

SDMS DocID 240380

Industri-plex
5.3
240380



Cynthia Brooks
<cb@g-etg.com>
10/20/2005 04:06 PM

To Joe Lemay/R1/USEPA/US@EPA
cc
bcc

Subject Question RE: EPA reopens public comment period

Dear Joe: Thanks for sending on the Fact Sheet. I have two quick question, after reading through it. Do you know why no elevated ammonia shows up around the West and East Hide Piles? (They didn't test for it, I'm guessing?) And, did EPA look at the most recent work being done at Tufts regarding ammonia?

You were missed on the tour (which I also missed)...but I heard several very reliable reports that Anna and Marc (who led some 40 people around) did such a great job, it was the "best part of the symposium."

Thanks again, Joe.
Cindy

Cynthia Brooks
President, GETG, Inc.

----- Message from <Lemay.Joe@epamail.epa.gov> on Thu, 20 Oct 2005 14:02:44 -0400 -----

To: <cnbrooks@msn.com>, <cb@g-etg.com>

Subject: EPA reopens public comment period

(See attached file: Industri-plex OU-2 October 2005 Fact Sheet Supplementing the June 2005 Proposed Plan.pdf)



Industri-plex OU-2 October 2005 Fact Sheet Supplementing the June 2005 Proposed Plan.pdf



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Indstri-Plex

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Fax 617-918-1291

November 1, 2005

Mr. Joseph LeMay
US EPA
1 Congress Street, Suite 1100 (HB0)
Boston, MA 02114-2023

Dear Mr. LeMay (lemay.joseph@epa.gov):

RE: INDUSTRI-PLEX SITE (Operable Unit 2)
WELLS G & H (Operable Unit 3), WOBURN, MA
Remedial Investigation/Feasibility Study MSGRP
(Multiple Source Ground Water Response Plan)
Halls Brook Holding Area (HBHA)/Aberjona River – to Mystic Lakes extending...

Aberjona River MSGRP - Additional comment - deadline extended...

- I can only assume, given the information, that "Stewardship Controls" will include those mentioned for DOE sites of concern (like the Woburn Landfill listing); and that you will include long-term institutional controls (applicable & necessary) by the government beyond the site(s) themselves since there was strong industrial involvement during the war(s) related to poor handling of wastes. But, I am not confident. Hence:

1. What will the long-term Government Institutional Controls be; and who specifically is responsible for them now/in the future?
2. Will you look for "hot spots" and removal instead of covering them up (capping)?
3. Where will this information be kept; and will all the information be publicly available?
4. Why is your report not more clear on the site contaminant?
5. Has this most pertinent information been incorporated into all other federal/state/local government plans and tax-payer studies?

I was disappointed to see limited comment by local EPA/Boston office, army corps of engineers, and governing health authorities given the magnitude of the problem, complexity of the issues, and longevity of monitoring necessity towards protection.

Sincerely,

Deborah L. Duggan
11 Hillcrest Street
Wilmington, MA 01887

Cc: Woburn Neighborhood Association/Aberjona Study Coalition



Debbie Duggan
<frindle2u@verizon.net>
11/02/2005 03:38 PM

To Joe Lemay/R1/USEPA/US@EPA
cc
bcc
Subject Comment Aberjona Study - deadline extended

EPA
Joe Lemay

Dear Sir,

Please advise me that you have received my comment letter dated November 1st - (I have, again, attached a corrected copy) since the first did not go through as well as faxing it.

Thank you,



Debbie Duggan/Wilmington 2nd Comment Industrial Plex Aberjona Study G H extended to November.doc

November 1, 2005

Mr. Joseph LeMay
US EPA
1 Congress Street, Suite 1100 (HB0)
Boston, MA 02114-2023

Dear Mr. LeMay (Lemay.Joe@epamail.epa.gov): FAX: 1-617-918-1291

RE: INDUSTRI-PLEX SITE (Operable Unit 2)
WELLS G & H (Operable Unit 3), WOBURN, MA
Remedial Investigation/Feasibility Study **MSGRP**
(Multiple Source Ground Water Response Plan)
Halls Brook Holding Area (HBHA)/Aberjona River – to Mystic Lakes extending...

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Sincerely,

Deborah L. Duggan
11 Hillcrest Street
Wilmington, MA 01887

Cc: Woburn Neighborhood Association/Aberjona Study Coalition



johnsalemmme@rcn.com
11/15/2005 01:10 PM

To Joe Lemay/R1/USEPA/US@EPA
cc
bcc
Subject Nov.17th Meeting

Industry - Plex
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240382



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Dear Mr. LeMay,

I plan on attending the meeting at the Shamrock School. I will be going with the Mayor-Elect of Woburn Mr. Tom McLaughlin.

As a concerned resident and a member of the Environmental Industry I would like to know how much money has been spent so far on studies and litigation vs. actual clean up costs.

Many of my fellow residents and friends are concerned about how the City of Woburn will be left fund wise since no one knows what the long term costs, damages and effects this Superfund site will have on our children & grandchildren. There should be a Trust Fund set up for the future. If there isn't I think this issue should be addressed at the meeting.

If you feel a need to contact me or give me any information aside from the meeting please do not hesitate to contact me which ever way is suitable for you.

Many thanks for your tireless work.

Respectfully yours,

John F. Salemmme
338 Russell Street
Woburn MA 01801
781-932-8570
johnsalemmme@rcn.com

Concerned Citizens Network

Kathleen M. Barry, President
14 Powder House Circle
Wilmington, MA 01887

Industrial-Plex
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240372



SDMS DocID

240372

Mr. Joseph F. LeMay
Remedial Project Manager
US EPA-New England
One Congress Street, Suite 1100 (HBO)
Boston, MA 02114-2023

Re: Comments on the Evaluation of Ammonia

November 16, 2005

Dear Mr. LeMay,

Pursuant to the notice issued on October 20, 2005 by the EPA to re-open the public comment period addressing ammonia exceedances within the Aberjona study area, the Concerned Citizens Network (CCN) of Wilmington wishes to place into the public record its concern with this finding. Furthermore, CCN wishes to compel the EPA to further expand its initial investigation of the Olin Corporation property located at 51 Eames Street, Wilmington, Mass. as a potential and significant source of ammonia contamination within the Aberjona watershed north of the Industrial-Plex.

The Olin Chemical Company property is listed with the Massachusetts Department of Environmental Protection (RTN 3-0471) as a Tier 1A highly contaminated site. Characterized by this department as a highly complex site, the DEP submitted a formal request on August 23, 2004 to the federal EPA that the heavily contaminated Olin Chemical site in Wilmington be included on the National Priorities List (NPL) or "Superfund". The DEP "believes that the NPL listing is the best way to ensure that the most effective cleanup technologies available are applied in a timely manner to attempt to remediate the Olin site, in light of the complexity, cost and resources that will be necessary to complete this project." [1]

The Olin Corporation property has historical wastewater disposal practices stemming back to the early 1950's. Prior to 1970, all waste was discharged into many unlined pits, lagoons and ponds located throughout the 53-acre parcel. A man-made pond was dug for the discarding of pure chemical liquors and was hence dubbed "Lake Poly". According to Nancy Smith of the EPA, the disposal of liquid waste resulted in subsurface contamination both on and off the Olin facility. According to Smith, the Olin facility is presently located on a ground water divide. The largest component of ground water flow from the Olin facility is westward toward the Maple Meadow Brook (MMB) wetlands, however, east of the divide, the ground water flows toward the ditch system in particular the East Ditch. She continues to state that flow from much of the facility is to the southeast within the Aberjona River watershed. [2]

Identified as hazardous substances available to a pathway, Ms Smith identified ammonia, as one of the source 1 constituents that was released into the un-lined pits. [2] In Wilmington, ammonia had been a culprit in the intermittent shut down of Wilmington's wells prior to the 2003 closing of the drinking water supply wells located in the MMB aquifer, and the discovery of N-nitrosodimethylamine. [5] The ammonia, sourced from the .75 mile Olin plume had interacted with the natural biofoam buildup in the distribution pipes causing a nitrification process that produced high Nitrite levels. Whereas a migration pathway of the Olin contamination extends to the east ditch and into the Aberjona watershed as well, it would be prudent to investigate this site as a potential source of the high ammonia now discovered.

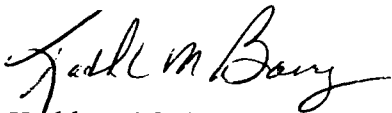
In July 2005, The Department of Environmental Protection determined that Olin's environmental investigative firm, MACTEC, had not collected sufficient technical data to exclude the 51 Eames Street property as a source of some of the contamination in the North Pond study area. Hence, Olin has been directed to collect additional samples within the existing limits of the North Pond in order to sufficiently rule in or rule out the Olin property as a source of contamination to that area. [4]

The Olin property and site has not been completely and thoroughly analyzed. Recently the EPA Nevada laboratory released a comprehensive analysis of organic chemical compounds found in the MMB aquifer. It has discovered approximately 196 compounds that have yet to be fully characterized with little information regarding risk assessments, formation mechanisms, fate and transport and toxicology of these *additional* compounds. [2,3] The concerned citizens in Wilmington have soberly realized the extent and magnitude of the Olin property's contamination with the loss of its once potable drinking water supply. We have a profound understanding of how far reaching chemicals like ammonia can travel from its original source.

The ammonia contamination on the Olin site and the site's contamination migratory pathway into the Aberjona watershed, are both well documented. In our opinion it is more than reasonable to investigate this site as a potential source contributor of the high ammonia levels found in the northern areas of the Industrial-Plex.

The Concerned Citizens Network is grateful for the opportunity to share its concern with the EPA and other interested parties seeking environmental protection.

Respectfully yours,



Kathleen M. Barry,
President CCN

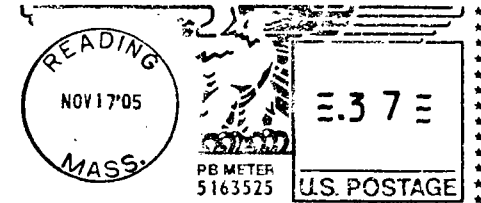
CC: The Honorable Edward Markey
The Honorable Robert Havern
The Honorable Edward Kennedy
The Honorable John Kerry
The Honorable James Miceli
The Honorable Patrick Natale

References:

1. Pyott C, Johnson S. Letter to the Town of Wilmington. Department of Environmental Protection: Re: Olin Chemical RTN 300471 National Priorities Listing Process. June 23, 2005.
2. Smith N. (2005), Hazardous Ranking Score; Olin Chemical Site No. MAD001403104, retrieved on November 14, 2005 from <http://epa.gov/superfund/sites/docrec/pdoc1741.pdf>.
3. Sovocool G, Grange A. (2004), A Study of Organic Compounds Present in Water Samples from the Town of Wilmington's Maple Meadow Brook Aquifer Study Area.
4. Pyott C. (2005), Letter from the MADEP to Olin Corporation Re: Wilmington Olin Chemical RTN 3-0471 North Pond Investigation.
5. Crispin L. Nitrite level forces shutdown, Wilmington Town Crier, October 17, 2002.



Concerned Citizens Network
14 Powder House Circle
Wilmington, MA 01887

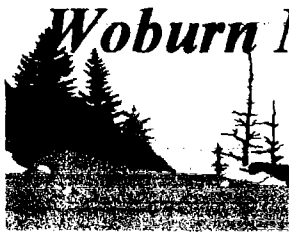


HBO

Mr. Joseph F. LeMay
Remedial Project Manager
US EPA-New England
One Congress Street, Suite 1100 (HBO)
Boston, MA 02114-2023

02114+2023-75





Woburn Neighborhood Association, Inc.

Linda A Raymond

10 North Maple Street

Woburn MA 01801-1407

www.woburnneighborhood.com

(781) 935-2438

Email fitwalker1@aol.com

November 17, 2005

Joseph F. LeMay
Remedial Project Manager
US EPA – New England
One Congress Suite 1100 (HBO)
Boston, MA 02114-2023

Re: Evaluation of Ammonia and Supplemental Soil Data Report, October 2005, Industri-Plex Site, Remedial Investigation/Feasibility Study.

Dear Mr. LeMay:

In our review, the Woburn Neighborhood Association, Inc. (WNA) has noticed that the following concerns were not addressed in the above studies.

1) The unlined Woburn Landfill is approximately a 40-acre 85' high site of contaminated waste that sits on top of an aquifer that is approximately $\frac{3}{4}$ surrounded by wetlands. This site has many contaminants of concern that we will probably never know about as stated by DEP Commissioner Phillip Weinberg in a meeting with the Woburn Neighborhood Association on February 25, 2002 (See attached). The landfill has in the past and will have the potential now and in the future to leach into the wetlands that flow into Halls Brook and continue to the Halls Brook Holding Area (HBHA) and then into the Aberjona River.

1a) The unlined Woburn Landfill is still listed as Atomic Weapons Employer (AWE) as recorded by the Department of Energy. (See attached)

1b) Between 1955- 1960 approx 50 55-gallon drums of low-grade uranium ore were dumped in the old landfill. In 1974 it was then trucked to the now new unlined landfill and co-mingled with other waste.

1c) In a revised 2004 report from the National Institute for Occupational Safety and Health Office of Compensation Analysis and Support Centers for Disease Control and Prevention states: The site warrants further investigation. (See attached)



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1d) Will the HBHA be able to also handle the contaminants coming from the unlined Woburn Landfill? After all this mountain of contaminated waste is now Woburn's landmark, another stigma, and will be here for eternity.

2) In a Department of Environmental Protection (DEP) report dated February 1, 2002 (see attached) regarding Olin Chemical in Wilmington, MA, the DEP states chemicals of concern that may have entered the East Ditch from the Olin property include inorganic chemicals one of which is listed as ammonia. The East Ditch is a narrow and shallow surface water drainage ditch that flows along the east side of the Olin property. The east ditch continues to flow to the south and turns into the New Boston St. Drain way, which was addressed as part of the cleanup activities for the Industri-Plex Site. The New Boston Street Drain way flows South and discharges into Halls Brook, and then into Halls Brook Holding area and eventually into the Aberjona River a chromium-containing floc is also known to migrate into the east ditch from the Olin property via surface water flow from the south ditch.

Since contamination knows no boundaries, it is our hope that the EPA does everything possible to insure the health, safety and welfare of all concerned from the known and the unknown at both of these sites that leaches into the Aberjona River.

References Enclosed:

- 1) Woburn Neighborhood Association, Inc. Newsletter, March 2002
- 2) Report Department of Energy, Updated Federal Register June 11, 2001
- 3) Report National Institute for Occupational Safety and Health Office of Compensation Analysis and Support Centers for Disease Control And Prevention, Revised June 2004
- 4) The Daily Times, Low-grade uranium ore dumped in North Woburn by Charles C. Ryan, October 12, 1979
- 5) The Daily Times, Chasing a Radioactive Ghost by Charles C. Ryan October 16, 1979
- 6) DEP Letter Olin corporation, Re: Wilmington MA, February 1, 2002

Sincerely,

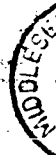
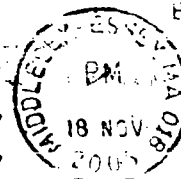
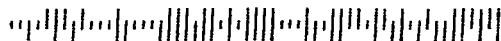


Linda A. Raymond, Co-Chairman
Woburn Neighborhood Association

Cc:

Senator John F. Kerry
Congressman Edward J. Markey
State Representative, Patrick Natale
EPA Regional Administrator, Robert W. Varney
DEP Superfund Project Manager, Anna Mayor
Woburn Mayor Elect, Thomas McLaughlin
Woburn City Council President, Paul Medeiros
Woburn Daily Times Chronicle

Woburn Neight
Michael L. & Li
10 North Maple Street
Woburn, MA 01801-1407



Joseph F. LeMay
Remedial Project Manager
US EPA - New England
One Congress Suite 1100 (HBO)
Boston, MA 02114-2023



FITWALKER1@aol.com
11/18/2005 11:21 AM

To Joe Lemay/R1/USEPA/US@EPA

cc JCirie4188@aol.com

bcc

Subject Woburn Neighborhood Association, Inc. Comments

Mr. LeMay,

Attached are the Woburn Neighborhood Association, Inc. Comments on the *Evaluation of Ammonia and Supplemental Soil Data* and further comments on the *Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation* and the *MSGRP Feasibility Study and Proposed Plan* Industri-Plex Site
Woburn, Massachusetts

A hard copy with all attachments was sent to your office Via US mail on 11/18/05
Linda A Raymond Chairman



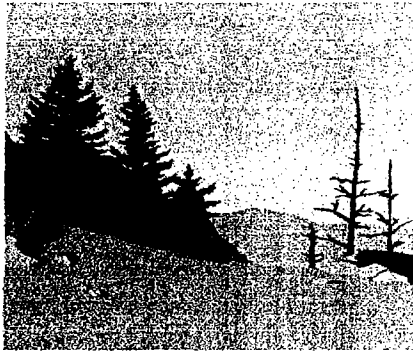
Woburn Neighborhood Association, Inc. wna cover.pdf

WOBURN NEIGHBORHOOD ASSOCIATION

March 2002

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p. 1



Meeting Schedule

The Woburn Neighborhood Association (WNA) is waiting for the Department of Environmental Protection to issue their report on our concerns and allegations. After that report is issued we will schedule a meeting, and at this meeting we will invite the authors of the DEP report to speak.

Toxics Action Conference

On Saturday March 16th members of the WNA will attend the largest annual environmental conference in New England. The conference will be held at the Boston campus of Northeastern University. If you would like to attend please contact us at (781) 935-2438.

Volunteers

We would like to thank the following members for their assistance over the past few weeks: Shelia McCarthy, Ellen Farrell, Dipti Patel and Peter Steeves. If you are interested in volunteering a few hours of your time please contact us. Also, a thank you to Fel Medeiros who has posted information concerning the Woburn Landfill on the WREN site. www.gowren.org

WNA Updates

We have received a number of inquiries from residents who are wondering what we are doing while we are waiting for the DEP Report to come out. We have tried to update the community through our letters to the editor, and fliers. We have found that there are some WNA members who were not receiving updated information. We will update them through this newsletter until we can schedule a neighborhood meeting.

WNA Meets the DEP

One of the rumors that have been circulating for months regarding the Woburn landfill controversy is; the Woburn Neighborhood Association had refused to meet with the Department of Environmental Protection. The fact of the matter is we had requested to meet as a group so that we could properly state our concerns.

On Monday, February 25th the steering committee of the Woburn Neighborhood Association met with Commissioner Phillip Weinberg from the Department of Environmental Protection. Commissioner Weinberg is in charge of the investigation into our allegations of environmental abuses at the unlined Woburn landfill. The purpose of the three-hour meeting was to state for the record our concerns regarding the Woburn Landfill capping operation, and to update Mr. Weinberg on our investigation.

"The Plot Thickens"

The more we investigate, the more environmental improprieties we find. What started in October 2001 with the finding of medical waste, and the DEP documents in November of 2001, and the wetlands violations in January of 2002, and the Olin Chemical report of February of 2002 has

"HEALTH SAFETY AND WELFARE"

WOBURN NEIGHBORHOOD ASSOCIATION

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now uncovered a major flaw in the Woburn Landfill capping operation.

We asked Commissioner Weinberg during our conversation on February 25th if an ENF (Environmental Notification Form) was filled and an EIR (Environmental Impact Report) was called for. An ENF is a form that the contractor files at the beginning of a project that states the impact of the landfill project on the environment, (land, air, water, traffic etc.) Part of the ENF process is to have **public meetings** to discuss the concerns of the community regarding the landfill project. We also asked Mr. Weinberg if an EIR was requested. We explained our understanding of one of the sections of the Massachusetts Environmental Protection Act, which specifically stated because of one of the conditions at the landfill an EIR, is required. The EIR is a comprehensive environmental reporting system that could have answered most of our questions before they were asked.

On February 28th we sent to Director Hutchins at the Executive Office of Environmental Affairs a written request to require the contractor to provide an ENF and EIR. If the **unlicensed** health agent who was acting as the City of Woburn's Representative in 1999 requested what the Woburn Neighborhood Association is now requesting, most of our concerns would have been addressed. ***Considering Woburn's history, we are a community that will never forget, nor will we ever abandon our quest.***

Con Com Meeting

On Thursday, February 21 the Conservation Commission held a meeting as posted on a request to extend N. Maple Street. There was no discussion on this issue. Much to our surprise the unlicensed health agent,

Jack Fralick and construction engineer, John Fiore addressed ConCom on the **unlined Woburn Landfill (not posted)**. Their presentation included a one-year extension of the Order of Conditions to 12/31/03. They also spoke on the drainage system of the runoff (leachate) from the unlined landfill that will continue to flow into Halls Brook and then into the Aberjona River. Jack Fralick and John Fiore plan on coming back to ConCom within 6-8 weeks. We certainly hope that ConCom will properly inform the public on this highly controversial issue as to the date and time of all meetings.

"Isolation"

On February 14, 2002 we the Woburn Neighborhood Association received a copy of a Department of Environmental Protection Report which strongly suggested that toxic contaminates are entering the Woburn, Winchester, Stoneham and Medford water supply from a Super Fund site from an adjoining town. **See Marie Coady's Daily Times Chronicle 3/1/02 story included in this newsletter.**

After we reviewed the report we sent a letter to the author of the DEP report Mr. Stephen Johnson. In our letter to Mr. Johnson we stated that what deeply disturbed the Woburn Neighborhood Association regarding his report is the fact that Mr. Johnson did not notify any of the surrounding cities and towns of the potential nightmare that might be caused by the discovery of additional toxic chemicals flowing from the Olin Chemical Superfund site to Halls Brook and the Aberjona River.

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We asked Mr. Johnson if he investigated the seepage and runoff from the Northern slope of the Woburn Landfill that borders the Olin property to see if maybe, just maybe some of the toxic chemicals that he discovered flowing into Halls Brook and the Aberjona River might have originated from the unlined Woburn landfill? We further asked Mr. Johnson in our letter the following, how many other instances of environmental abuse has our area suffered that we were not made aware of, and is isolation (not sharing information between surrounding cities and towns) a DEP standard operating procedure? Mr. Johnson responded to say that it was an oversight that Woburn was not notified of this investigation.

On February 28, 2002 Under the Freedom of Information Act we requested a complete copy of the Olin report.

Why we are concerned!!

Please look at the water-flow map on the back page of the newsletter. It shows the location of Olin Chemical, Industry-Plex, and the Woburn landfill

Wilmington/Tewksbury Alliance

On Thursday February 28th members of the WNA attended a meeting of the Wilmington/Tewksbury Alliance. It was our chance to meet environmental groups from neighboring towns. One of the topics discussed was the Olin report.

US Representative Edward J. Markey Adds support

We the Woburn Neighborhood Association applaud United States Representative Edward J. Markey for the action he is taking

regarding our concerns of the unlined Woburn landfill. Representative Markey joins a distinguished group of influential officials who have pledged their support to our cause. This group includes Senator John F. Kerry, Representative Carol Donovan, Representative James Miceli, Senator Robert Havern and Inspector General Gregory Sullivan. On February 15, 2002 after receiving the Woburn Neighborhood Association reports and the hundreds of postcards and letters from the concerned residents regarding what we believe to be serious environmental abuses, Representative Markey contacted Commissioner Liss at the Department of Environmental Protection. He requested in his letter that his office receive a complete and thorough summation of the investigation. Thank you Representative Markey for joining us in our quest to resolve what we believe to be as serious as any environmental abuse our area has ever suffered.

The Woburn Neighborhood Association is making a difference.

