digit because the assumptions on which these estimates are based (e.g., toxicity values) are not sufficiently precise to warrant the use of more significant digits. The streamlined risk evaluation in the EE/CA should be modified consistent with this convention.

### **III. Effect of Recommended Changes on the Human Risk Evaluation Results**

The following illustrates specific aspects of the risk calculations that led to estimates of unacceptable risk, and pinpoints where the comments presented in Section II apply. One key aspect discussed in Section II that is not specifically noted below is the inappropriate use of subsurface data for assessing surface exposures.

#### TABLE 2-25.1

The HI of 43 is attributable almost entirely to dermal exposure to 4-methylphenol at a maximum concentration of 1,300 mg/kg dry weight. Adjusting the concentration to wet weight based on 26% solids would reduce the HI to about 10, as discussed above in Section II.6.a.

The other key factor is the soil adherence of 231 mg/cm<sup>2</sup>. EPA (2001) recommends use of the 50<sup>th</sup> percentile instead of 95<sup>th</sup> percentile. The 50<sup>th</sup> percentile is about 10-fold lower. Also, the absorption factor should be reduced for such a high loading rate by roughly a factor of 2 to 3, based on the sludge being fine-grained and Exhibit C-4 in EPA (2001), as discussed above in Sections II.6.b and II.6.c. Correcting for these factors would give a HI for this scenario that does not exceed 1.

The arsenic HI for dermal contact is 1.2 but the concentration of 7.6 mg/kg is within background soil levels. Therefore, arsenic should not be seen as contributing any site-related noncancer risk in this scenario.

The GI absorption adjustments to derive dermal RfDs for Sb, Cr, and Mn are consistent with guidance in EPA (2001). For the ingestion route, these adjustments without the corresponding adjustments to the oral dose estimates appear inappropriate, as discussed above in Section II.8. The ingestion HQs should be multiplied by the GI absorption values. Since these ingestion HQs are already less than 1, this revision would not materially affect the outcome of the risk evaluation.

#### TABLE 2-25.2a

The HI is already less than 1.

#### TABLE 2-25.2b

The HI of 13 is attributable almost entirely to ingestion exposure to Sb and Cd at maximum concentrations of 44 mg/kg and 17 mg/kg. These HI results are clearly suspect because these maximum concentrations are already lower than the proposed PRGs of 73 mg/kg and 82 mg/kg for these metals.

The problem with the HI estimates for Sb and Cd is the inappropriate GI absorption adjustment to the oral RfD without making the corresponding adjustment to the oral dose estimates, as discussed above in Section II.8. The HI would be less than 1 if the oral RfDs were not adjusted, or if the same adjustments were made to the oral dose estimates.

The HI also includes contributions from metals with exposure point concentrations that are within background levels (e.g., As and Mn). These background contributions to risk estimates should have been eliminated or at least discussed.

#### TABLE 2-25.3

The HI of 72 is attributable almost entirely to ingestion exposure to Sb, Cr, Mn, 4-methylphenol, and vanadium (in that order). The key issue is the improper GI absorption adjustments for Sb, Cr, Mn, and V. Using nonparametric bootstrap 95% UCLs should bring all the HQs to 1 or lower.

Also, the HQs of greater than 1 for the maximum concentrations of Cr, Mn, and V, as shown on this table, are inconsistent with the fact that these concentrations are already lower than the proposed PRGs for these metals.

#### TABLE 2-26.1

The cancer risk of  $2 \times 10^{-3}$  is attributable almost entirely to dermal exposure to pentachlorophenol and dioxin (expressed as TEQ). The key issues again are: 1) not using wet weight concentrations, as discussed above in Section II.6.a; and 2) using a soil adherence factor that is too high, as discussed above in Section II.6.b. For pentachlorophenol, the wet weight adjustment alone would reduce the risk to about  $5 \times 10^{-5}$ . As noted above in Section II.6, the cumulative cancer risk estimate for this scenario should be no higher than approximately  $4 \times 10^{-5}$  once these two issues are corrected. This corrected cumulative risk estimate is below EPA's  $10^{-4}$  risk threshold for taking action.

The risk from arsenic is not site-related since the concentration of 7.6 mg/kg is within background levels.

TABLE 2-26.2a

The cumulative cancer risk estimate is already less than  $10^{-4}$ .

TABLE 2-26.2b

The cumulative cancer risk estimate is already less than  $10^{-4}$ .