On February 10, 2002 the Woburn Neighborhood Association visited the Woburn Landfill after receiving many unconfirmed inquiries regarding the stopping of the capping operation. What we observed was, many of the wetlands violations we had previously witnessed had been corrected, and the dumping does not appear to have stopped.

On the first page of the February edition of the WNA Newsletter we displayed a picture of the Breed Avenue side of the landfill that clearly showed that there were no barriers in place to stop the trash juice from running into a storm drain. We took a comparison

“HEALTH SAFETY AND WELFARE”

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picture on February 10, 2002 and to our surprise the hay-bale barriers were in place. After our association meeting on January 6th we prepared a report on what we believe to be a number of violations to the Wetlands Protection Act. We sent this report to 19 responsible officials. Because of this report, this is the first time in four years the Woburn Landfill now has hay-bale barriers in place. I would like to take this opportunity to thank this responsible official for taking this action.

Although barrier installation was an important part of our short-term goals, we feel that this action was four years too late. We must have core testing done in the landfill. The residents of Woburn and surrounding cities and towns have the right to know what is in the landfill, and what has possibly seeped into their water supply. The test results might not affect us at this time but could possibly affect us in years to come. That is the main reason the WNA is trying to raise the awareness in our community regarding this issue. Let's not let history repeat itself.

Unreleased DEP Documents

At our last meeting and in our last newsletter we mentioned that the DEP did not release all of the documents we had requested under the Freedom of Information Act. On February 4, 2002 we requested the Secretary of State to review the documents in question and if they agree with our claim release the documents to the Woburn Neighborhood Association

WNA Membership

Membership in our organization means you will become part of a network of concerned residents committed to achieving our

common goals. You will receive copies of our newsletter, and might be called upon in the future to help with additional mailings.

If you are interested in joining our association you can reach us at:

wna20@hotmail.com or by phone (781)

935-2438 or by mail WNA Mike

Raymond 10 North Maple Street Woburn MA.

Summary

Join us in the environmental protection of our community. Please notify the responsible officials listed on page 5. It will be your letters, and phone calls that will convince them. Even after the investigations are completed, and if you don't agree with their results, voice your opinion. Please contact us if you need help writing your letters.

Remember, as Margaret Mead once said;

“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed it's the only thing that ever has.”

“HEALTH SAFETY AND WELFARE”

FRIDAY, MARCH 1, 2002



By MARIE COADY

Superfund sites and landfills are full of smoke and mirrors

A line from one of syndicated columnist Art Buchwald's columns has always stuck in my mind. He once wrote that while sitting next someone at a bar discussing some pressing national problem, the gentlemen expressed concern that things weren't going well. But Buchwald calmed his fears by telling his bar buddy that he needn't worry, because the government had experts working for them, and they must know what they are doing. To which his bar buddy replied, "But what if they don't?"

I mean what guarantee do we have that the people running our government agencies actually know what they're doing? Case in point: How can we be sure that the US Environmental Protection Agency (EPA) and our state Department of Environmental Protection (DEP) actually know how to clean up a Superfund site. I mean can they really do that, or is it all smoke and mirrors?

I have to admit they talk a good game, and they certainly produce a lot of paper, but can they actually clean up a site that's "ranked fifth worst out of more than 1,400 Superfund sites across the nation" to the point that it is no longer a threat to the population? And if they do, where does all that contaminated gunk they remove go? It can't all be remediated. So some of it has to be dumped somewhere. But where?

Take the Woburn Industri-Plex Superfund site for example. How can we be sure it's really safe to set foot on that ground? According to the US (EPA), it's a miracle. The EPA is so delirious with joy at the "success" of the Industri-Plex site, they've dedicated a whole Web site to its "Return to Productive Use". To hear them tell is you could let little your kids dig sand castles there, and they'd be as safe as in their mother's womb. But that's not what Mark Corvo thinks. And he should know.

Corvo was the lead technician for Rust Utilities, Inc., the company hired to remediate the Superfund site back in the early 1994, when he stumbled across a situation that turned him into a whistleblower and got him fired. Corvo's job was to oversee the removal of contaminated water and soil at the site and ready it for transportation to where it would be remediated. But one night when he came back to the job site unexpectedly, he discovered a crew working under the cover of darkness and pumping the "fire-engine red" water and mud that he had spent two days removing, from a "parcel of land known as PX Realty," right into the New Boston Street drainway which runs into the Aberjona River.

That was in May of 1994, but the story didn't appear in the *Boston Globe* until June 17, 1995, in an article headlined, "Doubts cast on cleanup of Woburn industrial site". The article went on to reveal that as far back as 1994 there were problems with the remediation of the Industri-Plex. But as it turned out no one paid any attention in spite of the fact that Mark Corvo tried to call attention to some very big problems that neither the EPA, nor the DEP, or Superfund program directors did anything about.

But then that could have been the result of a new piece of legislation that had been pushed through the

MA State Legislature in 1993 that turned the tables on the DEP and put a new law onto the books that gave developers and polluters the authority to decide the course of any environmental cleanup and left the EPA and DEP merely to audit their paperwork and catch them when they don't follow the rules.

This catch me if you can policy is still in effect, and it renders both our US and State agencies ineffective at best, and leaves the 13,000 households within two miles of the Superfund site completely at the mercy of developers and the so-called "environmental clean-up" companies they hire to do their dirty work.

More to the point, if the day crew at the Superfund site does one thing and the night crew does something else, what guarantee do we have that much of that "fire-engine red" muck didn't end up at the Woburn Landfill. After all, we already have one report from

• Coady (From Page 1C)

citizen observers who followed a line of trucks from the Industri-Plex all the way to the Woburn Landfill back in January of 2001. And those trucks were oozing a disgusting, smelly "fire-engine red" liquid and letting it drip all over the roadway as it made its way along Woburn's streets to the Landfill.

We also know from documents and news reports that when the old dump on Commerce Way was closed, much of what was there was moved to the new Woburn dump on New Boston Street, now euphemistically called the Woburn Landfill.

We also know there were truck drivers who mistakenly attempted to register complaints with the Wilmington Board of Health, thinking that was where they had deposited their disgusting load only to discover that the complaint should have been made to the Woburn Board of Health. But our Board of Health proudly proclaims that they have never heard a whisper of complaint about the Woburn Landfill. And that's what has emboldened city officials to continue to perpetrate this fraud on the residents of Woburn and allow city officials to remain conveniently deaf.

Just in case you're wondering what that "fire-engine red" liquid could possibly have been, according to the EPA it's a combination of benzene, toluene, arsenic, lead, and chromium. But the major ingredient that contributes to the "fire engine red" color of that muck at the Industri-Plex site is arsenic. And according to the International Occupational Safety and Health Information Center (CIS), exposure to arsenic can cause some very severe health and fire risks.

For instance, it's combustible. That means should it catch fire, it will give off irritating and toxic fumes and cause an explosion. The CIS recommends that it not be exposed to an open flame. Like the ones that will be present once the gas collection system is installed at the Woburn Landfill to burn off the methane gas produced as a by-product of the other debris dumped at the Landfill.

The CIS also warns that simple, and even short term exposure to arsenic can cause coughing, sore throat, shortness of breath and weakness as well as an irritation to the skin which manifests itself in redness and swelling, much like the complaints made by the drivers of the trucks that delivered that oozing "fire-engine red" muck to the Woburn Landfill back in fall of 2000.

But the most violent reaction to arsenic is ingestion. If by chance some soil or water permeated with arsenic is mistakenly ingested, the results are abdominal pain, diarrhea, nausea, vomiting, a burning sensation in the throat and chest and ultimately shock or collapse into unconsciousness.

Question is how much of what was at the Superfund site, now highly acclaimed as the Industri-Plex, had been deposited at the Woburn Landfill? And how much of the additional "redevelopment projects planned for the 245 acre site" are actually safe?

MARIE COADY

(2)

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[Following is the text of a DOE Federal Register notice published January 17, 2001, pp. 4003-4009.
Note: this list was updated by a Federal Register notice published on June 11, 2001, pp. 31218-24]

6450-01-p

DEPARTMENT OF ENERGY

Energy Employees Occupational Illness Compensation Act of 2000; List of Covered Facilities

AGENCY: Department of Energy.

ACTION: Notice of Listing of Covered Facilities

SUMMARY: The Energy Employees Occupational Illness Compensation Act of 2000 ("Act"), Public Law 106-398, establishes a program to provide compensation to individuals who developed illnesses as a result of their employment in nuclear weapons production-related activities and certain other federally-owned facilities in which radioactive materials were used. On December 7, 2000, the President issued Executive Order 13179 ("Order") directing the Department of Energy ("Department" or "DOE") to list covered facilities in the Federal Register. This notice responds to both the Act and the Order.

FOR FURTHER INFORMATION CONTACT: Office of Worker Advocacy, 1-877-447-9756.

ADDRESSES: The Department welcomes comments on this list. Individuals who wish to suggest additional facilities for inclusion on the list, indicate why one or more facilities should be removed from the list, or provide other information may contact:

Office of Worker Advocacy (EH-8)
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
email: worker_advocacy@eh.doe.gov
toll-free: 1-877-447-9756

SUPPLEMENTARY INFORMATION:

Purpose:

The Energy Employees Occupational Illness Compensation Act of 2000 ("Act"), Public Law 106-398, establishes a program to provide compensation to individuals who developed illnesses as a result of their employment in nuclear weapons production-related activities and certain other federally-owned facilities in which radioactive materials were used. On December 7, 2000, the President issued Executive Order 13179 ("Order") directing the Department of Energy ("Department" or "DOE") to list covered facilities in the Federal

Register. Section 2. c. vii of the Order instructs the Department to list three types of facilities:

- 1) Atomic weapons employer facilities, as defined in section 3621 (4) of the Act;
- 2) Department of Energy facilities, as defined by section 3621 (12) of the Act; and
- 3) Beryllium vendors, as defined by section 3621 (6) of the Act.

Compensation options and mechanisms are defined differently for each of these facility categories defined within the Act.

The following list represents the Department's best efforts to date to compile a list of facilities in these three categories. Reconstructing the operational history of the nuclear weapons system over a sixty-year period is a complex and sometimes imprecise undertaking. Some list entries are based on records that contain the names and addresses of companies and facilities at the time work was performed for the Department and its predecessor federal agencies. The list may identify a corporate headquarters facility as a production location, or may contain some inadvertent duplication because of changes in names, ownership, and addresses. Similarly, attempts to minimize duplication may have resulted in the inadvertent omission of subsidiaries and satellite locations that should be included. Accordingly, the Department is continuing its research efforts in order to better understand past production activities, and DOE intends to update this list at least once annually so long as new information becomes available. The public is invited to comment on the list and provide additional information.

In addition to continuing its research efforts, the Department is developing information dissemination mechanisms to make facility-specific data available to the public, including a publicly accessible database of site-related information. This database will help ensure that the Department keeps track of facilities involved in atomic weapons and other work potentially resulting in contamination or exposure. The site database will include, among other information, the type of nuclear weapons-related production work done, the dates such work occurred, and available health and safety data concerning the facility. The listing of facility name and location in this notice represents only a first step in providing information to the public.

The Act does not cover workers involved in uranium mining and milling, or those who worked in support of naval nuclear propulsion programs. Consequently, facilities associated with this type of work are not listed in this notice. Some workers who became ill as a result of their employment at these facilities may be covered by other programs such as the Radiation Exposure Compensation Act (RECA), the Federal Exposure Compensation Act (FECA), or other jurisdictions' worker compensation programs.

Introduction to the Covered Facility List

The list that follows represents the three categories of employers defined by the Act: atomic weapons employers ("AWE"), Department of Energy facilities ("DOE"), and beryllium vendors ("BE"). Some facilities fall into more than one category. For example, if a private contractor facility handled both radioactive materials and beryllium, it will have "AWE" and "BE" in the "facility type" field. For another example, a facility will have both "DOE" and "AWE" codes if ownership changed between the DOE and another entity. The Department intends to provide facility-specific explanations of the applicability of these

categories through the database mentioned above.

Each of the categories is defined below:

1. Atomic Weapons Employers

Section 3621 (4) of the Act defines an atomic weapons employer as "an entity that--

(A) processed or produced, for the use by the United States, material that emitted radiation and was used in the production of an atomic weapon, excluding uranium mining and milling; and

(B) is designated as an atomic weapons employer for purposes of this title by the Secretary of Energy."

Most facilities listed as an AWE conducted nuclear weapons-related work for a limited period of time or in certain select areas of the plant. For example, some sites worked with radioactive materials to evaluate processing machinery that was being considered for use in atomic weapons production. Radioactive materials may not have been used as a routine part of the facility's operations. The Act covers those workers who became sick as a consequence of their work in support of nuclear weapons production activities, and was not intended to cover all workers at each site named.

The lines between research, atomic weapons production, and non-weapons production are often difficult to draw. For the purposes of this notice, and as directed by the Act, only those facilities whose work involved radioactive material that was connected to the weapons production chain are included. Available information about many of these firms is incomplete or unclear, and the Department welcomes comments or additional information regarding facilities that may have supported atomic weapons production that are not on this list, as well as information that clarifies the work done at facilities named below.

2. Department of Energy Facilities

Section 3621 (12) of the Act defines a Department of Energy facility as "any building, structure, or premise, including the grounds upon which such building, structure, or premise is located--

(A) in which operations are, or have been, conducted by, or on behalf of, the Department of Energy (except for buildings, structures, premises, grounds, or operations covered by Executive Order 12344, pertaining to the Naval Nuclear Propulsion Program); and

(B) with regard to which the Department of Energy has or had--
(i) a proprietary interest; or

(ii) entered into a contract with an entity to provide management and operation, management and integration, environmental remediation services, construction, or maintenance services."

Consistent with this definition, the Department has taken a broad view of where operations

have been conducted by DOE or its predecessor agencies. The following list includes any facility handling radioactive materials or beryllium in which the Department had management and operations, management and integration, environmental remediation, or construction and maintenance contracts. This broad definition includes many facilities which are not generally thought of as Departmental facilities, as well as facilities which are not necessarily involved with weapons-related work. For example, some universities and private companies are included because the Department contracted for environmental remediation services at these sites, even though the Department did not own the facility. Also, some DOE-owned laboratories are included because they do work involving radioactive materials, even though that work is not related to nuclear weapons production.

The Act covers production workers at the Gaseous Diffusion Plants at Paducah, KY and Piketon, OH. Production workers at these facilities are covered for work conducted until July 28, 1998, when the facilities were privatized under the control of the United States Enrichment Corporation (USEC, Inc.)

The listing of Department of Energy facilities is only intended for the context of implementing this Act and does not create or imply any new Departmental obligations or ownership at any of the facilities named on this list.

3. Beryllium Vendors

Section 3621(6) of the Act defines beryllium vendor as the following:

- "(A) Atomics International.
- (B) Brush Wellman, Incorporated, and its predecessor, Brush Beryllium Company.
- (C) General Atomics.
- (D) General Electric Company.
- (E) NGK Metals Corporation and its predecessors, Kawecki-Berylco, Cabot Corporation, BerylCo, and Beryllium Corporation of America.
- (F) Nuclear Materials and Equipment Corporation.
- (G) StarMet Corporation, and its predecessor, Nuclear Metals, Incorporated.
- (H) Wyman Gordan, Incorporated.
- (I) Any other vendor, processor, or producer of beryllium or related products designated as a beryllium vendor for purposes of this title under Section 3622."

Beryllium metal has been an important material for atomic weapons production, and it was used at many places throughout the production system. The following list indicates private firms that processed, produced, or provided beryllium metal for the Department, as defined by the Act. This information is drawn from a variety of historical documents, and much data remains incomplete. The Department welcomes comments or additional information about its beryllium vendors.

Covered Facility List

Jurisdiction	Facility Name	Location	Faci
AL	Southern Research Institute	Sylacauga	AWE
AL	Speed Ring Experimental & Tool Company	Culman	BE
AL	Tennessee Valley Authority	Muscle Shoals	AWE
AK	Amchitka Island Nuclear Explosion Site	Amchitka Island	DOE
AK	Project Chariot Site	Cape Thompson	DOE
CA	Arthur D. Little Co.	San Francisco	AWE
CA	Atomics International	Canoga Park	BE
CA	Burris Park Field Station	Kingsburg	AWE
CA	Ceradyne, Inc.	Santa Ana	BE
CA	Dow Chemical Co.	Walnut Creek	AWE
CA	Electro Circuits, Inc.	Pasadena	AWE
CA	Energy Technology Engineering Center	Santa Susana	DOE
CA	General Atomics	La Jolla	AWE/
CA	General Electric Vallecitos	Pleasanton	AWE
CA	Hunter Douglas Aluminum Corp.	Riverside	AWE
CA	Laboratory for Energy-Related Health Research	Davis	DOE
CA	Laboratory of Biomedical and Environmental Sciences	Los Angeles	DOE
CA	Laboratory of Radiobiology and Environmental Health	San Francisco	DOE
CA	Lawrence Berkeley National Laboratory	Berkeley	DOE
CA	Lawrence Livermore National Laboratory	Livermore	DOE
CA	Sandia Laboratory, Salton Sea Base	Imperial County	DOE
CA	Sandia National Laboratories--Livermore	Livermore	DOE
CA	Stanford Linear Accelerator Center	Palo Alto	DOE
CA	Stauffer Metals, Inc.	Richmond	AWE
CA	University of California	Berkeley	AWE/
CO	Coors Porcelain	Golden	BE
CO	Project Rio Blanco Nuclear Explosion Site	Rifle	DOE
CO	Project Rulison Nuclear Explosion Site	Grand Valley	DOE
CO	Rocky Flats Plant	Golden	DOE
CO	Shattuck Chemical	Denver	AWE
CO	University of Denver Research Institute	Denver	AWE/
CT	American Chain and Cable Co.	Bridgeport	AWE
CT	Anaconda Co.	Waterbury	AWE
CT	Bridgeport Brass Co., Havens Lab	Bridgeport	AWE
CT	Combustion Engineering	Windsor	AWE/
CT	Connecticut Aircraft Nuclear Engine Lab. (CANEL)	Middletown	BE/D
CT	Dorr Corp.	Stamford	AWE
CT	Fenn Machinery Co.	Hartford	AWE
CT	New England Lime Co.	Canaan	AWE
CT	Seymour Specialty Wire	Seymour	AWE/
CT	Sperry Products, Inc.	Danbury	AWE
CT	Torrington Co.	Torrington	AWE
DE	Allied Chemical and Dye Corp.	North Claymont	AWE
DC	National Bureau of Standards, Van Ness Street	Washington	AWE
DC	Naval Research Laboratory	Washington	AWE/
FL	American Beryllium Co.	Sarasota	BE
FL	Armour Fertilizer Works	Bartow	AWE
FL	C.F. Industries, Inc.	Bartow	AWE
FL	Gardinier, Inc.	Tampa	AWE
FL	International Minerals and Chemical Corp.	Mulberry	AWE
FL	Pinellas Plant	Clearwater	DOE
FL	University of Florida	Gainesville	AWE
FL	Virginia-Carolina Chemical Corp	Nichols	AWE

FL	W.R. Grace Co., Agricultural Chemical Div.	Ridgewood	AWE
ID	Argonne National Laboratory--West	Scoville	DOE
ID	Idaho National Engineering Laboratory	Scoville	DOE
IL	Allied Chemical Corp.	Metropolis	AWE
IL	American Machine and Metals, Inc.	E. Moline	AWE
IL	Argonne National Laboratory--East	Argonne	DOE
IL	Armour Research Foundation	Chicago	AWE
IL	Blockson Chemical Co	Joliet	AWE
IL	C-B Tool Products Co.	Chicago	AWE
IL	Crane Co.	Chicago	AWE
IL	ERA Tool and Engineering Co.	Chicago	AWE
IL	Fansteel Metallurgical Corp.	North Chicago	BE
IL	Fermi National Accelerator Laboratory	Batavia	DOE
IL	Granite City Steel	Granite City	AWE/
IL	Great Lakes Carbon Corp.	Chicago	AWE
IL	GSA 39th Street Warehouse	Chicago	AWE
IL	International Register	Chicago	AWE
IL	Kaiser Aluminum Corp.	Dalton	AWE
IL	Lindsay Light and Chemical Co.	W. Chicago	AWE
IL	Madison Site (Speculite)	Madison	AWE/
IL	Midwest Manufacturing Co.	Galesbury	AWE
IL	Museum of Science and Industry	Chicago	AWE
IL	National Guard Armory	Chicago	AWE/
IL	Podbeliniac Corp.	Chicago	AWE
IL	Precision Extrusion Co.	Bensenville	AWE
IL	Quality Hardware and Machine Co.	Chicago	AWE
IL	R. Krasburg and Sons Manufacturing Co.	Chicago	AWE
IL	Sciaky Brothers, Inc.	Chicago	AWE
IL	Swenson Evaporator Co.	Harvey	AWE
IL	University of Chicago	Chicago	AWE/
IL	W.E. Pratt Manufacturing Co.	Joliet	AWE
IL	Wycoff Drawn Steel Co.	Chicago	AWE
IN	American Bearing Corp.	Indianapolis	AWE
IN	Dana Heavy Water Plant	Dana	DOE
IN	General Electric Plant	Shelbyville	AWE
IN	Joslyn Manufacturing and Supply Co.	Ft. Wayne	AWE
IN	Purdue University Van der Graaf Lab.	Lafayette	AWE
IN	Washrite	Indianapolis	AWE
IA	Ames Laboratory	Ames	DOE
IA	Iowa Ordnance Plant	Burlington	DOE
IA	Titus Metals	Waterloo	AWE
KS	Spencer Chemical Co., Jayhawks Works	Pittsburg	AWE
KY	Paducah Gaseous Diffusion Plant	Paducah	DOE
MR*	Eniwetok Test Site	Marshall Islands	DOE
MD	Armco-Rustless Iron & Steel	Baltimore	AWE
MD	W.R. Grace and Company	Curtis Bay	AWE/
MA	American Potash & Chemical	West Hanover	AWE
MA	C.G. Sargent & Sons	Graniteville	AWE
MA	Chapman Valve	Indian Orchard	AWE/
MA	Edgerton Germeshausen & Grier, Inc.	Boston	AWE
MA	Fenwal, Inc.	Ashland	AWE
MA	Franklin Institute	Boston	BE
MA	Heald Machine Co.	Worcester	AWE
MA	La Pointe Machine and Tool Co.	Hudson	AWE
MA	Massachusetts Institute of Technology	Cambridge	AWE/
MA	Metals and Controls Corp.	Attleboro	AWE
MA	National Research Corp.	Cambridge	AWE
MA	Norton Co.	Worcester	AWE/
MA	Nuclear Metals, Inc.	Concord	AWE/
MA	Reed Rolled Thread Co.	Worcester	AWE