TABLE 2-26.3

The cancer risk of  $2 \times 10^{-4}$  is attributable almost entirely to ingestion exposure to dioxin TEQ at maximum concentration of 0.0026 mg/kg. The most useful improvement would be to calculate a nonparametric 95% UCL, which should give a value closer to the mean of 0.000512 mg/kg or at least less than the proposed PRG of 0.001 mg/kg.

#### **IV. Conclusions**

The “streamlined” evaluations in the EE/CA significantly overstate the potential human health and ecological risks posed by current and anticipated future conditions at the Mohawk Tannery Site. As a result, the EE/CA does not demonstrate that the risks posed by Site conditions warrant removal action under 40 CFR 300.415, or support the need for the large-scale excavation proposed by EPA. In fact, the very real traffic risk created by the need to transport the excavated material along local roads may well offset any theoretical risk reduction offered by the proposed remedy.

To the extent that some action may be warranted at the Site, such as preventing sludge in Area 1 from entering the Nashua River in the event of a severe flood, EPA should consider measures short of complete sludge removal that might be more appropriate (such as closing the Area 1 lagoon in place with a soil cover, perhaps after removal of the uppermost portion of the sludge). Reducing the amount of material removed from the Site would reduce truck traffic and risks, the potential for odors, and the overall cost of the remedy.

## V. References

- Dragun J. and A. Chiasson. 1991. Elements in North American Soils. Hazardous Materials Control Resources Institute. Greenbelt, Maryland.
- New Hampshire Department of Environmental Services (NHDES). 2001. Letter to Chester Realty Trust. Subject: Nashua - Mohawk Tannery Site. Groundwater Monitoring Results. DES Site #198404002. July 21.
- U. S. Environmental Protection Agency (EPA). 1997a. Ecological Risk Assessment Guidance for Superfund. Process for Designing and Conducting Ecological Risk Assessments. Interim Final. EPA/540/R-97/006. September.
- U. S. Environmental Protection Agency (EPA). 1997b. The Lognormal Distribution in Environmental Applications. EPA/600/R-97/006. December.
- U. S. Environmental Protection Agency (EPA). 2001. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Risk Assessment). Interim. EPA/540/R/99/005. Review Draft. September.

**ATTACHMENT**

**Resumes for:**

**Stephen Song  
Stephen Washburn**

## Stephen Song, Ph.D.

1

### Education

- 1986 Ph.D., Water Resources Engineering, University of California, Los Angeles
- 1982 M.S., Water Resources Engineering, University of California, Los Angeles
- 1979 B.S., *cum laude*, Civil Engineering, University of California, Los Angeles

### Experience

Dr. Song is a Principal at ENVIRON Corporation. He has 16 years of consulting and industry experience in hazardous waste management, including extensive experience in: the development and application of risk-based approaches to improve site investigation and remediation; regulatory negotiations; RCRA compliance; and regulatory analysis. His project management experience includes major projects under the following regulatory programs:

- RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS);
- RCRA Closure and Post-Closure;
- Superfund Removal Action;
- Superfund Remedial Design (RD) and Remedial Action (RA); and
- Underground Storage Tank (UST) Removal and Corrective Action.

Dr. Song's areas of technical and regulatory expertise include:

- Human health risk assessment;
- Fate and transport modeling;
- Statistical analysis of environmental data; and
- RCRA hazardous waste management.

The following describe some of Dr. Song's work at ENVIRON:

- Directed an RFI baseline risk assessment for a major automotive manufacturing facility in Ohio where potential exposures to workers and neighboring residents from more than a dozen SWMUs, including landfills, surface impoundments, and USTs, were assessed. Dr. Song lead extensive negotiations that succeeded in convincing USEPA Region 5, possibly for the first time in an RFI, to allow future land use to be assessed as industrial, rather than residential, and ground water exposures to be assessed at only existing drinking water wells which were off-site and screened in a lower, rather than the uppermost, aquifer.
- Designed and obtained approval from the Pennsylvania DEP for an RFI/CMS in which the field work and baseline risk assessment were phased with the phase-out of production at a major chemical manufacturing facility in Pennsylvania. Dr. Song directed the

baseline risk assessment which included evaluation of potential exposures to workers and neighboring residents during excavations into shallow, contaminated ground water, and to users of off-site surface water that may be affected by transport of ground water from the facility.