MA	Shpack Landfill	Norton	AWE/
MA	Ventron Corporation	Beverly	AWE/
MA	Winchester Engineering and Analytical Center	Winchester	DOE
MA	Woburn Landfill	Woburn	AWE
MA	Wyman Gordon Inc. Grayton,	North Grafton	BE
MI	AC Spark Plug	Flint	BE
MI	Baker-Perkins Co.	Saginaw	AWE
MI	Carboloy Co.	Detroit	AWE
MI	Extruded Metals Co.	Grand Rapids	AWE
MI	General Motors	Adrian	AWE/
MI	Gerity-Michigan Corp.	Adrian	BE
MI	Mitts & Merrel Co.	Saginaw	AWE
MI	Oliver Corp.	Battle Creek	AWE
MI	Revere Copper and Brass	Detroit	AWE/
MI	Speed Ring Experimental & Tool Company	Detroit	BE
MI	Star Cutter Corp.	Farmington	AWE
MI	University of Michigan	Ann Arbor	AWE
MI	Wolverine Tube Division	Detroit	AWE
MN	Elk River Reactor	Elk River	DOE
MS	Salmon Nuclear Explosion Site	Hattiesburg	DOE
MO	Kansas City Plant	Kansas City	DOE
MO	Latty Avenue Properties	Hazelwood	AWE/
MO	Mallinckrodt Chemical Co., Destrehan St. Plant	St. Louis	AWE/
MO	Medart Co.	St. Louis	AWE
MO	Roger Iron Co.	Joplin	AWE
MO	Spencer Chemical Co.	Kansas City	AWE
MO	St. Louis Airport Site	St. Louis	AWE/
MO	Tyson Valley Powder Farm	St. Louis	AWE
MO	United Nuclear Corp.	Hematite	AWE
MO	Weldon Spring Plant	Weldon Spring	DOE
NE	Hallam Sodium Graphite Reactor	Hallam	DOE
NV	Nevada Test Site	Mercury	DOE
NV	Project Faultless Nuclear Explosion Site	Central Nevada Test Site	DOE
NV	Project Shoal Nuclear Explosion Site	Fallon	DOE
NV	Yucca Mountain Site Characterization Project	Yucca Mountain	DOE
NJ	Aluminum Co. of America (Alcoa)	Garwood	AWE
NJ	American Peddinghaus Corp.	Moonachie	AWE
NJ	Baker and Williams Co.	Newark	AWE
NJ	Bell Telephone Laboratories	Murray Hill	AWE
NJ	Bloomfield Tool Co.	Bloomfield	AWE
NJ	Bowen Lab.	North Branch	AWE
NJ	Callite Tungsten Co.	Union City	AWE
NJ	Chemical Construction Co.	Linden	AWE
NJ	Du Pont Deepwater Works	Deepwater	AWE/
NJ	International Nickel Co., Bayonne Laboratories	Bayonne	AWE
NJ	J.T. Baker Chemical Co.	Phillipsburg	AWE
NJ	Kellex/Pierpont	Jersey City	AWE/
NJ	Maywood Chemical Works	Maywood	AWE/
NJ	Middlesex Municipal Landfill	Middlesex	AWE/
NJ	Middlesex Sampling Plant	Middlesex	DOE
NJ	National Beryllia	Haskell	BE
NJ	New Brunswick Laboratory	New Brunswick	DOE
NJ	Picatinny Arsenal	Dover	AWE
NJ	Princeton Plasma Physics Laboratory	Princeton	DOE
NJ	Rare Earths/ W.R. Grace	Wayne	AWE/
NJ	Standard Oil Development Co. of NJ	Linden	AWE
NJ	Tube Reducing Co.	Wallington	AWE
NJ	U.S. Pipe and Foundry	Burlington	BE
NJ	United Lead Co.	Middlesex	AWE

NJ	Vitro Corp. of America	West Orange	AWE
NJ	Westinghouse Electric Corp.	Bloomfield	AWE
NJ	Wykoff Steel Co.	Newark	AWE
NM	Chupadera Mesa Chupadera	Mesa	DOE
NM	Los Alamos Medical Center	Los Alamos	DOE
NM	Los Alamos National Laboratory	Los Alamos	DOE
NM	Lovelace Respiratory Research Institute	Albuquerque	DOE
NM	Project Gasbuggy Nuclear Explosion Site	Farmington	DOE
NM	Project Gnome Nuclear Explosion Site	Carlsbad	DOE
NM	Sandia National Laboratories	Albuquerque	DOE
NM	South Albuquerque Works	Albuquerque	DOE
NM	Trinity Nuclear Explosion Site	White Sands Missile Range	DOE
NM	Waste Isolation Pilot Plant	Carlsbad	DOE
NY	Allegheny-Ludlum Steel	Watervliet	AWE
NY	American Machine and Foundry	Brooklyn	AWE
NY	Ashland Oil	Tonawanda	AWE/
NY	Baker and Williams Warehouses	New York	AWE/
NY	Bethlehem Steel	Lackawana	AWE
NY	Bliss & Laughlin Steel	Buffalo	AWE/
NY	Brookhaven National Laboratory	Upton	DOE
NY	Burns & Roe, Inc.	Maspeth	BE
NY	Colonie Site (National Lead)	Colonie	AWE/
NY	Columbia University	New York City	AWE/
NY	Electro Metallurgical	Niagara Falls	AWE
NY	General Astrometals	Yonkers	BE
NY	Hooker Electrochemical	Niagara Falls	AWE
NY	International Rare Metals Refinery, Inc.	Mt. Kisko	AWE
NY	Ithaca Gun Co.	Ithaca	AWE
NY	Lake Ontario Ordnance Works	Niagara Falls	DOE
NY	Ledoux and Co.	New York	AWE
NY	Linde Air Products	Buffalo	AWE
NY	Linde Ceramics Plant	Tonawanda	AWE/
NY	New York University	New York	AWE
NY	Peek Street Facility**	Schenectady	DOE
NY	Radium Chemical Co.	New York	AWE
NY	Rensselaer Polytechnic Institute	Troy	AWE
NY	Sacandaga Facility**	Glenville	DOE
NY	Seaway Industrial Park	Tonawanda	AWE/
NY	Seneca Army Depot	Romulus	AWE
NY	Separations Process Research Unit (at Knolls Lab.)**	Schenectady	DOE
NY	Simonds Saw and Steel Co.	Lockport	AWE
NY	Staten Island Warehouse	New York	AWE
NY	Sylvania Corning Nuclear Corp.	Hicksville	AWE/
NY	Sylvania Products Corp.	Bayside	AWE/
NY	Titanium Alloys Manufacturing	Niagara Falls	AWE
NY	Trudeau Foundation	Saranac Lake	BE
NY	University of Rochester Medical Laboratory	Rochester	AWE/
NY	Utica St. Warehouse	Buffalo	AWE
NY	West Valley Demonstration Project	West Valley	DOE
NC	Beryllium Metals and Chemical Corp.	Bessemer City	BE
NC	University of North Carolina	Chapel Hill	BE
OH	Air Force Plant 36	Evandale	AWE
OH	Ajax Magnathermic Corp.	Youngstown	AWE
OH	Alba Craft	Oxford	AWE/
OH	Associated Aircraft Tool and Manufacturing Co.	Fairfield	AWE/
OH	B & T Metals	Columbus	AWE/
OH	Baker Brothers	Toledo	AWE/
OH	Battelle Columbus Laboratories	Columbus	AWE
OH	Battelle Memorial Institute	Columbus	AWE/

OH	Beryllium Production Plant (Brush)	Luckey	BE/D
OH	Brush Beryllium Co.	Elmore	AWE/
OH	Brush Beryllium Co.	Cleveland	AWE/
OH	Brush Beryllium Co.	Loraine	AWE/
OH	Cincinnati Milling Machine Co.	Cincinnati	AWE
OH	Clifton Products Co.	Clifton	BE
OH	Clifton Products Co.	Painesville	BE
OH	Copperweld Steel	Warren	AWE
OH	Du Pont-Grasselli Research Laboratory	Cleveland	AWE
OH	Extrusion Plant	Ashtabula	DOE
OH	Feed Materials Production Center	Fernald	DOE
OH	General Electric Company	Cincinnati/Evendale	AWE/
OH	Gruen Watch	Norwood	AWE
OH	Harshaw Chemical Co.	Cleveland	AWE
OH	Herring-Hall Marvin Safe Co.	Hamilton	AWE/
OH	Horizons, Inc.	Cleveland	AWE
OH	Kettering Laboratory, University of Cincinnati	Cincinnati	BE
OH	Magnus Brass Co.	Cincinnati	AWE
OH	McKinney Tool and Manufacturing Co.	Cleveland	AWE
OH	Mitchell Steel Co.	Cincinnati	AWE
OH	Monsanto Chemical Co.	Dayton	AWE
OH	Mound Plant	Miamisburg	DOE
OH	Painesville Site (Diamond Magnesium Co.)	Painesville	AWE/
OH	Piqua Organic Moderated Reactor	Piqua	DOE
OH	Portsmouth Gaseous Diffusion Plant	Piketon	DOE
OH	R. W. Leblond Machine Tool Co.	Cincinnati	AWE
OH	Tech-Art, Inc.	Milford	AWE
OH	Tocco Induction Heating Div.	Cleveland	AWE
OH	Vulcan Tool Co.	Dayton	AWE
OK	Kerr-McGee	Guthrie	AWE
OR	Albany Research Center	Albany	AWE/
OR	Wah Chang	Albany	AWE
PA	Aeroprojects, Inc.	West Chester	AWE
PA	Aliquippa Forge	Aliquippa	AWE/
PA	Aluminum Co. of America (Alcoa)	New Kensington	AWE
PA	Babcock & Wilcox	Parks Township	AWE
PA	Beryllium Corp. of America	Hazleton	BE
PA	Beryllium Corp. of America	Reading	BE
PA	Birdsboro Steel & Foundry	Birdsboro	AWE
PA	C.H. Schnoor	Springdale	AWE/
PA	Carnegie Mellon Cyclotron Facility	Saxonburg	AWE
PA	Carpenter Steel Co.	Reading	AWE
PA	Chambersburg Engineering Co.	Chambersburg	AWE
PA	Foote Mineral Co.	East Whiteland Twp.	AWE
PA	Frankford Arsenal	Philadelphia	AWE
PA	Heppenstall Co.	Pittsburgh	AWE
PA	Jessop Steel Co.	Washington	AWE
PA	Koppers Co., Inc.	Pittsburgh	AWE
PA	Landis Machine Tool Co.	Waynesboro	AWE
PA	McDaniel Refractory Co.	Beaver Falls	BE
PA	Nuclear Materials and Equipment Corp.	Apollo	AWE/
PA	Penn Salt Co.	Philadelphia	AWE
PA	Philadelphia Naval Yard	Philadelphia	AWE
PA	Shippingport Atomic Power Plant	Shippingport	DOE
PA	Superior Steel Co.	Carnegie	AWE
PA	U.S. Steel Co., National Tube Division	McKeesport	AWE
PA	Vitro Manufacturing	Cannonsburg	AWE/
PA	Westinghouse Atomic Power Development Plant	East Pittsburgh	AWE
PR	BONUS Reactor Plant	Punta Higuera	DOE
PR	Puerto Rico Nuclear Center	Mayaguez	DOE

RI	C.I. Hayes, Inc.	Cranston	AWE
SC	Savannah River Site	Aiken	DOE
TN	Clarksville Facility	Clarksville	DOE
TN	Oak Ridge Gaseous Diffusion Plant (K-25)	Oak Ridge	DOE
TN	Oak Ridge Hospital	Oak Ridge	DOE
TN	Oak Ridge Institute for Science Education	Oak Ridge	DOE
TN	Oak Ridge National Laboratory (X-10)	Oak Ridge	DOE
TN	Vitro Corp. of America	Chattanooga	AWE/
TN	W. R. Grace	Erwin	AWE
TN	Y-12 Plant	Oak Ridge	DOE
TX	AMCOT	Forth Worth	AWE
TX	Mathieson Chemcial Co	Pasadena	AWE
TX	Medina Facility	San Antonio	DOE
TX	Pantex Plant	Amarillo	DOE
TX	Sutton, Steele and Steele Co.	Dallas	AWE
TX	Texas City Chemicals, Inc.	Texas City	AWE
VA	Babcock & Wilcox Co.	Lynchburg	AWE
VA	Thomas Jefferson National Accelerator Facility	Newport News	DOE
VA	University of Virginia	Charlottesville	AWE
WA	Hanford	Richland	DOE
WA	Pacific Northwest National Laboratory	Richland	DOE
WV	Huntington Pilot Plant	Huntington	AWE/
WI	Allis-Chalmers Co.	West Allis, Milwaukee	AWE
WI	Besley-Wells	South Beloit	AWE
WI	LaCrosse Boiling Water Reactor	LaCrosse	DOE
WI	Ladish Co.	Cudahy	BE

* Marshall Islands

** Consistent with the Act, coverage is limited to activities not performed under the responsibility of the Naval Nuclear Propulsion program.

Issued in Washington, D.C. January 10, 2001

Signature

David M. Michaels, PhD, MPH

Assistant Secretary

Environment, Safety and Health

Related Resources:

- [Facility List in PDF Format](#)
- [DOE Employees Occupational Illness Initiative](#)

[FAS](#) | [Government Secrecy](#) | [DOE Docs](#) ||| [Index](#) | [Search](#) | [Join FAS](#)

Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities

Prepared by:
National Institute for Occupational Safety and Health
Office of Compensation Analysis and Support
Centers for Disease Control and Prevention

Julie Louise Gerberding, M.D., M.P.H.
Director
Revised June 2004

Support in developing this report was provided under
contract and interagency agreement by:

Trinity Engineering Associates Inc.
Cincinnati, Ohio

and

U.S. Public Health Service, Federal Occupational Health
Chicago, Illinois

Appendix A-3 Residual Radioactivity Evaluations for Individual Facilities

FACILITY NAME: Woburn Landfill
 Woburn, Massachusetts

ALSO KNOWN AS: Winchester Engineering Vicinity Property

TIME PERIOD: 1955-1960

DESCRIPTION OF ACTIVITIES:

Fifty 55-gallon drums of low grade uranium ore were buried at the Woburn site. The material came from the AEC Raw Materials Development Laboratory operated by the National Lead Company under contract from 1955-1960.

Documentation indicates that the material in question had an activity level similar to granite, and was dumped from the drums into a truck for disposition, and subsequently co-mingled with other refuse and waste. The original landfill was excavated in 1974 and was replaced with clean backfill to support construction of a light industrial complex.

Radiological surveys of the old landfill site and the new landfill (where the excavated material was taken to) does not indicate radioactivity greater than expected background levels at either facility.

It appears that the dumping of the contents from fifty drums occurred in 1960, whereupon the drums were reused. Based on the described low-level radiological characteristics of the material and subsequent radiological surveys from the affected areas there is no indication or reason to suspect residual contamination of any consequence, existed beyond the date of 1960.

INFORMATIONAL SOURCES:

The sources of information used in this evaluation include information on the DOE Worker Advocacy Website and internal AEC/DOE correspondence provided by the DOE Worker Advocacy Group.

EVALUATION FINDINGS:

Documentation reviewed indicates that there is little potential for significant residual contamination outside of the period in which weapons-related production occurred.

Appendix A-1 Changes to Radiological Facility Status

Facility	City	State	Period	Evaluation Finding in Status Report	Evaluation Finding in Final Report
Westinghouse Electric Corp. (NJ)	Bloomfield	NJ	1941-1943	This site warrants further investigation.	Documentation reviewed indicates that there is potential for significant residual contamination outside of the period in which weapons-related production occurred.
Woburn Landfill	Woburn	MA	1955-1960	This site warrants further investigation.	Documentation reviewed does not indicate that there is potential for significant residual contamination outside of the period in which weapons-related production occurred.
Wolff-Alport Chemical Corp.	Brooklyn	NY	1949-1950	This site warrants further investigation.	Documentation reviewed indicates that there is potential for significant residual contamination outside of the period in which weapons-related production occurred.

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The Daily Times

Woburn Edition

October 16, 1979

This article originally appeared in
The Daily Times, Woburn, Mass., on the date indicated.

Chasing a 'Radioactive Ghost'

By CHARLES C. RYAN

WOBURN - The first inkling that there might have been radioactive materials disposed of in the North Woburn dump came to light about a month ago at a regular meeting of the Woburn City Council.

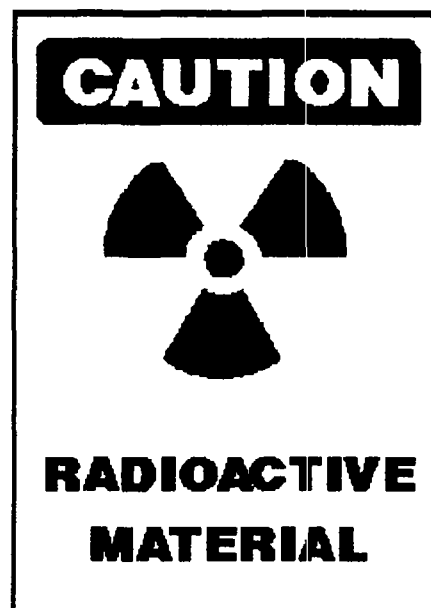
During the course of the Council's discussion with representatives from the State Division of Environmental Quality Engineering about the arsenic and chromium waste pits found in North Woburn, Councilor Gene English asked if the DEQE knew anything about radioactive material being dumped in North Woburn.

English explained that he had been told by a former North Woburn resident that the man had observed U.S. Army personnel disposing of some radioactive material in the New Boston Street dump.

With the public already concerned and alarmed about the discovery of the chromium, lead and other toxins in North Woburn, the Daily Times reporter, myself, decided not to publish English's statement.

The decision was not made lightly because it is a newspaper's job to report what happens, particularly what happens in the public arena, but - without some kind of verification with hard evidence it would have been irresponsible to cause unnecessary alarm.

Instead a detailed search was conducted to see if there was any truth at all to English's statement.



Since the facility in nearby Winchester was named as the possible source of this radioactive material, the search began there.

The answer was "No. We don't believe so, but ..."

It seemed before the Food and Drug Administration moved to Winchester, the plant was operated by American Cynamid and National Lead Laboratories under contracts with the Atomic Energy Commission from 1950 to 1961.

In 1961, the U.S. Public Health service took over.

It was then learned that the contracts given out by the AEC involved research in finding methods of extracting uranium from low-grade American and Canadian uranium ore.

National Lead was called, but there were no records of the facility except a corporate annual report which indicated the facility was being operated in 1960 by National Lead under contract with the AEC.

The nuclear Regulatory Commission was called. The answer was again, no. But there was a press release in 1978, showing the lab to be clean of radioactive contamination.

The army was called at Fort Devens. No, they had no record of Army personnel being involved in any waste disposal, but they would check with Washington. Try the Army base at Watertown Arsenal.

The Arsenal had no information, except that their decommissioned small research nuclear reactor was safe and, no, it was not putting any radioactivity into the river. (They weren't even asked that question, since the reporter had been unaware that there was a decommissioned reactor there).

Calls were then made to the Department of Energy, back to the Nuclear Regulatory Commission, back to DOE, back to NRC, etc.

Then back to Winchester where it was learned someone vaguely remembered something being taken to a dump -- they thought it may have been in North Woburn - sometime in the mid 1950s. No, they didn't know how much.

The phone calls were begun again. This time searching for persons who had formerly been employed at the facility when it was operated by National Lead and American Cynamid.

Eventually, a few names cropped up. Each was tracked down. Almost all of them had retired, didn't remember anything, or referred the inquiry to another name.

Another call to Winchester. Maybe it wasn't in the 1950s. Maybe it was in

1960, they said. Try so-and-so.

So-and-so had just retired, but the person with the NRC in New York called him at home, was then referred to someone in Oakridge, Tenn. at the DOE.

Several people were spoken to and the search narrowed.

Then Oakridge called back a week or so later.

So and so recalls that there were 25 to 50 glass pint jars of ore which were disposed of.

It seems they were first taken to a private landfill, but the person who owned it took a look at the glass jars and decided perhaps he didn't want that kind of fill, then the material was taken to North Woburn.

So there was some ore dumped in North Woburn, the DOE said, but nothing to worry about. Even so someone will run some tests up there the next time we have a team in that area sometime with the next year.

The man who had remembered the glass jars was at the U.S. FDA Health Lab in Winchester. All stories lead back to where they began, it seems.

A call was placed. "What can you tell me about the glass jars that were disposed of in the Woburn dump? What kind of ore? Was it refined? Tailings?"

"Well actually the person you should talk to about that is Mr. Bernat."

When Edward Bernat was asked about the glass pint jars he seemed surprised.

There were drums of ore stored in the backyard when the facility closed down, he said.

"How many? Two? Five?"

"No. More than that. There was about 50. I can't be sure, but there were approximately that many. We got a dump truck and they were emptied and transported up to the dump on (New) Boston Street. We took all our stuff up there."

Mr. Bernat did not recall any army personnel ever being involved in any of the operations in Winchester.

Fifty, 55-gallon barrels of uranium ore. It had taken a month to get to the answer, but the army personnel still remain a mystery.

Were there ever any at the dump disposing of anything?

There's no answer yet.

Meanwhile, the officials at DOE in Oakridge, when told there were 50 drums of ore, not 50 glass jars, decided it was still safe, but there should be more priority given to the planned testing.

They'll be up within a month they said.

(The likelihood is that much of the information I had been seeking about the dumping of the uranium ore was classified. The Soviet Union was still the "Evil Empire," and release of any research involving radiation and uranium was considered a possible threat to national security. It was more than a decade later that some early research on radioactivity was released, including a study done on the effects of radioactive isotopes mixed into the food given a number of retarded children at the Fernald School in Massachusetts -- without their knowledge. In the light of that vile study, how much of what the government tells you can you actually believe? Eventually, state officials did come out and test the area in North Woburn where the dumping of the ore had taken place. They also tested the cellars and homes of all of the families who had children with leukemia. All of the radiation levels were found to be normal, given the naturally higher background radiation level of the granite in the area -- which was a great relief. But it also failed to solve the mystery. What was causing the elevated levels of leukemia? And, if anyone actually did see army personnel dumping something, what was it?)

E-mail Charles C. Ryan for questions or comments.

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The Daily Times

Woburn Edition

October 12, 1979

This article originally appeared in
The Daily Times, Woburn, Mass., on the date indicated.

Low-grade uranium ore dumped in North Woburn

(There was an apparent elevated level of childhood leukemia in the city of Woburn that, up to this point, had not been confirmed. There were only two known causes of leukemia at the time: Benzene - at industrial exposure levels at certain leather factories; and radiation -- as the surviving victims of Hiroshima and Nagasaki so horribly proved. Thus it was very chilling when a member of Woburn's City Council claimed that radioactive material had been dumped in the city by a bunch of soldiers. This was a story that, even though it was mentioned at a public meeting, couldn't be printed without some kind of hard confirmation or a real hysteria could have erupted in the city. But if it proved true, then it might also provide an explanation for the elevated levels of leukemia. There was bad news ... and good news.)



By **CHARLES C. RYAN**

WOBURN - Sometime in 1960, about fifty 55-gallon drums of low-grade uranium ore were disposed of in the old Woburn dump off New Boston Street, according to an employee of the U.S. Food and Drug Administration (FDA).

Experts at the U.S. Department of Energy, the Nuclear Regulatory Commission and Food and Drug Administration, however, indicate that the uranium ore should not constitute any health hazards, as it is normally no more radioactive than New England granite.

Even so, Lee Keller, Director of Technical Services at the Department of Energy's Nuclear office in Oakridge, Tenn., told the Daily Times they will

inspect the site where the ore may have been dumped within a month.

It will not be all that easy to identify where the material was dumped for several reasons.

According to Edward Bernat of the U.S. FDA Health Lab on Holton Street at the Woburn-Winchester line, when the ore was disposed of, it was taken out of the 55-gallon drums in which it had been stored and placed into the back of a dump truck and then hauled up to the New Boston Street dump.

"We were dumping all of our stuff up there," he recalls.

But, even if the uranium ore was dumped at the old dump - operated by Allstate Sand and Gravel Co. under a lease to the city of Woburn at the time - it may not still be there.

In the 1960's the land in question, along with a great deal more land in the same area, was acquired by the Woburn Redevelopment Authority (WRA) to create the Woburn Industrial Park.

According to WRA Executive Director Ralph Bergman the old landfill material was excavated and hauled off the old dump site in October and early November of 1973 in order to bring the land down to the grade level of the B&M railroad line which runs along the easterly side of the Woburn Industrial Park.

"All of the fill material they used to burn rubbish back when the dump was operating was hauled up to the new dump on Merrimac Street," Bergman recalls.

The fill material was transferred to the new city dump site around the same time that the new dump road was being constructed and some of the fill may have gone into that, he believes.

"At no time was anyone in city government or anyone with the WRA aware that uranium ore had been disposed of at the Woburn dump.

Atomic Energy Commission

As far as the Daily Times has been able to determine the facility in nearby Winchester which is now operated by the FDA was originally built by the Atomic Energy Commission (AEC) around 1950 to 1951.

The facility was then occupied by American Cyanamid Corporation which, under a contract with the AEC, attempted to devise more efficient methods of extracting uranium from low-grade American and Canadian ore. (American and Canadian ores are not high grade ores. It is the high-grade ore, called pitchblende, which is largely mined to extract reactor and weapons grade uranium).

A subsidiary assignment of the contract the AEC gave American Cynamid was to determine the health hazard - if any - which might exist in the ore tailings (the material left after the uranium is extracted).

Sometime in the 1950s the contract was passed from American Cynamid Corporation to National Lead Laboratories (which among other things, makes Dutch Boy paint).

Until 1960, National Lead conducted the same kind of research as American Cynamid did, experimenting with methods of extracting uranium from the low-grade ores available in this country.

According to Carl Eifert, of the U.S. Department of Energy in Washington, National Lead's contract was phased out, and in 1961, the U.S. Department of Health, Education and Welfare took over the facility and operated a public health service there which was assigned to monitor and detect minute amounts of background radiation occurring in the atmosphere, food, water and milk as a result of the testing of atomic bombs.

Around 1971, public health moved out and the FDA took over the operation, conducting similar testing and samplings of food, water, atmosphere and suspected materials.

According to Paul Bolin, current Director of the FDA facility, the lab in Winchester was one of those responsible for monitoring the background radiation during the Three Mile Island accident in Pennsylvania.

Bolin explained that each year, on a routine basis, the lab takes dietary samples of average citizens from 12 test points in the country and measures the residual radiation counts.

The facility also regularly looks at manufactured items such as microwave ovens, X-ray machines, color televisions and other goods which could possibly emit radiation and conducts tests to make sure they work correctly.

According to Dr. Eifert at the Department of Energy, a government survey team visited the Winchester facility in 1977 and gave it a clean bill of health, except for one or two laboratory hoods, which were taken out and disposed of.

How safe is it?

"We had to test the facility too, before we came in here," explains FDA Lab Director Bolin. "We do tests for very low level radiation and if the background count was anything beyond normal we couldn't conduct those tests."

Woburn Board of Health member, Dr. David Fitzpatrick agrees. Before taking up practice as a doctor of internal medicine in Woburn, he worked for the Public Health Service for two years at the Winchester Laboratory.

"I remember learning that when they had to make a whole body counter, they had to take the iron from the Battleship Arizona, which was sunk at Pearl Harbor, to make sure the refined iron was free of radiation."

Dr. Fitzpatrick explained and other federal experts confirmed that since the dropping of the A-bomb on Nagasaki and Hiroshima and the A-bomb tests conducted in the late '40s and early '50s, most metals have a higher radiation count than desired for such sensitive tests.

Most of the experts consulted by the Daily Times have indicated that the uranium ore does not constitute much of a health hazard, if any.

In terms of direct radiation, it is safe, as safe as much of the granite in this area of New England.

But it is not the direct radiation which might pose a problem. Uranium breaks down. It is not a stable element. The next step down from uranium is radium and radium, itself is also unstable. Radium emits radon gas as it breaks down and radon gas can, in high enough concentrations, constitute a health hazard.

Dr. Bolin at the Winchester FDA facility believes that any radon gas given off by the uranium ore would disperse and be safe.

Arthur Whitman, with the Department of Energy in Washington agrees that is normally the case, but not always.

In Canonsburg, Pa., an industrial park has been built on top of a disposal site for uranium ore tailings and recent tests there show a higher than normal radon count, he said.

The uranium ore there, however, was a much higher-grade ore than the ore which was experimented on in Winchester.

Sitting on uranium?

The problem arises, Whitman said, when a building is constructed on top of the ore because it then traps the radon gas in much higher concentrations than would occur if the landfill were open to the weather.

Even then, the levels of radon gas from the kind of ore used in Winchester is likely to be very low, if detectable.

If the ore was not moved from the location of the old dump on New Boston Street, there is a very slight chance that an industrial building may be sitting on top of it.

According to the Woburn Redevelopment Authority, several buildings have been built around the old dumpsite, though the major, central section of the dump is not yet covered.

At the north end of the dump site, Continental Chemical & Coating Co. constructed a building at 219 New Boston St. in 1972, about a year before the rest of the dump material was excavated in 1973.

In 1976 Insul-tab was built on a medium sized hill in the middle of the old dumpsite.

In 1976 and 1977, two buildings were erected by William Cummings on either side of Roessler Road, located along the northwesterly side of the old dump.

In 1978 Usen Corporation built a facility on top of a ledge outcropping in the middle of the old dump, and also in 1978 Grillco Company constructed a building on the old dumpsite.

Presently, Mansco Corporation is constructing a building for Atlantic Plywood Co. in the middle of where the old dump was formerly located before the fill material was excavated.

How many millirems?

What few people realize is that we are all exposed to various forms of radiation each year from various sources.

In fact, the average person breathes in about 50 millirems a year from radioactive radon and other, daughter gases, emitted from the earth's crust. We each pick up another 50 millirems a year from solar radiation, and ingest another 20 millirems from the food and water we eat and drink.

In some areas of the country, the radiation levels are much higher than others. Colorado, for instance, receives much higher radiation from cosmic rays than New England. New England granite, on the other hand, gives off more radiation than other soil and rock samples, according to Dr. Kenneth Skrable at the University of Lowell's Nuclear Office.

Oddly enough, Skrable explained that persons who are turning to solar power and tightly insulating their homes may be exposing themselves to much higher radiation by doing so than persons living near a nuclear power plant.

He said a recent study done in Chicago showed some tightly insulated homes with no seals on their cellar floors, had radioactive gas levels as high as the maximum allowed uranium miners, as high as 50,000 to 100,000 millirems a year.

Without proper ventilation in a house, the naturally occurring radioactive gases given off by the earth's crust tend to collect.

Those gases, he said, are also water-soluble and wells in Maine have been found to contain very high concentrations of radon gas -- higher than the

levels allowed by the EPA (Environmental Protection Agency).

The uranium ore in question, particularly if it is spread out over an area of either the old dump site or the new dump in North Woburn, is not likely to approach those levels of exposure at all.

Paul Bolin at the Winchester Lab, in fact, feels that the millirem levels may only be around 50 a year.

(Statistically a person whose entire body is exposed to 1,000 millirems in a year will increase the likelihood he or she may contract cancer by one in 10,000 in their lifetime, according to Lowell University's Dr. Skrable, who is considered an expert in the area of naturally occurring radiation.

E-mail Charles C. Ryan for questions or comments.

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JANE SWIFT
Governor

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Metropolitan Boston – Northeast Regional Office

2002 FEB - 6

TO THE ATTORNEY GENERAL
PLANNING & CONSERVATION

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

FEB 01 2002

Olin Corporation
P.O. Box 248
1186 Lower River Road, NW
Charleston, TN 37310
ATTN: Stephen Morrow

RE: Wilmington
Olin Chemical
51 Eames Street
RTN 3-0471
**Additional Phase II Investigations of the East Ditch;
Conditional Approval, Additional
Investigation Requirements**

Dear Mr. Morrow:

On October 12, 2001 the Department of Environmental Protection (DEP) received a Scope of Work entitled "Additional Phase II Investigations of the East Ditch." The Scope of Work (SOW) was prepared on behalf of the Olin Corporation by Harding ESE, Inc. with the assistance of Gecmega, Inc., and was reviewed by Margret Hanley, the Licensed Site Professional of Record. The SOW describes additional investigation activities that will be completed to define the nature and extent of contamination in the East Ditch that can be attributed to past activities at the Olin Property.

BACKGROUND

The Olin Property in Wilmington is a former chemical manufacturing facility that has been owned and operated by various companies since the early 1950's. Olin is in the process of investigating the extent of contamination from prior releases at the Property, in accordance with the Phase II Site Characterization requirements in the Massachusetts Contingency Plan. Chemicals of concern that may have entered the East Ditch from the Olin Property include the inorganic chemicals ammonia, chromium, sulfate, chloride and sodium, and the organic compounds n-nitrosodiphenylamine, phthalates, and trimethylpentenes. A chromium-containing floc is also known to migrate into the East Ditch from the Olin Property via surface water flow from the South Ditch.

PHASE II EAST DITCH SCOPE OF WORK

The East Ditch is a narrow and shallow surface water drainage ditch that flows along the east side of the Olin property through a heavily industrialized area. Surface water drainage from the Olin property enters the East Ditch approximately 3/8 mile south of Eames Street. The East Ditch continues to flow to the South and turns into the New Boston Street Drainway, which was addressed as part of cleanup activities for the Industri-Plex Site. The New Boston Street Drainway flows South and discharges into Hall's Brook, then into Hall's Brook Holding Area, and eventually into the Aberjona River.

Olin proposes to complete the following investigative activities in order to assess the extent of their potential contribution to sediment and surface water contamination in the East Ditch:

- Additional assessment of sediment and surface water quality will be performed in the unculverted portions of the East Ditch to the east and south of the Property. Sediment and surface water samples will be collected upstream and downstream of the confluence with the South Ditch, and analyzed for contaminants of concern.
- An ecological characterization will be performed to identify potential ecological receptors that are present in the East Ditch. Aquatic populations will be sampled, evaluated, and compared to background areas in order to determine the degree of impairment.
- The bioavailability of floc, and its potential impact on ecological receptors in the East Ditch and at downstream environments, will be evaluated.
- The information collected as part of this investigation will be used to update both human health and ecological risk characterizations for the East Ditch.

CONDITIONAL APPROVAL

DEP believes that further investigative work is necessary to determine the extent of contamination in the East Ditch from releases from the Olin Property, and the potential for this contamination to impact human health and environmental receptors. DEP approves of the SOW for the Supplemental Phase II Investigation, but the following activities also must be completed:

- In order to define the full extent of contamination in the East Ditch, surface water and sediment samples must be collected in the New Boston Street Drainway (and potentially further downstream) and analyzed for the contaminants of concern. DEP is concerned that the New Boston Street Drainway, which was remediated by 1998 as part of the cleanup of the Industri-Plex Superfund site, may have become recontaminated from releases from the Olin property to the East Ditch.
- The information collected must be used to complete human health and ecological risk characterizations for the additional areas investigated.
- All of the additional data must eventually be included in human health and ecological risk characterizations which address conditions for the entire site.

DEP understands that one year is required in order to evaluate chemical and ecological conditions in the East Ditch during a range of seasonal conditions, so a summary report describing the results of all of the information collected during completion of the Phase II SOW for the East Ditch must be submitted to DEP within one year of the date of this letter. However, parts of the investigation should be completed more quickly. Therefore, a report summarizing the results of the sediment sampling must be submitted to DEP within three months of the date of this letter, and a report summarizing investigations completed to determine the bioavailability of the floc must be submitted to DEP within six months of the date of this letter. Please be advised that these dates are being established as an Interim Deadlines, pursuant to 310 CMR 40.0167.

FORMER DRAINAGE DITCH AND NORTH POND – INVESTIGATION REQUIRED

The 1955 aerial photograph included in the Phase II SOW for the East Ditch shows a surface water drainage ditch, which travels from west to east across the Olin property and discharges into the North Pond. The surface water drainage from the Olin site discharged into the North Pond via this ditch

for an unknown period of time, although Olin indicates that this drainage ditch was not evident in a 1963 aerial photograph of the area. The extent to which contamination from the Olin property migrated to the East in these water bodies needs to be investigated. Surface water and sediment quality samples must be collected from the North Pond. In addition, a soil boring and soil sampling program will be necessary to

determine if contamination still exists in areas of the former drainage channel and the North Pond which were filled in the 1970's to make way for the development of Presidential Way and the Bay State Bindery facility.

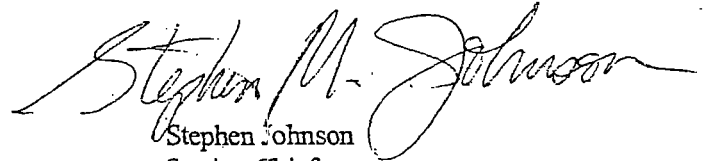
A supplemental Scope of Work must be submitted to DEP to address the additional activities listed above. The supplemental Scope of Work must be submitted to DEP for review within 90 days of the date of this letter. Please be advised that this date is being established as an Interim Deadline, pursuant to 310 CMR 40.0167.

Your cooperation in this matter is appreciated. If you have any further questions regarding this matter, please contact Christopher Pyott at (978) 661-7739 or at the letterhead address.

Very truly yours,

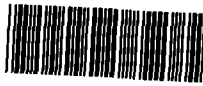


Christopher Pyott
Environmental Analyst
Site Management



Stephen Johnson
Section Chief
Site Management

cc: Wilmington BOH
Wilmington Water Department
Wilmington Conservation Commission
Data Management: SOW
DEP/NERO/Water Supply, Attn: Jim Persky
DEP/NERO/BWSC, Attn: John Fitzgerald, Regional Engineer
Sleeman, Hanley, & DeNitto, 63 St Botolph Street, Boston, MA 02116
Attn: Margaret Hanley
Geomega, 2995 Baseline Road, Suite 202, Boulder, CO 80303, Attn: Andy Davis



SDMS DocID 240373

Industri-Flex
5,3
240373



Paul Medeiros
<paulderman@prodigy.net>
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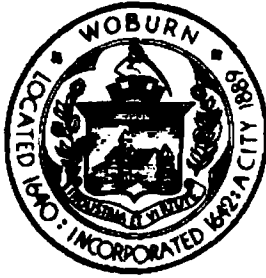
To Joe Lemay/R1/USEPA/US@EPA
cc William Campbell <WCampbell@cityofwoburn.com>, Joanna
Gonsalves <jgonsalv@comcast.net>, John Ciriello
<jcirie4188@aol.com>, Thomas McLaughlin
bcc

Subject City Council Comments

Joe
Please accept this attached document as the comment on behalf of the Woburn
City Council.
Thanks
Paul A. Medeiros
City Council President
9 Marietta Street
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Draft Letter to EPA from City Council 11-05 Comments.doc



Woburn City Council
City Hall
10 Common Street
Woburn, MA 01801

November 17, 2005

Joseph F. LeMay
U.S. Environmental Protection Agency
One Congress Street
Suite 1100 (HBO)
Boston, MA 02114
Lemay.joe@epa.gov

Re: Comments about EPA's October 2005 Supplement to the Proposed Clean-up Plan for the Industri-plex Superfund Site, Woburn, MA (Operable Unit 2 and Wells G&H Operable Unit 3) (the "Draft Feasibility Study" or the "Proposed Plan")

Dear Mr. LeMay:

Consistent with our correspondence to you dated August 31, 2005, the Woburn City Council cannot endorse the original or supplemental proposals preferred by the U.S. Environmental Protection Agency (EPA) for clean-up of the Industri-plex Superfund Site, Woburn, MA (Operable Unit 2 and Wells G&H Operable Unit 3) (the above-referenced Proposed Plan).

The City Council is very disappointed that the EPA has failed to respond to our numerous appeals for more time and technical support (or at the very least, sufficient time to arrange for the necessary technical support). The EPA's decision to issue a supplemental technical memorandum and re-open the public comment period on October 18, 2005 for another thirty-day period has only served to increase our disappointment and frustration with the EPA's approach to this clean-up. It is obvious that EPA could easily have listened to our pleas and kept the public comment period open until November 18, 2005 and thus allowed the City Council the reasonable opportunity to find outside resources we desperately need to assist us providing meaningful review and comment on the Proposed Plan. We believe that the agency's responses and actions to date suggest that EPA does not view the City of Woburn as a significant or important stakeholder in the Proposed Plan. In fact, the City of Woburn is one of the most critical stakeholders involved in the clean-up process whose role must be recognized and respected for the following reasons:

- We are elected to represent and protect the citizens of Woburn. As such, we are responsible for making sure that such an important clean-up plan is the right plan for our community. EPA is always promoting community involvement and, according to your own guidelines, you are supposed to, “Work closely with state, tribal and local governments to encourage, coordinate and improve public involvement activities...”¹ Again, “Community Acceptance,” is one of the criteria EPA uses to select a remedy for any superfund site. Therefore, the City of Woburn, by EPA’s own guidelines and policies, should be regarded as a major, central stakeholder to the Proposed Plan and deserves to be recognized as such.
- As a body, through existing and newly created Committees and Sub-Committees, the Woburn City Council has been actively involved in the clean up and redevelopment of the Industri-plex Superfund Site since it began in the early 1990’s. We’ve created the Industri-plex I-93 Committee and reviewed numerous aspects of the redevelopment from re-zoning to special permits. The Council has also hosted a number of special meetings to address ongoing questions and concerns about various aspects of the clean up—ranging from the use of clean fill from Dear Island to the status of the clean up of the Aberjona River. As individuals we have also been intimately involved in such organizations such as FACE (For A Cleaner Environment), ASC (Aberjona Study Coalition) and WREN (Woburn Residents Environmental Network). Our point is that, we are a knowledgeable, informed and involved group and we have been since the beginning. We only ask for the time and the resources to review this critical final step in this process that has spanned many years. This seems reasonable. If EPA will not grant us the resources we’ve asked for, then at least give us the time to find the resources on our own, but please do not continue to deny us both.
- EPA has proposed institutional controls as part of the Proposed Plan. As stated in our August 31 letter, “the City has never been included in the EPA’s discussions and communications about these Institutional Controls, nor has the EPA taken the time to explain what, according to TOSC, will be a complex land use restrictions that will necessarily involve local government.” Since it was incorporated in 1642, the City of Woburn has been responsible for regulating and enforcing land use within our community. Therefore, we ought to be included in any review and discussion about any major new land use restrictions. Yet we have no information at all about the institutional controls you have already completed for the Industri-plex Site, and we fear the negative impacts of more institutional controls included in the Proposed Plan, since two of our largest commercial landowners have said that these institutional controls will reduce their property values and hurt Woburn’s tax base. They also advised that their properties need not be stigmatized with superfund since the same land use restrictions could be implemented by working with the Massachusetts DEP, which we support. In any case, the City of Woburn will be significantly impacted by and should have a major role in any decision or plan for institutional controls and we deserve to be included in the process. EPA’s Proposed Plan calls for permanent land use restrictions that must be regulated and enforced. Having been here since 1642, the City of Woburn is going to still be here in 2142. Even the EPA cannot make that guarantee.
- As you are aware, the City of Woburn owns two of the parcels that EPA has included in the Proposed Plan—the Wells G&H wetland area and the Cranberry Bog Conservation Area as

¹ EPA Public Involvement Policy, Guidance for Implementing Public Involvement Policy, May 2003.

well as the roadways and sidewalk areas in the area. We may even own some other parcels in the proposed plan area that I am unaware of at this time without some research. While we understand that EPA has committed to the City harmless from liability, as a landowner, we believe we are a significant stakeholder!

It seems clear that EPA will not grant the City the external peer review it has been requesting for the last three years. And while we are grateful to the folks from the University of Connecticut, the TOSC program is not an independent technical review that in any way approaches the level of scientific or technical support we need to assist us in evaluating the Proposed Plan. Clearly TOSC is another under-funded federal program, as evidenced by the fact that it takes more than a week to get a phone call returned from the TOSC personnel. During a thirty-day comment period, a full week makes a huge difference. Also, the time that TOSC has spent on reviewing the Proposed Plan has been very limited, as is obviously reflected in their two pages of comments (compared to the thirty pages of comments EPA received from the Aberjona Study Coalition or many of the private parties who have retained outside experts). You said that TOSC is "a resource that's inclusive of our superfund process and there to help them [the City] review and understand the documents. And that's how the City of Woburn has used the TOSC group," which you characterize as an "independent technical review."² TOSC has never been able to help the City review and understand the Proposed Plan because, at the very least, they have not had sufficient time or resources to do so. The City has worked with TOSC because that is the only choice you have afforded us, not because the program is in any way adequate for the job at hand. Therefore, since EPA has not and is unlikely to give the City the critical technical support it needs to review and understand the Proposed Plan, the EPA must allow the City sufficient time to make arrangements for its own technical support. There is no justification for denying this request, since you have offered no credible explanation for closing the public comment period on August 31, 2005 or for closing it again on November 18, 2005. These are arbitrary dates that do not relate to the protection of public health and the environment. The City Council urges the EPA to stop setting these arbitrary deadlines and, rather, to sit down and talk to us because we are a major, important stakeholder and we need to be involved in how this whole clean up can best proceed. We believe that this is the only way to make real meaningful progress.

Again, within the severe limitations on time and resources, the City Council has worked with TOSC on preparing limited comments on the Proposed Plan, which has been sent by Chris Perkins via e-mail on behalf of the City Of Woburn. However, please understand that the TOSC comments do not necessarily reflect the views of the City, since we (the Woburn City Council) because of time constraints were not given an opportunity to review/comment on the document that was submitted to EPA.

We respectfully request your consideration of all the points raised in this letter and look forward to meeting with you at the earliest possible opportunity so that real progress can be made on the final clean-up plan for the Industri-plex and Wells G&H sites. Thank you in advance for your time.

Sincerely,

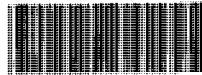
² Statements made to *Woburn Daily Time Chronicle* by Joseph LeMay, September 2, 2005.

WOBURN CITY COUNCIL

By: _____
Paul M. Medeiros, City Council President

Enclosures

cc: The Honorable Edward Markey, US Congress House of Representatives
The Honorable John Kerry, US Congress Senate
The Honorable Edward Kennedy, US Congress Senate
Senator Robert Havern, Fourth Middlesex District
Representative Jay R. Kaufman, Fifteenth Middlesex District
Representative Patrick Natale, Thirtieth Middlesex District
The Honorable John Curran, Mayor, City of Woburn
Woburn City Councilors:
Alderman Charles E. Doherty, Ward 1
Alderman James E. McSweeney, Ward 2
Scott D. Galvin, Alderman Ward 3
Alderman William N. Booker, Ward 4
Alderman John A. Ciriello, Ward 6
Alderman Thomas L. McLaughlin, Ward 7
Alderman-at-Large Paul J. Denaro
Alderman-at-Large Joanna Gonsalves



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ROPES & GRAY LLP

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November 18, 2005

Paul B. Galvani
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paul.galvani@ropesgray.com

BY ELECTRONIC MAIL AND REGULAR MAIL

Joseph F. LeMay
Remedial Project Manager
US EPA -- New England
One Congress Street, Suite 1100 (HBO)
Boston, MA 02114-2023

Re: Comments from Stauffer Management Company, LLC to EPA's Reopening of the Public Comment Period for the MSGRP Study Area

Dear Mr. LeMay:

Enclosed please find Comments submitted by Stauffer Management LLC ("SMC") in response to EPA's reopening of the public comment period for the Proposed Plan for the cleanup of the MSGRP Study Area ("the Study Area"). SMC reiterates and incorporates by reference all comments it has previously submitted, including but not limited to those submitted on August 31, 2005.