- Directed the development of risk-based soil and ground water criteria for protection of human health at industrial facilities in the People's Republic of China, on behalf of a major US-based multinational automobile manufacturer. Presented the criteria before the China National EPA on two occasions, and successfully negotiated over a two-year period the adoption of the criteria as national guidance. The development work included original research to derive exposure factors (e.g., exposure frequency, exposure duration, skin surface area, and body weight) that were specific to workers in China.
- Served as a subject-matter expert on human health risk assessment for the U. S. Army's Environmental Restoration Independent Technical Review Program, which uses independent subject-matter experts to assist the Army in identifying opportunities for improving the cost-effectiveness of investigations and remediations at Base Realignment and Closure (BRAC) installations and active Army sites.
- Provided technical guidance to Ohio EPA on the use of Monte Carlo techniques in the development of generic risk-based soil and groundwater cleanup standards under the Ohio Voluntary Action Program (a brown fields program), on behalf of an Ohio industry coalition.
- Provided technical guidance to Michigan DEQ on the use of vapor and particulate emission models, air dispersion models, and vapor intrusion models in the development of generic risk-based soil and groundwater cleanup criteria under Michigan's site remediation rules (Part 201 Rules, formerly Act 307 Rules), on behalf of a Michigan industry coalition.
- Developed comments on USEPA's December 1994 draft Soil Screening Guidance for several industrial clients. The comments critiqued the technical basis of the draft risk-based approach, identified technical errors in the USEPA methodologies, and suggested alternate methods to improve the efficiency of the soil screening levels.
- Directed the RD/RA of an operable unit at a major Superfund site in USEPA Region 3. Dr. Song negotiated changes to the \$22 million remedy specified in the ROD that saved the PRPs more than \$10 million. The RD/RA included segregation and characterization of admixed hazardous wastes that were disposed in a 5,000 yd<sup>3</sup> in-ground vault and design of technologies to treat the wastes to meet RCRA land disposal restrictions treatment standards.
- Developed and successfully negotiated with USEPA Region 4 a risk-based screening methodology for evaluating broad-spectrum (i.e., TCL/TAL) soil characterization data collected at more than 45 sites in six states under a CERCLA 106(a) order. The screening methodology allowed estimates of cumulative excess cancer risk and estimates of noncancer effects to be compared with an acceptable risk of 10<sup>-4</sup> and a hazard index of 1, respectively.
- Assisted the Michigan Part 201 Program Advisory Group (formerly Act 307 Program Advisory Group) in the development of the technical details for standard default risk-

## Stephen Song, Ph.D.

based cleanup standards appropriate to industrial land use under Michigan's Natural Resources and Environmental Protection Act (NREPA, formerly Act 307). The standards, in part, are based on Monte Carlo analysis of multiple, human exposure pathways.

- Developed comments on Ohio EPA's 1993 *Guidance for Reviewing Risk-Based Closure Plans for RCRA Units* and *Closure Plan Review Guidance for RCRA Facilities*, on behalf of a major automotive manufacturer. The comments offered suggestions on technical aspects of Ohio EPA's approach to risk-based clean closures and on streamlining the administrative review of closure plans.
- Directed the development of risk-based screening levels for lead, including soil screening levels appropriate to workers at industrial sites and screening levels appropriate to recreational consumption of fish.
- Developed an expert report that refuted a RCRA Section 7003 "imminent and substantial endangerment" claim against a large inactive land disposal site located on a major river in Illinois.
- Developed an expert report on the historical regulatory framework governing RCRA-related remedial actions and the implementation experience during the 1980s to early 1990s at the federal and state levels.
- Provided expert review of RCRA hazardous waste classification issues and assisted in the development of litigation strategy.

Before joining ENVIRON, Dr. Song served seven years with the General Motors Corporation (GM), Environmental Activities Staff. While at GM, he provided oversight and technical support in RCRA compliance to more than 100 manufacturing facilities. Dr. Song led the development of GM strategies and procedures for managing RCRA-related remedial activities including corrective action, closure/post-closure, UST removal/cleanup, and facility closing/sale. He also conducted legislative and regulatory negotiations and analysis on a variety of RCRA and Superfund issues on behalf of GM. His work at GM included the following:

- Led a coalition of major Michigan industries in successful negotiations with Michigan DEQ and environmental advocacy groups to develop the first workable cleanup standards under Michigan's Superfund law (formerly Act 307). Dr. Song contributed the key concepts to the development of Michigan's three-tier approach to setting risk-based cleanup standards and Michigan's standard default risk-based cleanup standards for industrial land use.
- Provided technical guidance on RCRA closures and post-closures of hazardous waste management units at more than two dozen GM manufacturing facilities. These closures included container management units, tanks, surface impoundments, waste piles, and landfills. As part of these closures, Dr. Song led successful negotiations with the regulatory agencies in Michigan, Ohio, and Missouri to approve the first risk-based RCRA clean closures in those states.

Dr. Song also held the following positions:

**Stephen Song, Ph.D.**

Song, S. 1996. Development of Risk-Based Screening Criteria for Industrial Sites in Mexico. Instituto Nacional de Ecologia (INE), Procuraduria Federal de Proteccion al Ambiente (PROFEPA), and Secretaria de Comercio y Fomento Industrial (SECOFI). Mexico City, Mexico. April.

Song, S. and L. Rosolowsky. 1995. Improving EPA's Soil Screening Guidance. Society of Risk Analysis Annual Conference. Honolulu, HI. December.

Washburn, S. and Song, S. 1995. Practical Guidance on CERCLA Risk Assessment. Training seminar for the Mobile Oil Corporation, Superfund Group. Princeton, NJ. June.

Song, S. 1993. Texas Risk Reduction Rules: Exposure Assessment Issues. ENVIRON client seminar. Houston, TX. June.

Song, S., and L. Marolf. 1993. Michigan's Three-tier Approach to Setting Cleanup Standards for Sites of Environmental Contamination. Water Environmental Federation Specialty Conference on The Development of Soil, Sediment, and Groundwater Cleanup Standards for Contaminated Sites--How Clean Is Clean? Washington, D.C. January.

Stenstrom, M.K. and S. Song. 1991. Effect of oxygen transport limitation on nitrification in the activated sludge process. *Res. J. Water Pollut. Control Fed.*, **63**, 208

## Stephen T. Washburn

1

### Education

- 1982 M.S., Chemical Engineering, Massachusetts Institute of Technology
- 1980 B.S.E., Chemical Engineering, Princeton University

### Experience

Mr. Washburn is a Principal at ENVIRON Corporation. He has a broad background and over 15 years of experience in environmental science and engineering, with specific expertise in risk assessment and risk-based engineering. Specific areas of expertise include contaminant fate and transport, risk-based evaluation and remediation of hazardous waste and industrial sites, hazardous waste management, incineration, and chemical process design. His work at ENVIRON has included the following:

- Performed comprehensive risk assessments for numerous RCRA and Superfund sites, including facilities in Ohio, Illinois, Indiana, Tennessee, New Jersey, Pennsylvania, New York, Oklahoma, and California.
- Developed risk-based remediation strategies for hazardous waste and industrial sites across the U.S. These strategies have been used to successfully negotiate for cost-effective, protective remedies. Examples include the Whitmoyer Superfund Site in Pennsylvania, the DuPont RCRA Site in New Jersey, and the Rocky Mountain Arsenal Superfund Site in Colorado.
- Provided litigation support on toxic tort lawsuits alleging health effects associated with possible historical exposure to chemicals in air and ground water.
- Selected by the U.S. Army Environmental Center to serve as a Subject Matter Expert (SME) on expert peer review panels to evaluate proposed and ongoing remediation efforts at Base Realignment and Closure (BRAC) sites and active Army installations. Participated in the independent technical review of over a dozen active and inactive installations, including Camp Navajo (Arizona), the San Francisco Presidio (California), the Redstone Arsenal (Alabama), Fort Ord (California), the Aberdeen Proving Grounds (Maryland), and the Milan Army Ammunition Plant (Tennessee).
- Selected by U.S. EPA to serve on the external expert peer review panel for the *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*.
- Selected by U.S. EPA to serve on the external expert peer review panel for the multimedia, multipathway, and multiple receptor risk assessment (3MRA) model developed for the Hazardous Waste Identification Rule (HWIR).
- Principal-in-charge and primary agency contact for a multimillion-dollar remedial design project at a complex Superfund site in Pennsylvania. Responsible for developing and implementing site characterization plans, treatability tests and remedial design for soils, lagoons, drummed waste, ground water, and buildings.