Inexplicably, EPA has now reopened the public comment period because of putative ammonia contamination at the Study Area. Although EPA claims that it has known about ammonia all along, and states that its Proposed Plan already addresses ammonia adequately, it nonetheless states that ammonia "is now being highlighted as a contaminant of concern." It is apparent that EPA has latched onto ammonia as a pretext to reopen the public comment period in the face of the hue and cry from politicians and others about the unacceptably brief public comment period previously set. The presence of ammonia apparently will be relied upon by EPA as further support for selection of its predetermined Proposed Plan, regardless of the flaws that SMC and others have identified in the Plan—flaws which render EPA's remedy selection arbitrary, capricious, and otherwise not in accordance with law, and flaws which are not mended merely by adding ammonia as a contaminant of concern.

As the enclosed Comments make clear, however, ammonia does not pose a real problem at the Study Area, and should not be relied upon by EPA as support for selection of its Plan, for several reasons. First, the ammonia measurements relied upon by EPA to identify ammonia as a contaminant of concern do not establish that ammonia levels exceed the EPA's chronic criterion

in a consistent, statistically significant fashion (Comments § 2.2). Second, almost all of the ammonia identified in the groundwater within the Study Area would be in the form of ammonium ion, rather than ammonia, which is significant because ammonium ion does not present a risk to human health (Comments § 1.2). Third, as SMC has emphasized repeatedly, any risk to human health from any of the contaminants identified by EPA, including ammonia, is based on absurdly unrealistic exposure scenarios. When more realistic exposure scenarios are employed (Comments §§ 1.2-1.5), no risk to human health is presented. Fourth, with respect to the putative ecological risk presented by contaminants in the HBHA Pond, including ammonia, EPA once again ignores the fact that the Pond was never meant to function as an ecological habitat, but was instead meant to serve only as a stormwater retention device (Comments § 2.1). This principal function of the Pond as a flood control mechanism will be severely impaired by EPA's Proposed Plan.

Furthermore, EPA has completely failed to investigate the source of the ammonia, just as it has failed to investigate the source of the arsenic, even though it has listed many arsenic sources in its Remedial Investigation Report and Feasibility Study. Instead, EPA has identified only buried animal hides as a potential ammonia source. Surely, EPA is aware of the many other sources or potential sources of ammonia in the area, including several upgradient sources. SMC insists that EPA investigate *all* sources of hazardous substances to be remediated. EPA appears to acknowledge its responsibility to do so when it states, in the Fact Sheet announcing the reopening of the public comment period, that “[a]dditional pre-design investigations would be necessary to further understand ammonia background conditions.” The fact that EPA proposes to adhere to its original Proposed Plan, even as it acknowledges that further investigation of the nature and source of putative ammonia contamination is necessary, is further evidence of the arbitrary and capricious nature of EPA's conduct.

As demonstrated in SMC's August 31 submission, the alternative remedial plan submitted by SMC and the Pharmacia Corporation is far superior to EPA's Proposed Plan. This is true with respect to putative ammonia contamination, no less than other contaminants. EPA has done nothing to address the comments on its Proposed Plan, despite the serious flaws in the Plan. For EPA to fail to address such comments or the alternative remedial plan submitted by SMC and Pharmacia, and instead to rely upon the new-found “concern” about ammonia to ratify its predetermined remedy choice, is arbitrary, capricious, and otherwise not in accordance with law.

SMC reserves the right to comment on, or challenge, other “evidence” or commentary concerning the Proposed Plan, including in the pending legal proceedings.

ROPES & GRAY LLP

Joseph F. LeMay

- 3 -

November 18, 2005

Very truly yours,

A handwritten signature in cursive script that reads "Paul B. Galvani".

Paul B. Galvani

Enclosures

cc: Luke W. Mette, Esq.

GRAY LLP



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Timothy J. Casey

FILE

INITIALS

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"Casey, Timothy J."
<Timothy.Casey@ropesgray.com>

11/18/2005 02:24 PM

To Joe Lemay/R1/USEPA/US@EPA

cc luke.mette@astrazeneca.com, "Galvani, Paul B."
<Paul.Galvani@ropesgray.com>

bcc

Subject Comments by Stauffer Management Company LLC to EPA
Reopening of Public Comment Period for MSGRP Study
Area in Woburn, MA

Mr. LeMay:

Attached please find electronic versions of the comments submitted by Stauffer Management Company LLC to EPA's re-opening of the public comment period for the MSGRP Study Area in Woburn, Massachusetts. Hard copies of all of the attached materials will be placed in the mail today.

Please do not hesitate to contact me if you have any difficulty reading any of the attached materials.

Very truly yours,

Tim Casey

<<Cover Letter.pdf>> <<Comments.pdf>> <<Figure 1-1.pdf>> <<Figure 3-1.pdf>> <<Figure 4-1.pdf>>
<<Table 2-1.pdf>> <<Table 2-2.pdf>> <<Table 2-3.pdf>> <<Table 3-1.pdf>> <<Table 3-2.pdf>>
<<Table 3-3.pdf>> <<Table 4-1.pdf>>

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Cover Letter.pdf Comments.pdf Figure 1-1.pdf Figure 3-1.pdf Figure 4-1.pdf Table 2-1.pdf

Table 2-2.pdf Table 2-3.pdf Table 3-1.pdf Table 3-2.pdf Table 3-3.pdf Table 4-1.pdf

1.0 Comments on Human Health Risk Assessment

This section presents comments on the human health risk evaluation included as Section 4.1 of the Draft Final Technical Memorandum, Evaluation of Ammonia and Supplemental Soil Data, Remedial Investigation/Feasibility Study, Industri-Plex Site, Woburn, Massachusetts, October 2005. These comments were prepared by Dr. Lisa J.N. Bradley, DABT, Senior Toxicologist, ENSR International and Dr. Barbara D. Beck, DABT, FATS, Principal, Gradient Corporation.

1.1 Comments on Groundwater Exposure Scenarios

The U.S. Environmental Protection Agency (USEPA) has based the human health risk evaluation of ammonia in groundwater on the car wash scenario used in the Baseline Risk Assessment (TtNUS, 2005), stating that it is the more conservative of the two groundwater use scenarios evaluated in the Baseline Risk Assessment (car wash and industrial process water use). The Pharmacia Corporation and the Stauffer Management Company LLC would like to reiterate the following comments made in their August 31, 2005 submittals to USEPA:

- No risks or hazards should be calculated for the use of groundwater in a car wash because City of Woburn zoning and land use restrictions make this an incomplete exposure pathway. Consequently, this exposure scenario should not be included in the risk assessment.
- No risks or hazards should be calculated for future use of groundwater as industrial process water because the special permits are required for well installation in the City of Woburn and the fact that wells can not be installed on hazardous waste sites make this an incomplete exposure pathway. Consequently, this exposure scenario should not be included in the risk assessment.

The Massachusetts Department of Environmental Protection's (MADEP) Groundwater Use and Value Determination for the Site and study area supports a low use and value of the groundwater (see Appendix 6M of the MSGRP HHRA, TtNUS, 2005). In addition, the MADEP has also provided a classification of the groundwater as a Non-Potential Drinking Water Source Area.

Based on a discussion with Mr. John Fralick, a Health Agent of the Woburn Health Department, special permits are required for well installation within the City of Woburn. The following observations were provided by Mr. Fralick:

- Wells and the use of city water are mutually exclusive;
- Special permits are required for well installation; and
- Wells should not be installed on hazardous waste sites; there are approximately 250 hazardous waste sites in Woburn.

Based on this information, it is entirely unlikely and unreasonable to assume that well water would be used for any purpose within the Industri-Plex Site and the MSGRP study area. Therefore, the future groundwater use scenarios - industrial worker process water use and car wash worker - should not have been included in the MSGRP HHRA, nor in the risk assessment in the Draft Technical Memorandum as exposure to groundwater used for industrial or commercial purposes is not a realistic exposure pathway.

Were USEPA to make the far more reasonable assumption that use of groundwater as industrial process water or as car wash water will not occur in the future, no risks or hazards would be calculated for these scenarios.

1.2 Comments on Car Wash Exposure Scenario

Based on existing administrative controls, a car wash scenario using groundwater should not be included in the MSGRP HHRA. Nonetheless, because USEPA continue to employ this unrealistic scenario, it is necessary to point out specific problems with the scenario as constructed by USEPA. The zoning map (Figure 1-1) and supporting information for the City of Woburn (City of Woburn, 2004) indicate that the area encompassed by the Industri-Plex Site and the MSGRP study area are zoned B-I (Business Industrial), I-P (Industrial Park), IP2 (Industrial Park) and OS (Open Space). Use of a property as a car wash is prohibited in areas zoned I-P, IP2, and OS (City of Woburn, 2005). Only two small areas are zoned B-I, and for this zoning designation, possible use as a car wash requires a special permit. The two B-I areas are:

- **B-I #1: Woburn Mall and Lowes** - The area bounded by the southern-most portion of the Halls Brook Holding Area (HBHA) to the west, Mishawum Rd. to the south, and Commerce Way to the east, and extending north of Mishawum Rd. approximately 1000 feet (this is basically the area covered by the Woburn Mall and Lowes on the north side of Mishawum Road and the Hampton Inn, Fairfield Inn, 99's Restaurant, D'Angelos Restaurant, Toys 'R Us and the Scrub-a-Dub car wash on the south side of Mishawum Road); and
- **B-I #2: Target and Phillips Pond** - The area bounded to the east by Interstate 93, bounded to the north by the Regional Transportation Center (RTC) exit/entrance to Interstate 93, extending approximately 700 feet south on Commerce Way, and from there, east to the terminus of Commonwealth Ave. The BI designation also includes the area between Interstate 93 and Commonwealth Ave (approximately 700 feet south along Commonwealth Ave.) that encompasses Phillips Pond.

Therefore, there are only two locations within the Industri-Plex Site and the MSGRP study area where car washes could be located, and only by special permit. Given the fact that a car wash (the Scrub-a-Dub) is already present in one of them (B-1 #1), it is highly unlikely that a second car wash would be constructed in the B-1 #1 zoned area in the MSGRP study area north of Route 128/I-95 or in the B-1 #2 zoned area in the Industri-Plex Site, which is occupied by the Target retail store and its parking lot. It is even more unlikely that the City of Woburn would issue a special permit for installation of a groundwater supply well in an area of impacted groundwater or ignore its limitations on installation of water supply wells on hazardous waste sites, especially since the Scrub-a-Dub car wash uses municipal water. The car wash exposure scenario is made even more inappropriate by the fact that the only two zoning areas where car washes would be allowed are outside the ammonia plume defined by the Agency. For these reasons, the car wash exposure scenario should not be included in the risk assessment.

USEPA used a 95% upper confidence limit (UCL) concentration of ammonia in groundwater of 316 mg/L in their risk calculations. If only data from the B-1 zoned areas (all of which are from the B-1 #1 area) are used, the resulting 95% UCL concentration is 6.54 mg/L, which is two orders of magnitude lower than the USEPA value. If USEPA insists on including a car wash scenario in the risk assessment, this is the

groundwater concentration term that should be used in the air modeling.

In addition to using the appropriate groundwater concentration, USEPA must also consider the form of ammonia that is in the groundwater. USEPA's modeling does not account for the fact that below pH 9.25, ammonia exists largely as the ammonium ion (NH_4^+) in solution (Snoeyink and Jenkins, 1980). At pH 7.25, 99% of the ammonia in solution exists as NH_4^+ (ATSDR, 2004). This is a critical distinction because ammonium ion is not volatile and therefore would not be present in the air due to volatilization. At a groundwater pH of 7, less than 1% of the total ammonia in groundwater would be available for volatilization in a car wash as NH_3 . USEPA's shower modeling incorrectly assumes that all the ammonia in groundwater exists as NH_3 and is available for volatilization. However, the ammonium ion is highly soluble and does not volatilize from solution. We recommend that USEPA rerun the air modeling to address this issue. If the groundwater ammonia concentration is decreased to 1% of its current value, the total hazard index would be 0.85 instead of 85, even without correcting for all other problems with the modeling, which are discussed below. Consequently, ammonia non-cancer risk is below regulatory thresholds.

There are additional problems with the car wash/shower model, which are summarized below:

- A car wash is not an enclosed space; it has two wide openings for cars to enter and exit. Furthermore, modern day car washes are automated and a car wash worker does not stand in the direct spray area. If a worker is present at all, he or she would stand near the entrance or exit where he or she is exposed to fresh air. Thus the modeled air concentrations greatly overestimate the worker's exposure concentration.
- The exposure duration used for the car wash worker (25 years) is likely too high, based on USEPA occupational tenure estimates. A more reasonable value is 9 years, which is based on the median occupational tenure for all workers aged 35-39 years (USEPA, 1997b).
- Under the USEPA exposure scenario, the car wash worker is exposed to the modeled air concentration for 8 hours/day. However, this is an overestimate of the amount of time that the worker is exposed to the modeled air concentration, since the worker does not stand in the direct spray area and may not even stand at the car wash entrance for 8 hours at a time. Furthermore, it is highly unlikely that cars are transiting the car wash on a constant basis. For these reasons, a value of 4 hours is more reasonable, although still very conservative.
- The air modeling using the "shower model" was done with model inputs for a residential bathroom, which are not appropriate for a car wash. This flaw resulted in inhalation risks that are too high as well as PRGs for groundwater that are too low.
- The MSGRP HHRA used a "shower volume" of 6 m^3 in its calculation for the car wash scenario. A more realistic estimate of the volume of a car wash is 1000 m^3 , based on an estimated car wash size of $90 \times 20 \times 15 \text{ feet} = 27,000 \text{ ft}^3$ or 1000 m^3 .
- Per the following website:
http://seattletimes.nwsources.com/html/makeitcount/2002410023_ecoconsumer31.html, it should be assumed that 45 gallons of water is used per car, and that the car wash trip takes one minute. The estimate of 45 gallons is the upper-bound for an automatic car wash. A car wash duration of 1 minute is assumed. This equates to a water flow rate of 170 L/min.
- Commercially available automatic car wash driers can be found on the following website: http://www.sonnysdirect.com/system_models_detail_660.html. The apparatus shown has 4 blowers working at 4000 ft^3 per minute (conservatively assuming 10 HP motors). Assuming this occurs within the $27,000 \text{ ft}^3$ car wash, the air exchange rate in the car wash would be 0.6 min^{-1} ($4 \times 4000 \text{ ft}^3/\text{min} \div 27,000 \text{ ft}^3$).

The effect of applying these more realistic exposure parameters to the car wash "shower model", as described in the following sections, is to decrease the predicted air concentrations by an order of magnitude from 37,000 ug/m³ to 1,200 ug/m³, and to decrease the non-cancer risk from 85 to 1. Use of these parameters in combination with the more appropriate groundwater concentration of 6.54 mg/L further decreases the predicted air concentration by three orders of magnitude to 32 ug/m³, and decreases the non-cancer risk from 85 to 0.04. Finally, if these more appropriate assumptions are used in conjunction with the form of ammonia actually involved, i.e., only 1% of the ammonia in groundwater would be in the volatile NH₃ form at pH 7 in groundwater, all of these values would further decrease by two orders of magnitude.

1.3 Comments on Car Wash Air Modeling

In the Draft Technical Memorandum, USEPA states: "For estimation of air concentrations in a warm water car wash, the shower model approach presented by Foster and Chrostowski...was assumed to be proportionally representative of conditions similar to a car wash" (emphasis added). As stated in the comments submitted previously by the Pharmacia Corporation and the Stauffer Management Company LLC, and reiterated above, the model inputs used by USEPA were not representative of car wash conditions and, therefore, the model results are not proportionally representative of car wash conditions. USEPA has a responsibility to the public to prepare a scientifically defensible risk assessment that uses site-specific and scenario-specific information upon which to base remedial decisions. To continue to apply the model with the shower inputs without providing concrete justification for the use of those inputs is inappropriate. The modeling should be revised using the model inputs previously provided by the Pharmacia Corporation and the Stauffer Management Company LLC and discussed in more detail below.

USEPA modeled groundwater vapor exposure to a future car wash worker using the Foster and Chrostowski Shower Model. USEPA used default inputs that are meant for a residential shower and bathroom; these inputs are not appropriate for modeling air concentrations inside a car wash. Furthermore, even if appropriate inputs are used to determine the air concentrations within the car wash building, a worker is not exposed to these concentrations since he or she is outside the car wash building.

These flaws resulted in predicted inhalation risks that are too high as well as PRGs for groundwater that are too low. Performing the air modeling with a revised groundwater concentration and revised shower parameters, and calculating risk with revised exposure parameters, even while using the very conservative assumption that a worker is inside the car wash, results in much lower calculated health risks. This section discusses the air modeling used to estimate ammonia air concentrations in the car wash, and the impact of using more appropriate model input values.

The model inputs shown in the following table are more appropriate for modeling exposure to a car wash worker. These model inputs were submitted in the Pharmacia Corporation and the Stauffer Management Company LLC comments on August 31, 2005 and are explained below.

Changes to the Shower Model Parameters

Shower Parameter	USEPA Value	Appropriate Value
Shower volume (m ³)	6	1000
Water flow rate (L/min)	10	170
Air Exchange Rate (min ⁻¹)	0.0083	0.6

USEPA used a "shower volume" of 6 m³ in its calculation for the car wash scenario. A more realistic estimate of the volume of a car wash is 1000 m³, based on an estimated car wash size of 90 x 20 x 15 feet = 27,000 ft³ or 1000 m³.

USEPA used a default water flow rate for the shower model of 10 L/min. However, the water flow rate for a car wash is higher than in a shower. An estimate of 45 gallons of water used per car is the upper-bound for an automatic car wash (http://seattletimes.nwsource.com/html/makeitcount/2002410023_ecoconsumer31.html). A car wash duration of 1 minute is assumed. This equates to a water flow rate of 170 L/min.

The shower model default uses an air exchange rate of 0.0083 min⁻¹ (equivalent to half the room volume per hour). However, a car wash, unlike a standard residential bathroom, has two wide openings for cars to enter and exit, which increases the air exchange rate. One example of a commercially available automatic car wash drier (http://www.sonnysdirect.com/system_models_detail_660.html) has four blowers working at 4000 ft³ per minute (conservatively assuming 10 HP motors). Assuming this occurs within the 27,000 ft³ car wash, the air exchange rate in the car wash would be 0.6 min⁻¹ (4 x 4000 ft³/min ÷ 27,000 ft³).

Using the appropriate values from the above table and the USEPA 95% UCL groundwater concentration, the modeled air EPC is 1,200 µg/m³. In addition, using the appropriate values from the above table and the B-1 zoned area 95% UCL groundwater concentration, the modeled air EPC is 32 µg/m³.

1.4 Comments on Car Wash Exposure Assumptions

USEPA overestimated the exposure time and exposure duration for the car wash worker. This section discusses the impact of using more appropriate exposure assumptions. Based on the nature of car wash work, the exposure inputs in the following table are more appropriate:

Revised Exposure Parameters for the Car Wash Worker

Exposure Parameter	USEPA Value	Appropriate Value
Exposure Time (hr/day)	8	4
RME Exposure Frequency (days/yr)	250	250
RME Exposure Duration (years)	25	9
Averaging Time – NC (days)	9,125	3,285

These values, which were included in the comments submitted by the Pharmacia Corporation and the Stauffer Management Company LLC on August 31, 2005 and are discussed below, are still conservative since they assume the worker is in the direct spray area during all hours of exposure.

USEPA used an exposure duration of 25 years for the RME case (USEPA, 1997). However, due to a likely high turnover rate for a car wash worker, a more reasonable yet still conservative value is 9 years, which is based on the median occupational tenure for all workers age 35-39 years (USEPA, 1997, Volume III, Table 15-158, Pages 15 - 172). The change in exposure duration changes the non-cancer averaging time from 9,125 to 3,285 days.

USEPA used an exposure time of 8 hours/day to the modeled air concentration. This value is overly conservative because it fails to consider that 1) the worker is generally standing at one end of the car wash with exposure to fresh air, thereby reducing his direct exposure; 2) the car wash is not in continuous operation throughout those 8 hours per day, but rather runs only when cars are present, and 3) the worker may rotate through different tasks during the day and may not be stationed at the entrance all day. Therefore, while still very conservative, this analysis assumed the worker is exposed to the modeled air concentration for 4 hours/day.

1.5 Comments on Appropriate Modeled Exposure Point Concentration and Risk

The following table lists the revised risks for the car wash worker if both the revised air EPCs and the revised exposure parameters are used (second column), and if the revised groundwater concentration and the revised air EPCs and the revised exposure parameters are used (third column).

Risks to Car Wash Worker Using Revised Air EPCs and Exposure Parameters

Ammonia	USEPA Value	Value Using Appropriate Exposure Parameters	Value Using Appropriate Groundwater Concentration and Exposure Parameters
Groundwater EPC (mg/L)	316	316	6.54
Air EPC (µg/m ³)	37,300	1,200	32
Non-Cancer Risk	85	1	0.04

These revisions result in a non-cancer risk of 1 or 0.04, neither of which exceed USEPA's threshold HQ of 1. Therefore, a PRG for ammonia in groundwater is not necessary. Moreover, both of these values

would decrease by two orders of magnitude if the appropriate form of ammonia in groundwater is considered, i.e., only 1% of the ammonia would be in the volatile NH_3 form at pH 7 in groundwater.

1.6 Comments on Ammonia Toxicity Evaluation

The USEPA Reference Concentration (RfC) for ammonia is 0.1 mg/m^3 ($100 \text{ }\mu\text{g/m}^3$), and is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (USEPA, 2005). The ammonia RfC is based on the absence of pulmonary function effects and subjective symptomatology changes in an occupational study of 58 soda ash production workers exposed to a mean ammonia concentration of 6.4 mg/m^3 for an average of 12.2 years (Holness *et al.*, 1989). This No Observed Adverse Effect Level (NOAEL) of 6.4 mg/m^3 was adjusted to reflect continuous daily exposure (multiplied by $10 \text{ m}^3/\text{day} / 20 \text{ m}^3/\text{day}$, and 5 days / 7 days), and divided by an uncertainty factor of 30 (10 for the protection of sensitive individuals, 3 for data base deficiencies) to result in an inhalation RfC of 0.1 mg/m^3 . In developing the RfC, USEPA also considered a Lowest Observed Adverse Effect Level (LOAEL) of 17.4 mg/m^3 (corresponding to a human equivalent concentration of 1.9 mg/m^3 after applying species-specific dosimetric adjustments to estimate an equivalent delivered dose in humans) for increased severity of rhinitis and pneumonia with respiratory lesions in a rat subchronic inhalation study (Broderson *et al.*, 1976). In the IRIS file, USEPA characterizes these rat effects as "mild extrathoracic effects" (USEPA, 2005).

USEPA used the Holness *et al.* (1989) study to derive an RfC because it was a chronic human study and is the only chronic study available. One problem with this study is that it was not possible to determine dose-response effects since the workers were only exposed to one dose. The dose identified as the NOAEL (6.4 mg/m^3 , adjusted to a human equivalent concentration of 2.3 mg/m^3) was the only dose to which workers were exposed. Therefore, the actual NOAEL could be significantly higher, but since workers were not exposed to higher doses the actual NOAEL could not be determined. USEPA divided the NOAEL by an uncertainty factor of 30 (10 for the protection of sensitive individuals, 3 for data base deficiencies) to calculate an inhalation RfC of 0.1 mg/m^3 .