## Stephen T. Washburn

2

- Evaluated the risks associated with polychlorinated biphenyls (PCBs) in various surface water bodies, including the Sheboygan River in Wisconsin and the Kalamazoo River in Michigan.
- Provided litigation support to private parties in cost allocation/cost recovery disputes at several Superfund Sites, including the Helen Kramer Landfill in New Jersey, the Fike Artel Site in West Virginia, the Buzby Landfill in New Jersey, and the Kin-Buc Landfill in New Jersey.
- One of nine scientists selected nationwide by the American Society of Testing Materials (ASTM) to provide training to state regulatory agencies on the ASTM Risk-Based Corrective Action (RBCA) standard (E-1739). Has provided training in over 10 states, including New Jersey, Pennsylvania, Oregon and Michigan.
- Principal-in-charge of human health and ecological risk assessments for the WTI hazardous waste incinerator in East Liverpool, Ohio. These assessments included an evaluation of the potential effect of routine stack emissions, fugitive emissions, and accidental releases on the surrounding community and on ecological receptors.
- Selected by the U.S. Army Environmental Center to provide training to Army personnel on the principles of environmental restoration. Developed course materials on ecological risk assessment and risk management. Conducted training at several installations, including Picatinny (New Jersey), Ravenna (Ohio), and Seneca (New York).
- Retained by the U.S. Department of Justice as an expert to review EPA trial burn plans and risk assessments at the Drake Chemical Superfund Site in Pennsylvania.
- Evaluated disposal alternatives for dioxin-contaminated dredge spoils for a major industrial facility in New Jersey. Supervised bioaccumulation studies involving aquatic organisms to evaluate the potential for dioxin accumulation following ocean disposal.
- Coordinated a technical review of a proposed hazardous waste treatment facility in Ontario, Canada. Evaluated the proposed design and operation, and conducted a detailed, multipathway risk assessment to estimate the facility's potential impacts on human health and the environment. This risk assessment considered not only the emissions released during routine operation, but also those that would be released during facility upsets and transportation accidents. Provided expert testimony on human health and ecological risk assessment before the Ontario Environmental Assessment Board.
- Performed a multipathway exposure evaluation as part of a comparative assessment of the public health risks posed by five remedial alternatives for the McColl Superfund site in California. This assessment included an evaluation of risks to workers and the nearby community. Provided videotaped expert testimony presented to USEPA Region IX.
- Acted as the Principal-in-Charge or project manager on ecological risk assessments at hazardous waste sites, industrial facilities, and incinerators.
- Selected to serve as a member of the Risk Assessment Subcommittee of the Pennsylvania Science Advisory Board. This Subcommittee developed recommendations which were ultimately incorporated into Pennsylvania's Brownfield legislation (Act 2).

**Stephen T. Washburn**

- Conducted a Monte Carlo risk assessment of potential chemical releases from buried drums at an operating chemical facility. Calculated probabilistic distributions for chemical concentrations in the environment, human dose through various exposure pathways, and resulting human health risk.
- Evaluated the potential risks posed by a proposed steel mini-mill facility in Pennsylvania. Provided testimony in public hearings before the Pennsylvania Department of Environmental Resources.
- Performed a Monte Carlo risk assessment in Ohio to support risk-based Remedial Action Objectives (RAOs) and Preliminary Remediation Goals (PRGs) at a former refinery site.
- For the City of Bloomington, Indiana, directed a technical evaluation of the Superfund cleanup of six PCB-contaminated sites. Reviewed the design of a 200 ton/day rotary kiln combustor engineered to co-incinerate municipal solid waste (MSW) and PCB-contaminated soils; analyzed the projected performance of the kiln and its associated pollution control equipment during both routine operation and malfunction; and evaluated technical plans for the excavation, transport, and interim storage of contaminated material. Organized and participated in public forums to address human health and environmental risk issues related to the cleanup.
- Performed a peer review of the design and operation for a proposed commercial medical waste incinerator. Determined status of the facility with regard to best available control technology (BACT), and evaluated potential risks posed through indirect food chain pathways. Provided expert testimony on engineering and risk issues.
- Assisted a national public interest group in evaluating the air quality impacts associated with the proposed expansion of a county airport. Regulatory compliance was also assessed.
- Conducted a comparative assessment of the occupational risks posed by two remedial alternatives for the Hardage Superfund hazardous waste disposal site in Oklahoma. The assessment considered both potential exposures of workers to toxic chemicals and injuries associated with the use of heavy equipment.
- Designed and assisted in implementing tests at a paper and pulp mill boiler in Maine to determine the source of elevated dioxin levels in ash.
- Conducted a detailed review of the state-of-the-art for designing, operating, and siting hazardous waste landfills built in the U.S. between 1975 and 1982.
- For the New York City Department of Sanitation, conducted a multipathway risk assessment for retrofitted municipal solid waste incinerator in Southwest Brooklyn.
- Evaluated the technical capabilities of a U.S. contractor involved in the design and construction of hazardous waste incinerators. The study was used by a multinational, European-based corporation to help decide whether to acquire the contractor to enter the U.S. hazardous waste incinerator market.

## Stephen T. Washburn

4

- Conducted Monte Carlo risk assessments at RCRA sites with lead contamination in New Jersey and Pennsylvania. Both projects involved the use of Uptake/Biokinetic (UBK) modeling for evaluating the risks posed by exposures to lead.
- Conducted a multipathway risk assessment for a proposed hazardous waste physical/chemical treatment plant and landfill in Manitoba, Canada.
- Examined the feasibility of irrigating a golf course with treated wastewater; assessed the need for a buffer zone between the irrigated areas and an adjacent housing development to ensure the protection of public health.
- Reviewed state-of-the-art practices for the disposal of chlorinated solvents in the U.S. prior to 1972, and evaluated the extent of public concern regarding industrial chemical pollution of ground water during that period.
- Prepared responses to questions raised by concerned citizens during the siting of a hazardous waste incinerator in Louisiana.
- Provided litigation support to the owner of a large office building by evaluating the risks posed by PCB transformers in the building; reviewed historical data on PCB toxicity and PCB transformer spills and fires.
- Performed an analysis of the impact of leachate from the major New York City-area landfills on adjoining surface water quality.

Prior to joining ENVIRON, Mr. Washburn held the following positions:

- **Process Design Engineer, Kesler Engineering.** Specialized in the process redesign of petroleum refineries and the development of engineering software. Supervised operations analysis and computer modeling; and oversaw the development of rigorous distillation, equilibrium flash, and two-phase pressure drop simulation software for microcomputers. This software was eventually marketed by Kesler Engineering.
- **Materials Analyst, Alfa Laval AB.** Analyzed plastics using differential scanning calorimetry, gas chromatography, and thermogravimetric analysis.
- **Research Assistant, Massachusetts Institute of Technology.** Analyzed polycyclic aromatic hydrocarbon (PAH) levels in diesel soot using high-performance liquid chromatography, and evaluated the extent of PAH desorption in the human gastrointestinal tract.

## Publications And Presentations

Harris, R., S. Washburn, and F. Colombo. 2000. Risk of vapor migration from subsurface contamination into indoor air. In *Risk Analysis II*, ed. C.A. Brebbra. Southampton, UK: WIT Press. October.

Washburn, S. 2000. Application of risk assessment to site remediation. Invited Speaker. Fifth Annual Pennsylvania Bar Institute Environmental Law Forum, Harrisburg, Pennsylvania. March.

**Stephen T. Washburn**

- Washburn, S.T., and K.G. Edelman. 1999. Development of risk-based remediation strategies. *Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management*. Vol. 3, No. 2. April.
- Washburn, S., D. Arsnow, and R. Harris. 1998. Quantifying uncertainty in human health risk assessment using probabilistic techniques. *Proceedings of the Risk Analysis '98 Conference, Valencia, Spain*. Southampton, U.K.: Computational Mechanics Publications. October.
- Cizerle, K., S. Song, and S. Washburn. 1998. Potential risks associated with vapor migration from ground water into buildings. In *Risk, Resource and Regulation Issues*, ed. G.B. Wickramanayake and R.E. Hinchee. Columbus, Ohio: Battelle Press.
- Canter, D.A., M. Lorber, C.T. Braverman, R.O. Warwick, J.F. Walsh, and S.T. Washburn. 1998. Determining the margin of incremental exposure: an approach to assessing non-cancer health effects of dioxins. Presented at the 18th Symposium on Halogenated Environmental Organic Pollutants (Dioxin '98), Stockholm Sweden. August.
- Washburn, S. 1998. Risk assessment of environmental exposures. Presented at the *Conference on Key Environmental Issues in U.S. EPA Region II*, sponsored by the Association of the Bar of the City of New York in conjunction with USEPA Region II, the American Bar Association, the New Jersey Bar Association and the New York State Bar Association. June.
- Washburn, S., C.F. Kleiman, and D.E. Arsnow. 1998. Applying USEPA risk assessment guidance in the 90s. *Human and Ecological Risk Assessment*: 4(3). June.
- Washburn, S. 1998. Chairperson for Human Health Risk Assessment Session. First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, Cal. May.
- Washburn, S., and D.E. Arsnow. 1997. Exposure to mainstream cigarette smoke: Comparing the results of a theoretical cancer risk assessment to the results of epidemiological studies. Presented at the Society for Risk Analysis Conference, Washington, D.C. November.
- Canter, D.A., R.O. Warwick, J.F. Walsh, and S.T. Washburn. 1997. Evaluating non-cancer health effects of dioxins using a "margin of incremental exposure" approach. Presented at the Society for Risk Analysis Conference, Washington, D.C. November.
- Washburn, S. 1997. Risk assessment at hazardous waste and industrial sites. Presented at the American Law Institute - American Bar Association (ALI-ABA) Course of Study, Washington, D.C. October.
- Washburn, S. 1997. Invited Speaker. Ninth Annual UST/LUST National Conference, Sponsored by the USEPA Office of Underground Storage Tanks, Charlotte, N.C. March.
- Washburn, S. 1997. Invited Speaker. RBCA Leadership Council. Implementing risk-based corrective action for environmental programs. Washington, D.C. February.