California EPA (http://www.oehha.org/air/chronic_rels/AllChrels.html) developed a chronic reference exposure level (REL) of 0.2 mg/m^3 based on the same study, but using an uncertainty factor of 10 rather than 30. California EPA felt that the uncertainty factor of 3 for database deficiencies was not necessary. Therefore, depending on which uncertainty factors are used, it is possible to determine different inhalation reference levels based on the same study.

USEPA should emphasize the conservatism inherent in the ammonia RfC. The ammonia RfC is based on relatively mild, reversible respiratory effects such as respiratory irritation, and on a single NOAEL

exposure level. These observations, coupled with the use of an uncertainty factor of 30, reflect the conservatism inherent in the ammonia RfC.

1.7 Comments on Modeled Ammonia Air Concentrations vs. Observed Health Effect Levels

USEPA estimated an ammonia exposure concentration of 37 mg/m^3 ($3.7 \times 10^4 \text{ } \mu\text{g/m}^3$) for a car wash worker. As described above, revised ammonia exposure concentrations were derived for a car wash worker of 1.2 mg/m^3 , and 0.032 mg/m^3 using more appropriate modeling parameters. Both the USEPA-derived exposure estimates and the appropriately-derived exposure estimates are well below levels at which serious adverse health effects occur. Therefore, USEPA should provide perspective on the conservatism of the RfC by comparing the calculated ammonia levels with documented health effect levels.

A number of published controlled human studies looked at reversible, "less serious" health effects from ammonia exposures up to 350 mg/m^3 (ATSDR, 2004). At concentrations ranging up to 350 mg/m^3 , varying degrees of irritation were reported in at least some acute or short-term human studies. However, no serious or permanent human health effects were reported at this exposure level in humans (ATSDR, 2004).

For example, in an experimental study, six un-acclimated volunteers were exposed to 17.5, 35, or 70 mg/m^3 ammonia in an industrial environment, for 26 hours/day, 5 days/wk, 6 weeks (Ferguson *et al.*, 1977). The physician conducting the medical exams noted some transient eye, nose, and throat irritation, but the subjects stated that they were not aware of the irritation and suffered no discomfort as a result of exposures up to 70 mg/m^3 after the first week. The mild irritation was significantly less during the last three weeks of the study. Overall, the medical exams found no significant differences between the exposed volunteers and the controls based on measures of respiratory function and neurological tests. The study authors concluded that "continuous exposure to 100 ppm [70 mg/m^3], with occasional excursions to 200 ppm [140 mg/m^3], is easily tolerated and has no observed effect on general health" (Ferguson *et al.*, 1977). The 70 mg/m^3 is about twice as high as USEPA's modeled concentration of 37 mg/m^3 .

In another experimental study, 16 volunteers were exposed to ammonia concentrations ranging from 35 to 98 mg/m^3 for a period of two hours (Verberk, 1977). Although there was slight irritation to the eyes, nose, and throat at 35 mg/m^3 , and severe irritation at 98 mg/m^3 (such that it caused the subjects to leave the testing chamber early), there was no effect on pulmonary function tests at any of the doses tested. In a study by MacEwen *et al.* (1970, as cited in USEPA, 2005; ATSDR, 2004), four out of six volunteers reported moderate irritation (but not "discomforting or painful") when exposed to 35 mg/m^3 , but not 21 mg/m^3 , for ten minutes. Lastly, exposure to 350 mg/m^3 ammonia for 30 minutes caused reversible respiratory symptoms, including nasal and throat irritation, increased respiratory rates, and lacrimation.

(Silverman *et al.*, 1949).

Overall, ammonia exposures at or below 37 mg/m³ (USEPA's estimated exposure concentration) for extended durations are well below levels that cause serious or permanent adverse effects (ATSDR, 2004; Ferguson *et al.*, 1977; Holness *et al.*, 1989). Exposures at 1.2 mg/m³ or 0.032 mg/m³ (the appropriate revised exposure estimates) are unlikely to result even in slight irritation, let alone serious or permanent adverse effects. Brief exposures to ammonia concentrations ranging from about 35 to 350 mg/m³ may cause transient irritation of the eyes, nose, skin, and respiratory tract, but, as noted above, are below levels that cause serious or permanent adverse effects (ATSDR, 2004; Verberk, 1977; MacEwen *et al.*, 1970 (as cited in USEPA, 2005; ATSDR, 2004); Silverman *et al.*, 1949). There are no reported cumulative effects from repeated exposures to ammonia at the concentrations modeled by USEPA or the more appropriate concentrations included in this document.

1.8 Comments on Modeled Ammonia Air Concentrations vs. Occupational Levels

Because the exposure scenario involves a potential car wash worker, USEPA should also compare the estimated ammonia exposure concentration to occupational exposure guidelines, to provide additional perspective on the likelihood of adverse health effects. The OSHA Permissible Exposure Limit (PEL) for ammonia is 35 mg/m³, averaged over an eight-hour workday (NIOSH, 2004). The NIOSH Recommended Exposure Limit (REL) for ammonia is 18 mg/m³ (a 10-hour time-weighted average), and the short-term exposure limit (STEL) is 27 mg/m³ (15-minute exposure period) (NIOSH, 2004). These occupational exposure limits are intended to reflect concentrations to which a worker can be repeatedly exposed without significant risk of adverse health effects. Given that USEPA's estimated exposure concentration for a car wash worker (37 mg/m³) is very similar to the OSHA PEL value of 35 mg/m³, and the appropriately derived exposure estimates of 1.2 mg/m³ and 0.032 mg/m³ are even lower, adverse health effects would not be expected for a future car wash worker.

1.9 Conclusion

The use of groundwater in a car wash scenario should not be included in the risk assessment as a complete exposure pathway based on City of Woburn zoning and groundwater use restrictions and the fact that, even if a car wash were built in the site area, it would not be granted a permit to withdraw for use as process water (Brooks, 2005). However, if it is included, it should only be applied to the B-I zoning areas, and only using data from wells located in these areas, not using the summarized data for the Site and study area as a whole. Moreover, if the shower model is correctly applied to the data, whether in the B-I areas or erroneously for site-wide groundwater, no regulatory guidelines are exceeded.

1.10 References

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2.0 Comments on Ecological Risk Assessment

Katherine A. Fogarty, P.E., LSP, Senior Scientist, Menzie-Cura & Associates, Inc. prepared the Section 2.1 comments, and Stephen R. Hansen, Stephen R. Hansen and Associates prepared the Section 2.2 comments on the Draft Final Technical Memorandum, Evaluation of Ammonia and Supplemental Soil Data, Remedial Investigation/Feasibility Study, Industri-Plex Site, Woburn, Massachusetts prepared by Tetra Tech NUS, Inc. for USEPA and dated October 2005 and USEPA's subsequent Fact Sheet on the Site dated October 2005. These comments are based on a review of the portions of the documents that describe work done at or proposed for the HBHA Pond.

2.1 Comments on HBHA Pond as a Stormwater Detention Basin, Not an Aquatic Habitat

The comments made previously on USEPA's proposed plan (Bradley et al., 2005) provided details about the lack of an ecological habitat in the HBHA Pond due to its design as a stormwater detention basin. The addition of ammonia as a contaminant of concern for the HBHA Pond and subsequent remediation will not improve the habitat quality of the pond for benthic invertebrates and many fish species.

USEPA even acknowledges that the HBHA Pond was created to serve as a stormwater retention basin, and not ecological habitat. In USEPA's (TTNUS, 2005) Remedial Investigation (RI) report for the site, they state:

"The HBHA was constructed as a storm water retention area and control structure as part of an area-wide commercial development project. Based on a review of the limited available information, the design effort was directed towards management of flows during storm conditions and not towards developing a viable wetland habitat."

The design of HBHA Pond as a long deep water body with steep sidewalls limits the area of the pond available for a littoral zone, the zone in a pond that provides the highest quality habitat to invertebrates, fish, and wildlife, to a narrow band around the perimeter.

Because of this design, the HBHA Pond becomes thermally stratified in the summer. In thermally stratified ponds, the hypolimnion, or bottom layer, becomes anoxic in the summer months due to biodegradation of naturally occurring organic material. These characteristics of a stratified pond have been observed in HBHA Pond. USEPA's Proposed Plan will not change these characteristics, which are inherent because of the design of HBHA Pond.

As stated in our previous comments, the benthic invertebrate community in the hypolimnion of stratified lakes is usually not abundant or diverse because only a few species of invertebrates are tolerant of low dissolved oxygen concentrations (USEPA, 2003 and Moss, 1980). The main groups of species typically found below the thermocline are chironomid larvae, oligochaete worms, and phantom midge larvae (*Chaoborus*) (Wiederholm, 1980). If anoxia persists in a pond or lake, the invertebrate community in the

hypolimnion can be completely absent (USEPA, 2003). This condition has been observed in HBHA Pond, and will not be improved by remediation.

2.2 Comments on Application of the National Recommended Water Quality Criteria for Ammonia to HBHA Pond

Based on USEPA's Ecological Risk Assessment, USEPA concludes that ammonia is a COC in the Aberjona River Watershed that requires remedial action because the measured concentrations in the watershed exceed the USEPA chronic ambient water quality criterion. In reaching this conclusion, USEPA relies upon an evaluation of ammonia concentration data collected primarily between 1999 and 2001 in the Halls Brook Holding Area Pond (HBHA Pond). No data are presented or analyzed by USEPA for locations further downstream in the Aberjona River watershed. Therefore, the USEPA analysis does not address potential impacts to aquatic life in those portions of the Aberjona River Watershed that are appropriate for aquatic life. As previously discussed, the HBHA Pond is a storm retention basin, not an aquatic habitat.

A recent Master of Science Thesis by M. Cutrofello (August 2005) provides data that permit an initial evaluation of risk to aquatic life from ammonia toxicity in stretches of the Aberjona River Watershed downstream of the HBHA Pond. These data are summarized in Table 2-1 for locations starting at the outlet of the HBHA Pond, continuing through the HBHA Wetland, and proceeding down the Aberjona River to the Mystic Lakes Dam. It should be noted that the data are limited because they are instantaneous measures of ammonia and the USEPA chronic criterion (CCC), which is the first-tier yardstick for potential risk to aquatic life, is a 30-day average. However, in spite of the limitations, the data indicate the following:

- **Concentrations of total ammonia decrease downstream in the watershed (see Table 2-1).**
- **Exceedances of the USEPA chronic criterion are probably infrequent at the outlet of the HBHA Pond, rare at the outlet of the HBHA wetland, and extremely rare, if at all, further downstream (see Table 2-2).**

The estimation of potential exceedances of the USEPA chronic criterion was made by comparing the measured instantaneous total ammonia concentrations with the calculated CCC (based on measured temperature and pH of the ambient water). This comparison is presented in Table 2-2 and observations made from these data are described below.

At the outlet of the HBHA Pond, Cutrofello made measurements on 8 occasions from March 2004 to March 2005. Of these 8, seven had associated pH and temperature data to permit calculation of the CCC. Comparison of the measured ammonia concentrations and the CCC indicate that on one occasion, the instantaneous measurements exceeded the applicable 30-day average CCC. On three other occasions, the measured concentrations were slightly above the CCC, but within normal analytical certainty of $\pm 10\%$. It is unlikely that these slight exceedances would be statistically or biologically significant. There are insufficient data to determine whether the exceedances based on instantaneous

measurements would have been exceedances of a 30-day average, as specified in the CCC, if data collection had been more frequent.

At the outlet of the HBHA Wetland, Cutrofello made measurements on 10 occasions from March 2004 to March 2005. Of these 10, eight had associated pH and temperature data to permit calculation of the CCC. Comparison of the measured ammonia concentrations and the CCC indicate that on only one occasion did the instantaneous measurement exceed the applicable 30-day average CCC. On two other occasions, the measured concentrations were slightly above the CCC, but within normal analytical certainty of $\pm 10\%$. It is unlikely that these slight exceedances would be statistically or biologically significant. There are insufficient data to determine whether the exceedances detected based on instantaneous measurements would have been exceedances of a 30-day average, as specified in the CCC, if data collection had been more frequent.

On the Aberjona River at Route 128, Cutrofello made measurements on 28 occasions from January 2003 to August 2004. Of these 28, twenty-three had associated pH and temperature data to permit calculation of the CCC. Comparison of the measured ammonia concentrations and the CCC indicate that on no occasion did the instantaneous measurement exceed the applicable 30-day average CCC. On only one occasion was the measured concentration slightly above the CCC, but within normal analytical certainty of $\pm 10\%$. It is unlikely that this slight exceedance would be statistically or biologically significant.

Further downstream on the Aberjona River, there were no instantaneous measurements of total ammonia that exceeded the calculated CCC at any of the stations sampled (see Table 2-3).

2.3 Conclusions

- **USEPA did not take the limited aquatic habitat of HBHA Pond into account in their analysis. Even under the best of conditions, HBHA Pond is a stormwater retention basin and not a quality ecological habitat. Remediation to be conducted under USEPA's Proposed Plan will not improve the quality of the benthic invertebrate habitat in HBHA Pond.**
- **Measured instantaneous ammonia concentrations exceeded the applicable 30-day average CCC in amounts that were statistically significant only during 1 of 7 sampling events at HBHA Pond Outlet and 1 of 8 sampling events at HBHA Wetland Outlet. Of 23 samples collected from the Aberjona River at Route 128, immediately downstream of the HBHA Wetland, none exceeded the applicable 30-day average CCC for ammonia. Further downstream on the Aberjona River, there were no instantaneous measurements of total ammonia that exceeded the calculated CCC at any of the stations sampled.**

2.4 References

Bradley, L.J.N., K.A. Fogarty, R.L. Olsen, W.H. Eifert, A.S. Fowler, and L. McTiernan, 2005. Comments on USEPA's June 2005 Proposed Plan, Multiple Groundwater Source Response Plan Study Area, Woburn, Massachusetts, prepared for Pharmacia Corporation and Stauffer Management Company LLC.

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3.0 Comments on Ammonia Removal in HBHA Pond

Dr. Roger L. Olsen, Vice President, Camp, Dresser and McKee Inc. prepared these comments on ammonia degradation in Halls Brook Holding Area Pond.

Water samples from Halls Brook, HBHA Pond Outlet, HBHA Wetlands Outlet and depth profiles in the south and north portions of HBHA Pond were recently collected and analyzed for ammonia ($\text{NH}_4^+ + \text{NH}_3$) and nitrate concentrations (Figure 3-1) (Master of Science Thesis, M. Cutrofello, August 2005). Samples were collected on March 24, 2004; May 7, 2004; June 14, 2004; July 21, 2004; August 17, 2004; August 27, 2004; September 24, 2004; October 22, 2004; November 11, 2004; and March 22, 2005. There are four data sets that can be used to determine a 30-day average for ammonia because these samples were collected within 30 days of each other: samples collected August 17 and 27, 2004; August 27 and September 24, 2004; September 24 and October 22, 2004; and October 22 and November 11, 2004 (Tables 3-1 and 3-2). While two data points in a 30-day period are not an adequate data set for calculation of a 30-day average, it is interesting to note that the shallow oxic waters in the north and south ends of HBHA Pond have an average ammonia chronic criterion quotient of 0.9 and 1.0 while the deep anoxic waters have an average ammonia chronic criterion of 30 and 4.8:

Comparison of August to November 2004 Ammonia Quotients in HBHA Pond to Ambient Water Quality Criteria

<u>Sample Dates</u>	<u>North End HBHA Pond</u>		<u>South End HBHA Pond</u>	
	<u>Shallow Water</u>	<u>Deep Water</u>	<u>Shallow Water</u>	<u>Deep Water</u>
August 17 and 27, 2004	1.0	41	1.2	3.5
August 27 and September 24, 2004	0.8	27	1.1	2.5
September 24 and October 22, 2004	0.7	11	0.8	5.0
October 22 and November 11, 2004	<u>1.0</u>	<u>39</u>	<u>1.0</u>	<u>8.2</u>
Average	0.9	30	1.0	4.8

Similar to the other contaminants of concern for HBHA Pond surface water, arsenic and benzene, the ammonia criterion is exceeded in the anoxic bottom water. However, shallow water in HBHA Pond does not exceed the 30-day ammonia criterion. Clearly, ammonia is attenuating as it moves from deeper anoxic to shallower oxic waters in HBHA Pond.

Evaluation of vertical profile data for the north and south ends of HBHA Pond (Tables 3-1 and 3-2, respectively) and ammonia flux at the Halls Brook inlet to HBHA Pond and at the outlet of HBHA Pond (Table 3-3) indicate that:

- A significant amount of the load of ammonia at the HBHA Pond Outlet is due to Halls Brook (39 to 74 percent, average of 54 percent).
- Concentrations of ammonia decrease dramatically from the bottom of HBHA pond to the surface.

- The concentration decrease in ammonia is consistent with the decrease in arsenic concentration and is associated with the chemocline (specifically the transition from the anoxic to oxic zones).
- The chemocline and anoxic/oxic transition is stable in the northern part of the pond even during high flow events.
- The instantaneous concentrations of ammonia in the shallow layer of HBHA Pond were substantially below the ammonia CMC and typically below or very near the CCC.
- Typically the concentrations of ammonia at the HBHA Wetlands Outlet were lower than the concentrations at the HBHA Pond Outlet. Only one time was the concentration greater at the wetland outlet (March 24, 2004).
- These data provide further evidence that ammonia entrained in groundwater discharging to HBHA Pond is attenuated as it migrates through the surface water column and is below or very near the CCC in the shallow waters of the pond, which discharge through the HBHA Pond Outlet to the HBHA Wetland where additional ammonia removal occurs (see Section 4.0)

Major conclusions related to USEPA's proposed remedial actions include:

- Sediment removal in the HBHA pond would eliminate a sink and attenuation mechanism for the ammonia.
- The flow enhancements proposed in the August 31, 2005 Alternative Remedial Action Plan for HBHA Pond will further enhance ammonia attenuation and reduce concentrations at the pond outlet (eg, longer flowpaths, higher hydraulic retention time and enhanced nitrification capacity).
- The reactive cap proposed in the August 31, 2005 Alternative Remedial Action Plan should not substantially affect the chemocline and the attenuation of ammonia in the pond. Selected reactive media may decrease the pH slightly resulting in higher ammonia criteria (less ammonia and more ammonium ion).
- Overall, the enhancements proposed in the August 31, 2005 Alternative Remedial Action Plan should result in concentrations of ammonia below criteria at the HBHA Pond and Wetland Outlets (see Section 4.0).

4.0 Comments on Ammonia Removal in HBHA Wetlands

Mr. Walter H. Eifert, Principal Hydrologist, Roux Associates, Inc. prepared these comments on ammonia removal in HBHA wetlands.

4.1 Ammonia Removal in HBHA Wetlands

As discussed previously, the existing instantaneous data do not indicate that there are statistically significant exceedances of the 30-day average ammonia CCC at the HBHA Pond outlet. Even so, current data indicate that there already is ammonia removal occurring in the HBHA wetlands. A recent study (Cutrofello, 2005) reported that the existing HBHA Wetlands removed approximately 26 percent of ammonia entering the Wetlands from HBHA Pond during normal dry weather flow conditions (Table 4-1). While ammonia removal to these levels is typical in natural wetlands systems, enhancements can be designed and retrofitted to further improve ammonia removal efficiencies. Examples of applicable enhancements could include a lengthening of the hydraulic retention time (HRT) through the creation of more torturous flow paths throughout the system, the installation of strategically sized and placed ponds and micro-pools, and the manipulation and sequencing of vegetation plantings to enhance ammonia removal efficiencies. The design and placement of each enhancement feature would be closely engineered to optimize specific ammonia removal mechanisms such as nitrification/denitrification, volatilization and adsorption. Collectively, such enhancements constitute a highly engineered and designed Constructed Treatment Wetland (CTW) system; a treatment technology widely applied throughout the world for a variety of wastewater treatment applications. The HBHA wetlands enhancements proposed by Pharmacia Corporation and Stauffer Management Company LLC in the August 31, 2005, Alternative Remedial Action Plan (Figure 4-1), are in essence a Free Water Surface type (FWS) CTW. Importantly, the enhancements as initially proposed would further reduce ammonia concentrations in the discharge from the HBHA wetlands outlet. Thus, there presently is no indication that further ammonia remediation is warranted beyond that which would be effected by the August 31, 2005, proposal.

CTWs are recognized as one of the most efficient and cost-effective technologies for ammonia removal in domestic, agriculture and industrial wastewater (WPCF, 1990). Free Water Surface CTWs, such as that proposed by Pharmacia Corporation and Stauffer Management Company LLC in the August 31, 2005, Proposed Plan, have been widely used in the United States to treat animal wastes containing relatively high levels of BOD₅, TSS, and ammonia (Payne Engineering and CH2M Hill, 1997). Kadlec and Knight (1995) report an average first-order nitrification rate constant in FWS treatment wetlands of 0.29 day⁻¹. Demin et al. (2002) found ammonia was removed at a rate of 2.3 g m⁻² day⁻¹ in a 3.5-acre FWS-type CTW (hydraulic retention time (HRT) approximately 2 hours) in a three year study of the treatment of mine water containing 3.5-4.5 mg/L ammonia and 12 mg/L of ferrous iron in West Yorkshire, UK. Horne (1995) reported that a FWS CTW has been used as a polishing step to treat stabilization pond and activated

sludge plant effluent containing 2-14 mg/L nitrate (as nitrogen) and 25 mg/L ammonia (as nitrogen).

Important ammonia removal processes incorporated into the CTW enhancements proposed by Pharmacia Corporation and Stauffer Management Company LLC (August 31, 2005, Proposed Plan) include microbial nitrification and denitrification reactions, plant uptake, matrix adsorption, and ammonia volatilization. Microbial-mediated processes are considered to be responsible for up to 90% of ammonia removal in FWS-type CTWs (Demin et al., 2002; WPCF, 1990). Radial oxygen loss in the plant rhizosphere stimulates aerobic nitrification and also provides a facultative environment for both nitrification and denitrification reactions (Tanner et al., 1995; Brix, 1987). Plant uptake was identified to be the dominant ammonia nitrogen removal mechanism in a laboratory upflow macrophyte system planted with common reed (*Phragmites australis*) (Farahbakhshazad and Morrison, 1997). This is the same dominant species present in the HBHA Wetlands.

Theoretically, the nitrification process requires approximately 4.3 mg/L oxygen to convert 1.0 mg/L ammonia nitrogen to nitrate (Tchobanoglous, 1991). A previous study reported that the soil oxygenation rate in reed bed free water surface (FWS) CTW systems ranged from 0.02 to 12 g of O₂ m⁻²d⁻¹ (Armstrong et al., 1990; Brix and Schierup, 1990). The nitrogen removal efficiency in FWS wetlands can be enhanced through design and configuration modifications, such as alternating shallow water emergent vegetated zones with deeper water zones containing selected species of submerged aquatic vegetation. Such modifications served as the basis for design of the enhancements proposed in the August 31, 2005, Proposed Plan (Figure 4.1). The submerged vegetation provides a completely exposed open water surface for atmospheric re-aeration and root zone aeration through radial oxygen loss mechanisms (USEPA, 2000). The pond-marsh-pond configuration combined with the installation of natural flow deflectors and open water pools in the sequential low-marsh, high-marsh, low-marsh CTW proposed by Pharmacia Corporation and Stauffer Management Company LLC in the August 31, 2005, Proposed Plan (Figure 4-1) would significantly improve ammonia nitrogen removal through oxygenation enhancements, creation of the substrates to support nitrification/denitrification mechanisms, and increased hydraulic retention time. Based upon the reported average nitrification rate constant of 0.29 day⁻¹ (Kadlec and Knight, 1995), the August 31, 2005 proposed HBHA Wetlands Enhancement Plan would provide approximately 1.8 days of hydraulic retention time and reduce ammonia concentrations by up to 40%, as compared to 26% ammonia removal rate reported for the existing HBHA Wetlands (Cutrofello, 2005).

Finally, in the unlikely event that further reductions in ammonia concentrations are required, additional enhancements to the Pharmacia Corporation and Stauffer Management Company LLC Proposed Plan can be installed to achieve up to a 70% ammonia removal rate in the HBHA Wetlands. The potential enhancements would consist of the installation of appropriately designed and sized Subsurface Flow-type (SSF) CTW cells in an area immediately downgradient of the HBHA Pond Outlet. The SSF cells would be

passively operated and create no negative impact on the stormwater management functions of the HBHA system.

4.2 Conclusions

Measured instantaneous ammonia concentrations at the HBHA Pond Outlet only exceeded the applicable 30-day average CCC in a statistically significant manner during 1 of 7 sampling events. Similarly, only 1 of 8 sampling events exceeded the ammonia CCC criterion at the HBHA Wetlands Outlet. Collectively, these findings indicate that ammonia is attenuated in the Halls Brook Holding Area to the point where concentrations are below regulatory criteria a large majority of the time. Furthermore, the HBHA Wetlands are currently removing about 26 percent of the ammonia entering the system from the HBHA Pond. Importantly, the measured instantaneous ammonia concentrations generally meet the applicable 30-day average CCC at HBHA Wetland Outlet with the exception of one exceedance out of 8 measurements from March 2004 to March 2005 (see Section 2.2). Installation of the free water surface CTW system proposed in Pharmacia Corporation's and Stauffer Management Company LLC's August 31, 2005 comments on USEPA's June 2005 Proposed Plan, will further increase ammonia removal in HBHA Wetlands to levels at or below regulatory limits. Based on the observations presented and discussed herein, the following conclusions were developed from this review:

- The current HBHA Wetlands have been reported to reduce ammonia concentrations in HBHA Pond discharge by 26% (Cutrofello, 2005).
- Only one slight exceedance of the 30-day average CCC criteria for ammonia was observed at the HBHA Wetlands outlet under its existing configuration (June 14, 2004 Cutrofello data).
- The wetlands enhancements proposed for the HBHA Wetland system in Pharmacia Corporation's and Stauffer Management Company LLC's, August 31, 2005 Proposed Plan are projected to reduce ammonia concentrations entering the system by 40% under baseflow conditions.
- Realization of this level of ammonia removal would have reduced the single June 14, 2004 ammonia exceedance (i.e., 6.06 mg/L) at the HBHA wetlands outlet to 3.93 mg/L; below the corresponding 4.38 mg/L CCC criteria for ammonia.
- Ammonia is being attenuated in the HBHA Wetlands to levels near or below CCC criteria for baseflow discharges from the HBHA Pond. The proposed enhancements will improve the level of ammonia attenuation by as much as 40% at the HBHA Wetlands Outlet and likely preclude future exceedances under normal base flow conditions.
- In the unlikely event that additional ammonia removal is required, supplemental CTW enhancements (i.e., the installation of SSF-type CTW cells) can be used to increase ammonia removal efficiencies to levels of up to 70% in the proposed HBHA CTW system.

4.3 References

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5.0 Other Comments

5.1 Scouring of Deep Sediments

The Aberjona Study Coalition provided one comment on USEPA's 2005 Proposed Plan that requires a response or additional comment. It is:

- **USEPA does not take into account the possible ecological impact of deep sediment contamination.**

The text of the comment reads:

"As we commented in October 2003 (Zemba *et al.*, 2003), in the 2003 Baseline Ecological Risk Assessment (BERA), USEPA did not justify its decision not to sample sediment depths lower than 6 inches. In the current BERA, this problem has continued. In Appendix E.4 – Baseline Ecological Risk Assessment Supplemental Data of the Baseline Human Health and Ecological Risk Assessment Report – concentrations of Contaminants of Potential Concern (COPCs) from 12 foot, 2-3 foot and 34 foot were not presented nor discussed in the text. The concern of resuspension of deep sediments that may be contaminated was not addressed. Deeper contamination in sediments may exist beyond Reach 1, but the data have not been provided. Additionally, no remediation is proposed beyond Reach 0. Risk management actions, such as land use restrictions, could be taken to prevent scouring and erosion of contaminated deeper sediments."

HBHA Pond, the subject of this discussion is in Reach 1. Ample data exist that demonstrate the HBHA Pond was designed to be and is functioning as a stormwater detention basin. As such, it is a depositional environment where some contaminants, such as arsenic associated with iron oxide particles, settle out. Concerns have been raised and addressed in previous comments (Bradley *et al.*, 2005) over the stability of the oxic/anoxic boundary under severe flooding conditions. The oxic/anoxic boundary persists under conditions studied at the pond including flooding conditions (Bradley *et al.*, 2005). Since turbulence due to high flow does not break down this boundary, it will not scour sediment out of the bottom of the pond. Therefore, there is no reason to address scouring in the Baseline Ecological Risk Assessment or in the planned remediation.

5.2 References

Bradley, L.J.N., K.A. Fogarty, R.L. Olsen, W.H. Eifert, A.S. Fowler, and L. McTiernan, 2005. Comments on USEPA's June 2005 Proposed Plan, Multiple Groundwater Source Response Plan Study Area, Woburn, Massachusetts, prepared for Pharmacia Corporation and Stauffer Management Company LLC.

Zemba, S., R. Lester, K. Slatterhorn, J. Durant, R. Gehl, B. Potocki, and S. Smith, 2005. Comments on the Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation and MSGRP Feasibility Study and Proposed Plan, Industri-Plex Site, Woburn, Massachusetts, prepared for the Aberjona Study Coalition, Inc., August 31, 2005.

Figure 1-1

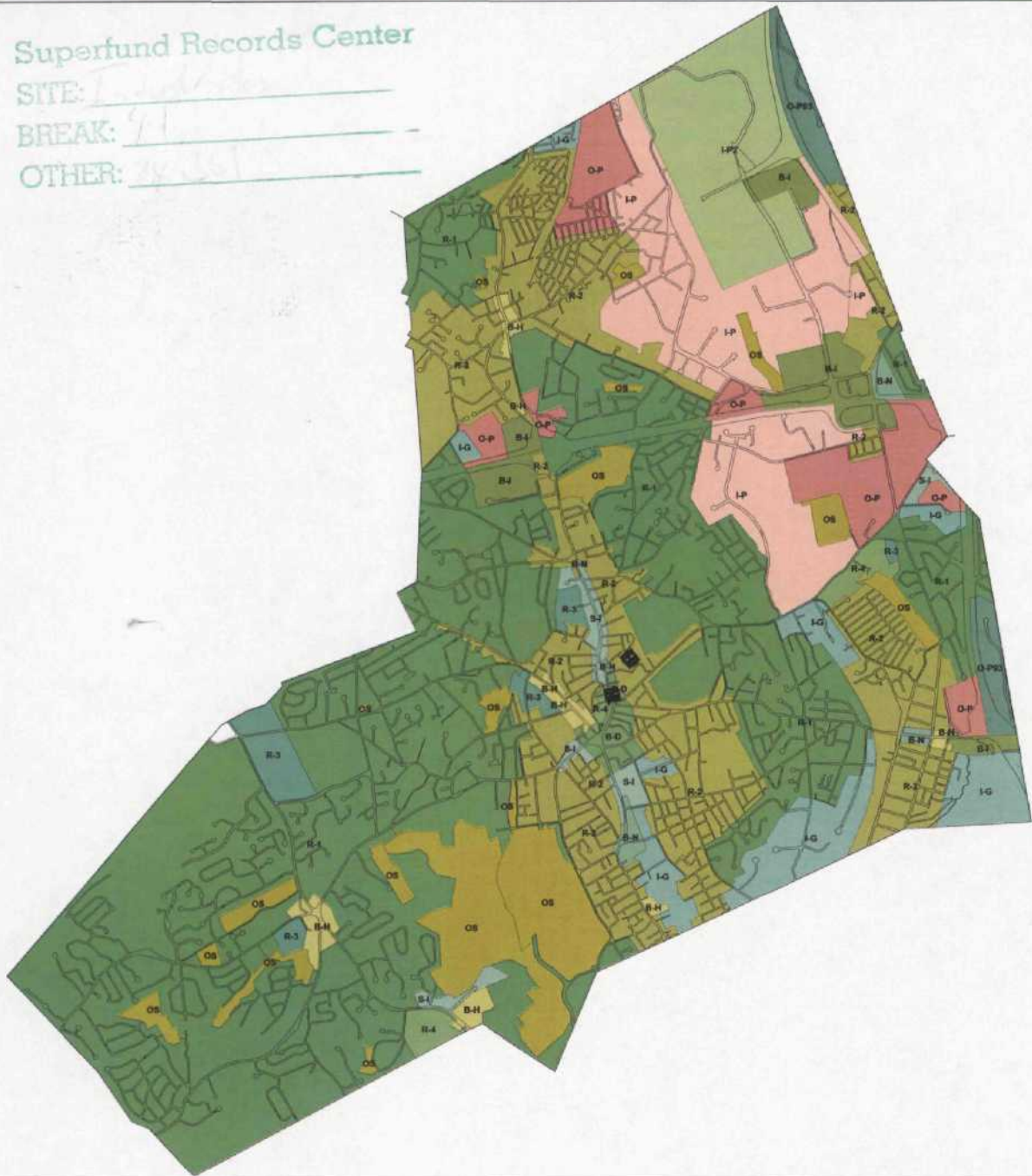
ZONING MAP

Superfund Records Center

SITE: _____

BREAK: _____

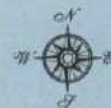
OTHER: _____



Zoning Legend

R-1 Single Family	B-N Business Neighborhood
R-2 Single & Two Family	I-G General
R-3 Townhouse & Garden Apts.	I-P Industrial Park
R-4 Apartment, Other	I-P2 Industrial Park
B-D Business Downtown	O-P Office Park
B-H Business Highway	O-P93 Office Park
B-1 Business Industrial	OS Open Space
	S-1 Mixed Use

CITY OF WOBURN ENGINEERING DEPARTMENT



0 1,000 2,000 4,000
Feet

Effective April 19, 1995
Revised through March 2, 2004

Revisions	By	Description
August 28, 2002	RF G	Open Space
August 28, 2002	RF G	Dragon Ct R-2
November 20, 2002	RF G	Salem St R-3
March 16, 2003	RF G	Longwood Ave R-2
July 3, 2003	RF G	Salem St R-3 CZ
September 25, 2003	RF G	Salem St R-4 CZ
March 2, 2004	RF G	Grove St R-3

FIGURE: 3-1

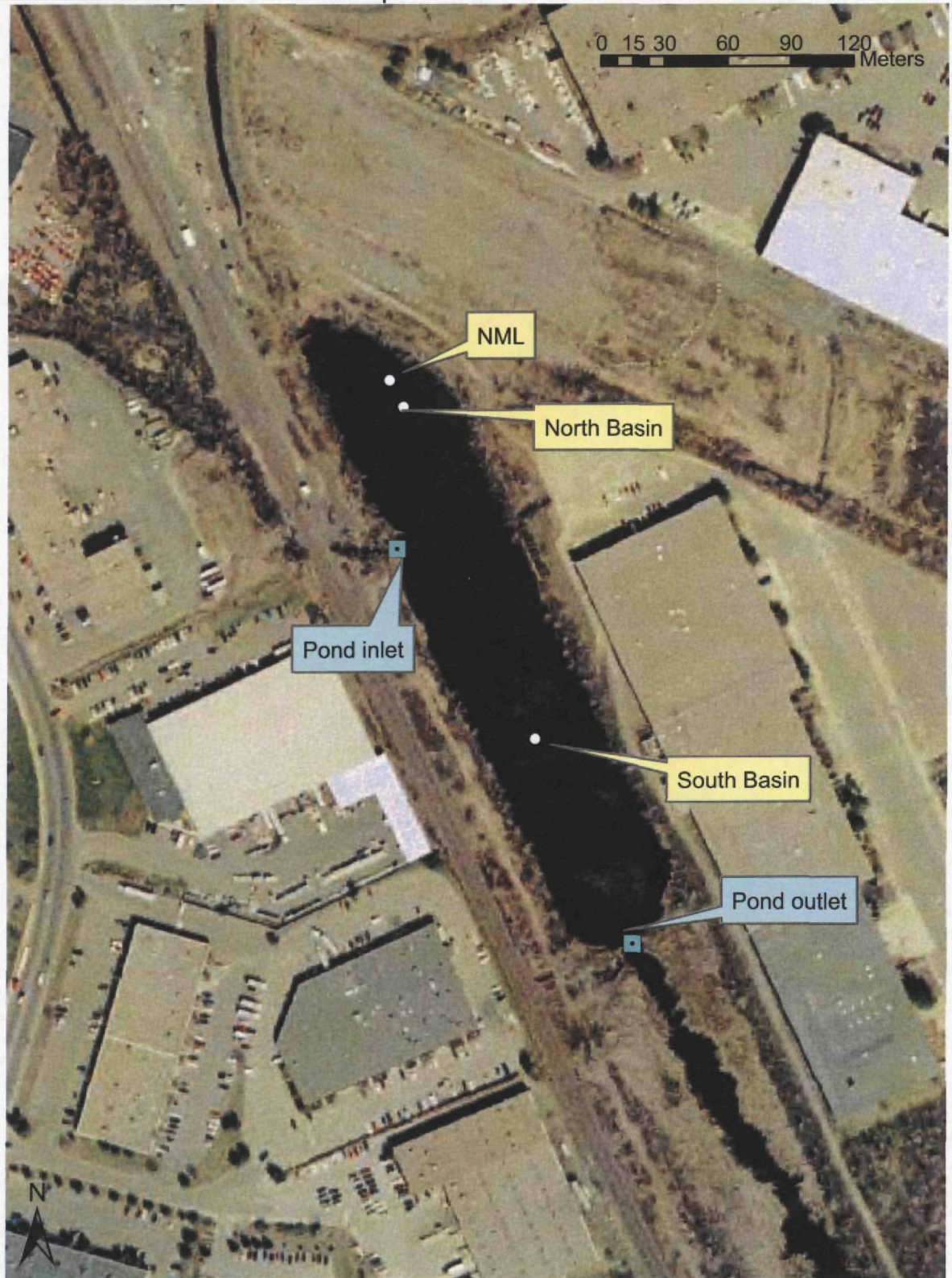
TITLE: **USEPA and Tufts University Halls Brook
Holding Area Pond Sampling Locations**

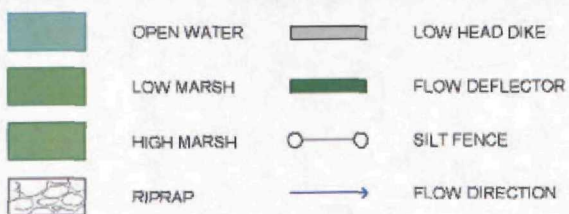
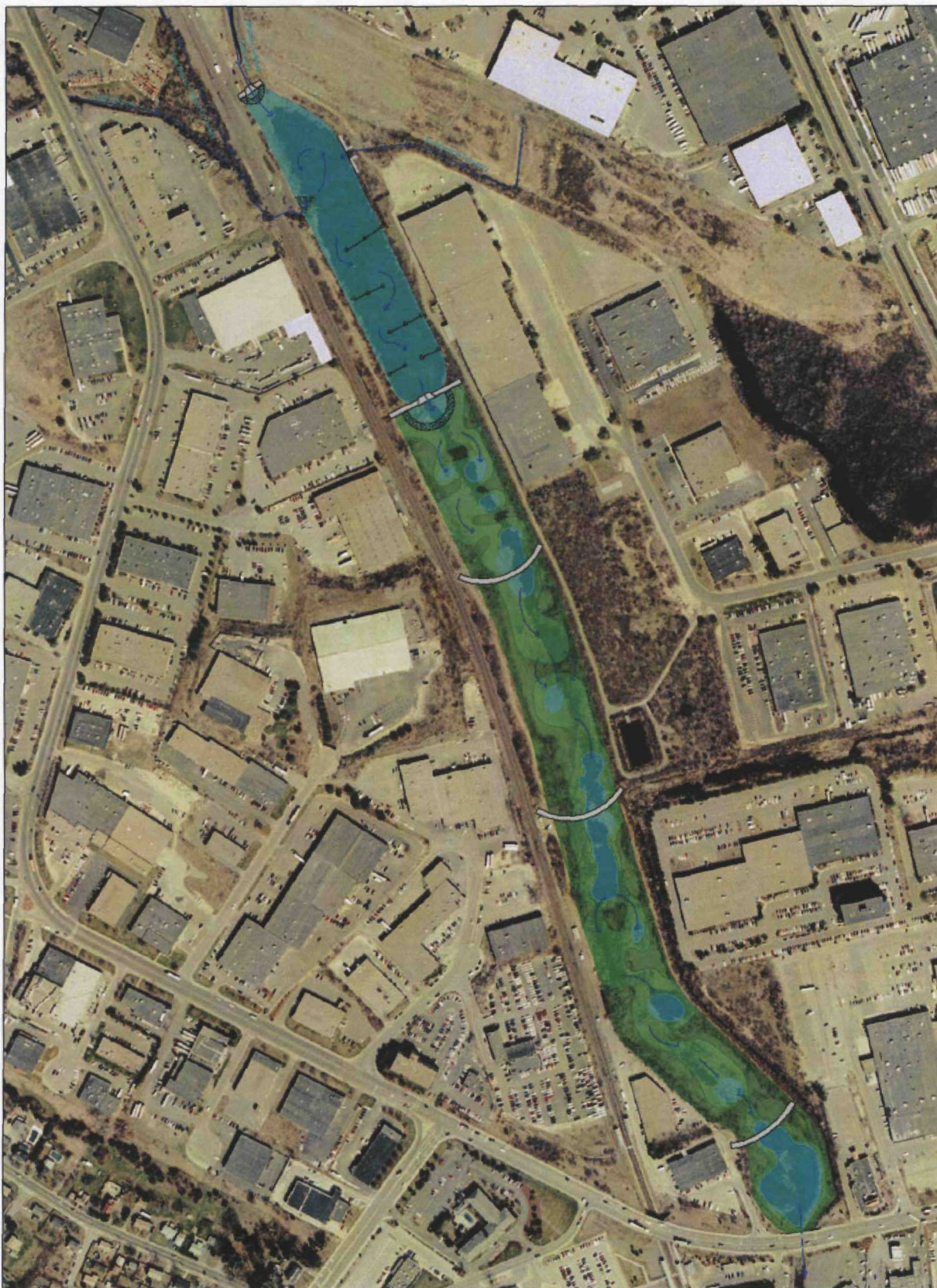
LOCATION: **Multiple Source Groundwater Response Plan Study Area, Woburn, Massachusetts.**



Menzie•Cura & Associates, Inc.
Environmental Consultants

NOTES: Prepared for Pharmacia Corporation and
Stauffer Management Company





AUGUST 31, 2005 PROPOSED ENHANCED
SEDIMENT RETENTION AND WETLAND
ENHANCEMENT CONCEPTUAL PLAN

HALL'S BROOK POND HOLDING AREA (H34A), WOBURN, MA

Prepared For: PHARMACIA CORPORATION AND
STAUFFER MANAGEMENT COMPANY

ROUX ROUX ASSOCIATES INC. Environmental Consulting & Management	Drawing by: A.L. Prepared by: A.L. Project Mgr.: W.E. File No.: P38113101.VCR	Date: 10/26/05 Scale: AS SHOWN Office: 101 Project: 10440163
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FIGURE
4-1

Table 2.1. Total Ammonia (mg/l) Measured in Aberjona River Watershed (Cutrofello 2005)

Date	HBHA Pond Outlet	HBHA Wetland Outlet	Route 128	Salem & Cedar Sts	Montvale Ave	Swanson St	USGS Gauge	Mystic Lakes Dam
1/16/03			3.74		2.84		1.42	
1/24/03			3.70		3.25		1.63	
2/7/03			3.14		2.40		1.38	
2/21/03			3.22		2.95		1.58	
3/8/03			4.05		2.65		1.21	
3/22/03			3.98		2.83		0.99	
4/16/03			0.62		0.64		0.17	
6/2/03								
6/18/03			0.75		0.42		0.45	
7/2/03								
7/16/03			2.30	2.37	0.48		0.26	0.10
7/30/03			1.12				0.35	0.34
8/13/03			1.95		1.06		0.26	0.03
8/28/03			2.99		0.38		0.26	
9/16/03			3.48		0.75		0.16	0.03
9/19/03			2.52		1.39		0.46	0.04
9/23/03			1.11		0.28		0.38	
10/3/03			5.76		2.36		0.25	0.19
10/24/03			5.22		2.73		0.87	0.24
11/20/03			3.68	3.63	2.47		0.88	0.31
12/17/03			1.92	1.54	1.27		0.54	0.44
2/4/04			8.04	4.92	3.82		1.14	0.47
3/5/04			4.52	3.86	3.24		1.22	0.57
3/12/04							1.19	
3/24/04	5.44	7.92						
3/31/04							0.35	
4/9/04			2.71	2.19	1.71		0.45	0.48
4/23/04			2.38	0.98	0.69		0.32	0.27
5/7/04	4.62	3.91						
5/17/04			2.95	2.03	1.43		0.39	0.20
6/14/04	6.63	6.06						
6/22/04			4.29	3.74	2.08		0.57	0.19
7/8/04							0.37	
7/21/04	6.10	3.61						
7/28/04						0.23	0.15	
8/5/04			3.04	0.80	0.52	0.19	0.11	0.01
8/17/04		2.75						
8/27/04	4.52	3.25						
9/8/04							0.30	
9/24/04	4.25	3.18						
9/28/04					0.37	0.24	0.23	
10/22/04		4.96						
11/11/04	10.79	8.09						
3/22/05	6.29	6.46						

Table 2.2. Total Ammonia in the Aberjona Watershed (Cutrofello 2005)

Date	Total Ammonia Concentrations (mg/l)					
	Measured at HBHA Outlet	Calculated EPA CCC	Measured at Wetland Outlet	Calculated EPA CCC	Measured at Route 128	Calculated EPA CCC
1/16/03					3.74	
1/24/03					3.70	
2/7/03					3.14	10.80
2/21/03					3.22	10.64
3/8/03					4.05	10.89
3/22/03					3.38	10.64
4/16/03					0.62	
6/18/03					0.75	5.69
7/16/03					2.30	4.11
7/30/03					1.12	3.26
8/13/03					1.95	3.85
8/28/03					2.99	3.57
9/16/03					3.48	4.37
9/19/03					2.52	4.82
9/23/03					1.11	4.55
10/3/03					5.76	7.71
10/24/03					5.22	10.06
11/20/03					3.68	8.65
12/17/03					1.92	10.15
2/4/04					8.04	9.01
3/5/04					4.52	10.46
3/24/04	5.44	10.44	7.92	8.73		
4/9/04					2.71	8.31
4/23/04					2.38	7.12
5/7/04	4.62	4.39	3.91	3.90		
5/17/04					2.95	4.58
6/14/04	6.63	4.89	6.06	4.38		
6/22/04					4.29	4.23
7/21/04	6.10		3.61			
8/5/04					3.04	4.61
8/17/04			2.75	3.88		
8/27/04	4.52	4.07	3.25	3.11		
9/24/04	4.25	4.99	3.18			
10/22/04			4.96	6.87		
11/11/04	10.79	10.46	8.09	9.82		
3/22/05	6.29	9.50	6.46	8.02		
# Comparisons	7		8		23	
# of Probably Significant Instantaneous Exceedences	1		1		0	
# of Probably Insignificant Instantaneous Exceedences	3		2		1	