## Stephen T. Washburn

6

- Washburn, S. 1996. ASTM risk-based corrective action (RBCA). Presented at the Environmental Exposition. Edison, New Jersey. May.
- Nielsen, J.M., S.T. Washburn, and K.M. Keoughan. 1996. Strategy for developing remediation target concentrations based on human exposure duration considerations. In *Environmental Toxicity and Risk Assessment, Fourth Volume, ASTM STP 1262*, eds. Thomas W. LaPoint, Fred T. Price, and Edward E. Little. American Society for Testing and Materials. May.
- Washburn, S. 1996. The wanderlust of risk-based corrective action (RBCA): Evaluating exposures and petroleum fate and transport. In *L.U.S.T. Line*, a publication of the New England Interstate Water Pollution Control Commission. January.
- Washburn, S. 1996. Moderator and Invited Speaker. Eighth Annual UST/LUST National Conference, Sponsored by USEPA Office of Underground Storage Tanks, Chicago, Ill. March.
- Washburn, S. 1995. A risk-based corrective action success story. Presented at the State University of New York (SUNY) Seminar "New Directions for Ground Water Cleanup," Stony Brook, N.Y. December 5.
- Washburn, S. 1995. Applying EPA risk assessment guidance in the 1990s. Presented at the "State of Practice of Risk Assessment in Human Health and Environmental Decision-Making" Workshop, Tallahassee, Fla., December 13.
- Washburn, S., J. Warnasch, and R.H. Harris. 1994. Risk assessment in the remediation of hazardous waste sites. In *Remediation of Hazardous Waste Contaminated Soils*, eds. Trantolo and Wise. Marcel Dekker, Publishers.
- Washburn, S. 1994. How to calculate dose and risk, and accommodate uncertainty. Presented at the Government Institutes Seminar on Environmental Risk Assessments, Orlando, Fla., March.
- Washburn, S. 1994. Elements of toxicology and chemical risk assessment. Presented at the UTECH Berlin Environmental Technology Forum, Berlin, Germany. February.
- Washburn, S. 1994. Panelist, Seminar on Ethics in Manufacturing, Research, and Computing, School of Engineering, Princeton University, Princeton, N.J. February.
- Washburn, S., and R.H. Harris. 1993. Application of Monte Carlo techniques in risk assessment. Presented to the Michigan Department of Natural Resources. January.
- Washburn, S., W.W. Li, and A. Nichols. 1993. Incineration, risk assessment and the Clean Air Act. Presented at the 1993 Incineration Conference, Knoxville, Tenn. May.
- Washburn, S. 1993. Improving risk assessment application: Status of current efforts. Presentation at Clean Site's Superfund Reauthorization Outreach Seminar, Seattle, Wash. March.

## Stephen T. Washburn

- Harris, R.H., R. Kapuscinski, C. Kleiman, and S. Washburn. 1993. Risk assessment in the remedy selection process at hazardous waste sites. In *Hazard Assessment of Chemicals*, Vol. 8, ed. J. Saxena. Taylor & Francis, Publishers.
- Washburn, S. 1993. The potential liabilities of mining landfills. Presented at the National Conference on Reclaiming Landfills. March.
- Washburn, S. 1993. A typical case example: Baseline risk assessment for a site with soil and ground water contamination. Presented at the Government Institutes Conference on Environmental Risk Assessment: Techniques and Applications. Arlington, Virg. February.
- Washburn, S., L. Barnhorn, and R.H. Harris. 1992. Risk assessment in the remediation of complex industrial facilities. In *Proceedings of the Twenty-Fourth Mid-Atlantic Industrial Waste Conference*, eds. Reed and Stack. Technomic Publishing Co.
- Washburn, S. 1992. Panelist, Seminar on Ethics and Environmental Consulting. Rider College. N.J. December.
- Simmonds, J., S. Washburn, K. Hentz, and R.H. Harris. 1992. Developments in the use of risk assessment to evaluate complex hazardous waste management facilities. *The Environmental Professional*, 14.
- Washburn, S. 1992. National Conference on the National Institutes for the Environment. Vice Chairman of the Pollution Prevention and Mitigation Working Group. Washington, D.C. May.
- Washburn, S. 1992. Risk assessment under the 1990 Clean Air Act Amendments. Presented at the First National Symposium on Permitting Under the Clean Air Act Amendments: Technologies at Work, Washington, D.C. April.
- Washburn, S. 1992. Selecting remedies at Superfund sites. Presented at the Government Institutes Conference on Environmental Risk Assessments: Techniques of Applications. April.
- Washburn, S., and A. Kahn. 1991. Uncertainties in estimating chemical degradation and accumulation in the environment. In *Risk assessment for municipal combustion: Deposition, food chain impacts, uncertainty, and research needs*, ed. C. Travis. New York: Plenum Press.
- Washburn, S., and R.H. Harris. 1991. Necessary evils. *Issues in Science and Technology*: (Fall). National Academy of Sciences.
- Washburn, S. 1991. Risk assessment and its uses in environmental regulations. Presentation for the Center for Energy and Environmental Management (CEEM), Alexandria, Virg., October.
- Washburn, S. 1990. The accumulation of chlorinated dibenzo-p-dioxins and dibenzofurans in milk and beef. In *Health Effects of Municipal Waste Incineration*, eds. C. Travis and H. Hattemer-Frey. Boca Raton, Fla.: CRC Press, Inc.

- Washburn, S. 1990. Assessing the risks of solid waste management. Presented at the Seminar Series on Solid Waste Management in the 1990s. Rensselaer Polytechnic Institute. April.
- Kapuscinski, R., S. Washburn, and R.H. Harris. 1990. Chapter 40: The use of risk assessment in selecting among remedial options for soil contamination. In *Proceedings of the Fifth Annual Conference on Hydrocarbon Contaminated Soils*.
- Washburn, S. 1990. Ethics and environmental consulting. Presentation at the Colloquium on Ethics in Industry, Rutgers University, New Brunswick, N.J. April.
- Washburn, S., M. Baviello, and M. Scott. 1989. Assessing the potential risks and liabilities of on-site hazardous waste incineration. In *Proceedings of the Hazardous Materials Management Conference and Exhibition*, Hazmat West 1989, Long Beach, Calif.
- Washburn, S., J. Brainard, and R. Harris. 1989. Human health risks of municipal solid waste incineration. *Environmental Impact Assessment Review* 9(3).
- Scott, M., and S. Washburn. 1989. Role of risk management in the siting of the OWMC waste management facility. In *Proceedings of the 6th National Conference on Hazardous Wastes and Hazardous Materials*, Hazardous Materials Control Research Institute, New Orleans.
- Washburn, S. 1989. Assessing human health risks from municipal solid waste incineration. Presented at the Society for Risk Analysis 1989 Annual Meeting, San Francisco. October.
- Washburn, S. 1989. Uncertainties in estimating chemical degradation and accumulation in the environment. Presented at the EPA/Oak Ridge National Laboratory Workshop on Risk Assessment for Municipal Waste Combustion: Deposition, Food Chain Impacts, Uncertainty, and Research Needs, Cincinnati. June.
- Washburn, S. 1988. The role of risk assessment in evaluating hazardous waste incineration. In *Proceedings of Wastech '88 - The Future of Waste Management: Examining Technological Development*, National Solid Wastes Management Association, Boston.
- Harris, R., and S. Washburn. 1988. The qualitative and quantitative risks of incinerating hazardous wastes. *Journal of the American College of Toxicology* 7(4):551.
- Washburn, S. 1988. Assessing the risks of hazardous waste incineration facilities: A case study. Presented at the International Symposium on Incineration of Industrial and Hazardous Wastes, Washington, D.C. May.
- Washburn, S. 1988. Ethics and environmental consulting. Colloquium on Ethics in Industry, Trenton State College, Trenton, N.J. May.
- Washburn, S. 1987. The application of risk assessment to incineration facility operations. Presented at the Air Pollution Control Association Technical Conference, Atlantic City, N.J. November.