Table 2.3. Total Ammonia (mg/l) Measured in Aberjona River Downstream of Route 128 (Cutrofello 2005)

Date	Measured at Salem & Cedar Sts	Calculated EPA CCC	Measured at Montvale Ave	Calculated EPA CCC	Measured at Swanson St	Calculated EPA CCC	Measured at USGS Gauge	Calculated EPA CCC	Measured at Mystic Lakes Dam	Calculated EPA CCC
1/16/03			2.84				1.42			
1/24/03			3.25				1.63			
2/7/03			2.40	6.86			1.38	10.44		
2/21/03			2.95	10.28			1.58	10.33		
3/8/03			2.65	11.00			1.21	10.48		
3/22/03			2.83	12.12			0.99	10.20		
4/16/03			0.64				0.17			
6/18/03			0.42	5.71			0.45	4.79		
7/16/03	2.37		0.48	7.03			0.26	3.73	0.10	1.99
7/30/03							0.35	3.49	0.34	1.35
8/13/03			1.06	3.59			0.26	3.35	0.03	0.45
8/28/03			0.38	4.19			0.26	3.53		
9/16/03			0.75	4.57			0.16	4.04	0.03	0.29
9/19/03			1.39	5.05			0.46	4.81	0.04	1.27
9/23/03			0.28	4.54			0.38	4.38		
10/3/03			2.36	8.24			0.25	6.58	0.19	3.12
10/24/03			2.73	10.12			0.87	8.22	0.24	5.77
11/20/03	3.63	8.34	2.47	8.37			0.88	7.82	0.31	7.08
12/17/03	1.54	10.23	1.27	10.48			0.54	8.64	0.44	8.07
2/4/04	4.92	7.96	3.82	10.60			1.14	7.38	0.47	5.41
3/5/04	3.86	10.35	3.24	10.64			1.22	9.31	0.57	8.59
3/12/04							1.19	10.56		
3/31/04							0.35	10.37		
4/9/04	2.19	8.36	1.71	9.09			0.45	6.85	0.48	6.32
4/23/04	0.98	7.46	0.69	7.50			0.32	6.51	0.27	2.71
5/17/04	2.03	4.99	1.43	4.73			0.39	3.78	0.20	1.50
6/22/04	3.74	3.80	2.08	4.39			0.57	4.32	0.19	1.99
7/8/04							0.37	4.29		
7/28/04					0.23		0.15			
8/5/04	0.80	4.52	0.52	4.79	0.19	4.40	0.11	4.39	0.01	1.61
9/8/04							0.30	3.85		
9/28/04			0.37		0.24		0.23			
# Comparisons	9		22		1		27		16	
# of Probably Significant Instantaneous Exceedences	0		0		0		0		0	
# of Probably Insignificant Instantaneous Exceedences	0		0		0		0		0	

Table 3-2

Comparison of August to November 2004 Ammonia Quotients in the South End of HBHA Pond to Ambient Water Quality Criteria

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

HBHA Pond Sampling Location	Surface or Bottom	Date	Depth in cm	Depth in feet	Temperature °C	pH	Specific Conductance uS/cm	Dissolved Oxygen mg/l	Ammonia Nitrogen mg N/L	Chronic Criterion	Chronic Quotient	Acute Ammonia Criterion	Acute Criterion Quotient	Average Chronic Quotient Top Layer	Average Chronic Quotient Bottom Layer
South Basin	S	17-Aug-04	25	0.8	21.43	6.71	479	5.72	3.58	4.12	0.87	44	0.08		
	S	27-Aug-04	25	0.8	24.84	6.6	692	7.3	4.98	3.37	1.5	47	0.11		
	D	17-Aug-04	375	12.3	18.37	6.55	667	3	4.21	5.16	0.82	48	0.09		
	D	17-Aug-04	400	13.1	17.57	7.11	1,730	0.35	28.93	4.63	6.2	33	0.89		
	D	27-Aug-04	200	6.6	18.03	6.15	763	2.46	8.73	5.50	1.6	54	0.16		
	D	27-Aug-04	225	7.4	18.02	6.13	809	0.88	16.68	5.51	3.0	54	0.31		
	D	27-Aug-04	275	9.0	17.74	6.11	928	1.065	18.07	5.61	3.2	54	0.33		
	D	27-Aug-04	375	12.3	16.91	6.39	1,373	0.29	34.58	5.79	6.0	51	0.68		
South Basin	S	27-Aug-04	25	0.8	24.84	6.6	692	7.3	4.98	3.37	1.5	47	0.11		
	S	24-Sep-04	25	0.8	19.01	6.89	737	7.14	3.48	4.59	0.76	39	0.09		
	D	27-Aug-04	200	6.6	18.03	6.15	763	2.46	8.73	5.50	1.6	54	0.16		
	D	27-Aug-04	225	7.4	18.02	6.13	809	0.88	16.68	5.51	3.0	54	0.31		
	D	27-Aug-04	275	9.0	17.74	6.11	928	1.065	18.07	5.61	3.2	54	0.33		
	D	27-Aug-04	375	12.3	16.91	6.39	1,373	0.29	34.58	5.79	6.0	51	0.68		
	D	24-Sep-04	225	7.4	14.62	6.5	795	2.35	4.32	6.62	0.65	49	0.09		
	D	24-Sep-04	250	8.2	14.63	6.49	911	0.83	12.6	6.63	1.9	49	0.26		
	D	24-Sep-04	275	9.0	14.63	6.5	1,036	0.4	4.89	6.62	0.74	49	0.10		
	D	24-Sep-04	375	12.3	14.7	6.65	1,610	0.34	20.76	6.43	3.2	46	0.45		
South Basin	S	24-Sep-04	25	0.8	19.01	6.89	737	7.14	3.48	4.59	0.76	39	0.09		
	S	22-Oct-04	25	0.8	10.49	7.07	620	7.8	6.59	7.45	0.88	34	0.19		
	D	24-Sep-04	225	7.4	14.62	6.5	795	2.35	4.32	6.62	0.65	49	0.09		
	D	24-Sep-04	250	8.2	14.63	6.49	911	0.83	12.6	6.63	1.9	49	0.26		
	D	24-Sep-04	275	9.0	14.63	6.5	1,036	0.4	4.89	6.62	0.74	49	0.10		
	D	24-Sep-04	375	12.3	14.7	6.65	1,610	0.34	20.76	6.43	3.2	46	0.45		
	D	22-Oct-04	225	7.4	10.44	6.83	658	5.9	7.27	8.12	0.89	41	0.18		
	D	22-Oct-04	275	9.0	11.85	6.76	1,400	3.2	56.50	7.55	7.5	43	1.3		
	D	22-Oct-04	325	10.7	13.05	6.91	1,905	2.8	80.02	6.70	12	39	2.1		
	D	22-Oct-04	350	11.5	13.11	6.9	1,970	3.3	90.77	6.70	14	39	2.3		
South Basin	S	22-Oct-04	25	0.8	10.49	7.07	620	7.8	6.59	7.45	0.88	34	0.19		
	S	11-Nov-04	25	0.8	6.39	6.7	1,000	7.6	10.79	10.46	1.0	45	0.24		
	D	22-Oct-04	225	7.4	10.44	6.83	658	5.9	7.27	8.12	0.89	41	0.18		
	D	22-Oct-04	275	9.0	11.85	6.76	1,400	3.2	56.50	7.55	7.5	43	1.3		
	D	22-Oct-04	325	10.7	13.05	6.91	1,905	2.8	80.02	6.70	12	39	2.1		
	D	22-Oct-04	350	11.5	13.11	6.9	1,970	3.3	90.77	6.70	14	39	2.3		
	D	11-Nov-04	200	6.6	6.1	6.73	870	7.6	12.75	10.39	1.2	44	0.29		
	D	11-Nov-04	275	9.0	8.1	6.5	1,900	0.8	71.35	10.08	7.1	49	1.5		
	D	11-Nov-04	400	13.1	11.2	6.75	3,400	0.6	122.49	7.89	16	43	2.8		

Table 3-3

Ammonia Mass Into and Out of HBHA Pond from July 2004 to March 2005

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

Date	Ammonia Mass from Halls Brook into HBHA Pond (kg/day)	Ammonia Mass at HBHA Pond Outlet leaving HBHA Pond (kg/day)	Percent of Ammonia Mass due to Halls Brook (%)²
21-Jul-04	6.3	16.3	38.6
17-Aug-04	44.1	92.1	47.9
27-Aug-04	19.1	35.1	54.4
24-Sep-04	13.2	27.1	48.7
22-Oct-04	29.9	45.2	66.1
11-Nov-04	22.8	47.7	47.8
22-Mar-05	78.3	105.1	74.5

Notes:

- 1) Data from page A-61, Michele Cutrofello, Sources and Load of Ammonia in Aberjona River Watershed, Master of Science Thesis, Tufts University, August 2005
- 2) Calculated: example calculation = $(6.3/16.3)(100\%) = 38.6 \%$

Table 4-1

Halls Brook Holding Area Ammonia Inflow and Outflow, July 21, 2004, to March 22, 2005

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

Location	Date	Q (m3/s)	NH4 (mg/l)	NH4 Flux (kg/d)	Removal (%)
Halls Brook	21-Jul-04	0.021	3.54	6.3	
	17-Aug-04	0.248	2.05	44.1	
	27-Aug-04	0.063	3.49	19.1	
	24-Sep-04	0.090	1.70	13.2	
	22-Oct-04	0.098	3.54	29.9	
	11-Nov-04	0.058	4.56	22.8	
	22-Mar-05	0.257	3.53	78.3	
HBHA Pond Outlet	21-Jul-04	0.031	6.10	16.3	
	17-Aug-04	0.248	4.3	92.1	
	27-Aug-04	0.090	4.52	35.1	
	24-Sep-04	0.074	4.25	27.1	
	22-Oct-04	0.075	7.00	45.2	
	11-Nov-04	0.051	10.79	47.7	
	22-Mar-05	0.193	6.29	105.1	
HBHA Wetland Outlet	21-Jul-04	0.031	3.61	9.8	40
	17-Aug-04	0.246	2.75	58.3	37
	27-Aug-04	0.093	3.25	26.1	26
	24-Sep-04	0.074	3.18	20.4	25
	22-Oct-04	0.074	4.96	31.8	30
	11-Nov-04	0.052	8.09	36.3	24
	22-Mar-05	0.192	6.46	107.1	-2
Average Removal					26

Notes:

- 1) Data from page A-61, Michele Cutrofello, Sources and Load of Ammonia in Aberjona River Watershed, Master of Science Thesis, Tufts University, August 2005

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November 18, 2005

By Electronic Mail and Regular Mail

Joseph F. LeMay, P.E.
Remedial Project Manager
Office of Site Remediation and Restoration
United States Environmental Protection Agency
Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

**RE: Comments Offered in Response To Second Public Comment Period
on Proposed Plan for Industri-Plex Superfund Site**

Dear Mr. LeMay:

In March 2005, the U.S. Environmental Protection Agency ("USEPA" or the "Agency") issued its Draft Final Multiple Source Groundwater Response Plan Remedial Investigation Report, hereinafter referred to as "MSGRP RI." In June 2005, the government issued its Draft Final Remedial Investigation/Feasibility Study, hereinafter referred to as "RI/FS," and a Proposed Plan for the Industri-Plex Superfund Site Operable Unit 2 ("OU-2") in Woburn, Massachusetts, hereinafter referred to as "PP." The initial public comment period for the PP ended on August 31, 2005. This firm, on behalf of our client Pharmacia Corporation f/k/a



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Monsanto Company by its Attorney-in-Fact Monsanto Company¹ (hereinafter "Pharmacia"), submitted formal comments on the PP for your review and comment. In addition to further comments described in the following paragraphs on behalf of Pharmacia, we reaffirm and incorporate herein by reference our previous comments.

The Agency, after further review of technical documents and public commentary, identified ammonia as a contaminant of concern in surface water and groundwater for OU-2. The public comment period on the PP was re-opened from October 20 to November 18, 2005. After reviewing the PP, recently-provided Agency documents including an October 2005 "Technical Memorandum – Evaluation of Ammonia and Supplemental Soil Data," an October 2005 Fact Sheet, and other sources of information available through public or academic sources, Pharmacia joined with Stauffer Management Company LLC ("SMC") in retaining experts to prepare comments with particular attention to ammonia-related issues. Those comments are attached hereto and are being submitted on behalf of Pharmacia within the specified public comment period. Pharmacia agrees with these comments as expressly set forth below. In addition, Pharmacia hereby reserves its rights to dispute particular findings and/or conclusions in these comments in later discussions with the Agency or other potentially responsible parties as additional and/or new data are developed.

Pharmacia has a number of concerns with regard to USEPA's perceived need to treat or otherwise control ammonia within OU-2. First of all, given ammonia's current status as a contaminant of concern, Pharmacia remains troubled over the Agency's apparent unwillingness to investigate the full impact of ammonia on the fate and transport of other contaminants at the Industri-Plex site. In addition, Pharmacia has through its technical experts identified significant limitations and deficiencies in USEPA's data set and methodology with regard to ammonia. Not only do these data limitations, and the failure to consider reasonable and appropriate exposure scenarios, invalidate the Agency's conclusions regarding the impact of ammonia on human health and the environment, they also erode the technical basis for its decision to remove or control that ammonia via the PP. More data of higher quality are therefore needed to quantify the full extent of the ammonia problem, if any, and to support the Agency's conclusion that the PP is needed and adequate for ammonia control. Insistence by the Agency on the continued use of questionable or incomplete data and methodologies will only further demonstrate the absence of a rational basis for the Agency's decision-making, lead to further delays in remedial activity and invite judicial confirmation of the arbitrary and capricious nature of USEPA's proposed remedy.

¹ The company today known as Monsanto Company was incorporated in 2000 by Pharmacia Corporation and subsequently spun off from Pharmacia Corporation. Pursuant to contractual arrangements between Pharmacia Corporation and Monsanto Company, Monsanto Company is acting as Pharmacia Corporation's attorney in fact with respect to this matter.

As you are well aware, CERCLA (42 U.S.C. Section 9621) establishes five principal requirements for the selection of Superfund remedies: These include 1) protection of human health and the environment, 2) compliance with ARARs, unless waiver is justified, 3) cost-effectiveness, 4) use of permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and 5) reduction of toxicity, mobility or volume through treatment. Effective application of each of these selection criteria depends on the availability of sufficient and adequate site-specific data. Reliance by the Agency on flawed data and related improper exposure and risk assumptions does not comply with the Agency's own requirements that the collection of sufficient contaminant concentration data from each relevant medium is necessary to adequately characterize the nature and extent of contamination and to develop sound estimates of risk associated with each exposure pathway. DQO Guidance: Data Quality Objectives Process for Superfund: Interim Final Guidance (EPA 540-R-93-071, 1993).

The Agency's remedial decisions must be carefully drawn from valid data and, pursuant to CERCLA, are subject to the provisions of the Federal Administrative Procedures Act which establishes judicial authority to overturn agency actions which are arbitrary, capricious, an abuse of discretion or otherwise not in accordance with the law. See Ethyl Corp. v. EPA, 541 F.2d 1, 33-34 (D.D.C.) (en banc), cert. denied 426 U.S. 941. (1976). On appeal, Agency decisions are therefore reviewed to ensure consideration of relevant data and development of a rational explanation of the chosen action based on data in the record. See, e.g. Motor Vehicles Mfrs. Ass'n v. State Farm Mut. Auto Ins. Co., 463 U.S. 29 (1983). USEPA's remedial decisions have not been upheld on appeal when the agency is unable to provide a rational basis for its determination that its actions are necessary for the protection of public health or safety, and/or when it has failed to consider all the relevant factors. See, e.g. W.R. Grace & Co., v. United States Environmental Protection Agency, 261 F.3d 330, 336, 338 (3rd Cir., 2000) (agency-established clean-up standard for ammonia in groundwater overturned as arbitrary and capricious and not rationally based on the facts).

Pharmacia notes three principal areas of concern within the OU-2 technical documents, in addition to other less significant concerns which are also addressed in the attached comments. First, the Agency has failed to consider all appropriate institutional, technical and physical factors in its calculation of human health risk associated with ammonia in groundwater. Attached hereto are comments by Dr. Lisa Bradley which demonstrate that USEPA's human health risk calculations with regard to ammonia in groundwater at or near the Industri-Plex site are inaccurate, devoid of a rational basis and technically insupportable. Secondly, we offer comments by Dr. Katherine Fogarty regarding the Agency's unreasonable and irrational insistence on the re-establishment, through ammonia control and the PP, of wetland habitat in the HBHA. The comments herein supplement our previous comments on this issue. As to Pharmacia's third major concern, comments are offered by Drs. Fogarty and Roger Olsen regarding USEPA's improper reliance on and use of a limited and inadequate data set to support its calculations of ecological risk and exceedances of relevant discharge criteria. As discussed

herein, the very basis for the identification of actual or likely exceedances of discharge criteria for ammonia are called into question by the paucity of the data set and the inapplicability of these data to a valid calculation of average monthly values upon which the discharge criteria are based. Notwithstanding the fact that these inadequate data arguably show a predominant pattern of exceedance of ammonia discharge criteria, the use of severely compromised data is not enough to insulate the Agency from claims of arbitrary and capricious decision-making. Pharmacia proposes that the discharge data are insufficient to rationally support the Agency's determination of an exceedance, and collection of more HBHA water quality data for problem identification and remedial system design data is warranted. To do less would be to invite a determination that USEPA has failed to validly identify an ecological risk such that its demand for a solution must be considered arbitrary and capricious.

Pharmacia also takes this opportunity to remind the Agency of its failure to address the Alternative Remedial Plan previously provided by Stauffer Management Company and Pharmacia, a plan which Pharmacia continues to believe is far superior to that proposed by the Agency and which is capable of addressing ammonia discharge from the HBHA to the Agency's satisfaction. Pharmacia believes that the Agency's refusal to consider this technically-supportable plan, and the Agency's adherence to its own decision based on inadequate assumptions, flawed methodology and improperly considered and calculated data, can not withstand judicial muster and comprises decision-making which is arbitrary, capricious, not in keeping with USEPA's jurisdiction under CERCLA and thus not in keeping with the law.

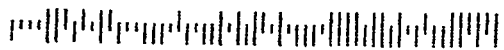
We ask your serious consideration of the attached comments, and Pharmacia's and SMC's proposed Alternate Remedial Plan, as the Agency begins final deliberations for a Record of Decision on Operable Unit 2. We appreciate the opportunity to respond and, if the Agency wishes, are prepared to provide even more detailed support to the submission included herein. We look forward to your response.

Very truly yours,



William L. Parker

cc: John Beling, Esq. - USEPA
Andrew Cohen, Esq. - MADEP
Anna Mayor - MADEP
Gerald Rinaldi - Industri-Plex Site Remedial Trust
Cindy Brooks - Custodial Trust
The Honorable John Curran, Mayor, City of Woburn



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11/18/2005 05:14 PM

To: Joe Lemay/R1/USEPA/US@EPA

cc

bcc

Subject: FW: Responses For Re-opened OU-2 Public Comment Period

-----Original Message-----

From: KFW - Kenneth Whittaker

Sent: Friday, November 18, 2005 5:08 PM

To: 'Lemay.joe@epa.gov'

Cc: WLP - William L. Parker

Subject: Responses For Re-opened OU-2 Public Comment Period

Mr. LeMay:

Attached please find electronic versions of the comments submitted by Pharmacia Corporation f/k/a Monsanto Company by its Attorney-in-Fact Monsanto Company in response to USEPA's re-opening of the public comment period for the MSGRP Study Area in Woburn, Massachusetts. Hard copies of all of the attached materials will be placed in the mail today.

Please do not hesitate to contact me if you have any difficulty reading any of the attached materials.

Very truly yours,

Kenneth F. Whittaker

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Comments.pdf



Figure 1-1.pdf



Figure 3-1.pdf



Figure 4-1.pdf



Table 2-1.pdf



Table 2-2.pdf



Table 2-3.pdf



Table 3-1.pdf



Table 3-2.pdf



Table 3-3.pdf



Table 4-1.pdf



John LeMay Letter.pdf

1.0 Comments on Human Health Risk Assessment

This section presents comments on the human health risk evaluation included as Section 4.1 of the Draft Final Technical Memorandum, Evaluation of Ammonia and Supplemental Soil Data, Remedial Investigation/Feasibility Study, Industri-Plex Site, Woburn, Massachusetts, October 2005. These comments were prepared by Dr. Lisa J.N. Bradley, DABT, Senior Toxicologist, ENSR International and Dr. Barbara D. Beck, DABT, FATS, Principal, Gradient Corporation.

1.1 Comments on Groundwater Exposure Scenarios

The U.S. Environmental Protection Agency (USEPA) has based the human health risk evaluation of ammonia in groundwater on the car wash scenario used in the Baseline Risk Assessment (TtNUS, 2005), stating that it is the more conservative of the two groundwater use scenarios evaluated in the Baseline Risk Assessment (car wash and industrial process water use). The Pharmacia Corporation and the Stauffer Management Company LLC would like to reiterate the following comments made in their August 31, 2005 submittals to USEPA:

- No risks or hazards should be calculated for the use of groundwater in a car wash because City of Woburn zoning and land use restrictions make this an incomplete exposure pathway. Consequently, this exposure scenario should not be included in the risk assessment.
- No risks or hazards should be calculated for future use of groundwater as industrial process water because the special permits are required for well installation in the City of Woburn and the fact that wells can not be installed on hazardous waste sites make this an incomplete exposure pathway. Consequently, this exposure scenario should not be included in the risk assessment.

The Massachusetts Department of Environmental Protection's (MADEP) Groundwater Use and Value Determination for the Site and study area supports a low use and value of the groundwater (see Appendix 6M of the MSGRP HHRA, TtNUS, 2005). In addition, the MADEP has also provided a classification of the groundwater as a Non-Potential Drinking Water Source Area.

Based on a discussion with Mr. John Fralick, a Health Agent of the Woburn Health Department, special permits are required for well installation within the City of Woburn. The following observations were provided by Mr. Fralick:

- Wells and the use of city water are mutually exclusive;
- Special permits are required for well installation; and
- Wells should not be installed on hazardous waste sites; there are approximately 250 hazardous waste sites in Woburn.

Based on this information, it is entirely unlikely and unreasonable to assume that well water would be used for any purpose within the Industri-Plex Site and the MSGRP study area. Therefore, the future groundwater use scenarios - industrial worker process water use and car wash worker - should not have been included in the MSGRP HHRA, nor in the risk assessment in the Draft Technical Memorandum as exposure to groundwater used for industrial or commercial purposes is not a realistic exposure pathway.

Were USEPA to make the far more reasonable assumption that use of groundwater as industrial process water or as car wash water will not occur in the future, no risks or hazards would be calculated for these scenarios.

1.2 Comments on Car Wash Exposure Scenario

Based on existing administrative controls, a car wash scenario using groundwater should not be included in the MSGRP HHRA. Nonetheless, because USEPA continue to employ this unrealistic scenario, it is necessary to point out specific problems with the scenario as constructed by USEPA. The zoning map (Figure 1-1) and supporting information for the City of Woburn (City of Woburn, 2004) indicate that the area encompassed by the Industri-Plex Site and the MSGRP study area are zoned B-I (Business Industrial), I-P (Industrial Park), I-P2 (Industrial Park) and OS (Open Space). Use of a property as a car wash is prohibited in areas zoned I-P, I-P2, and OS (City of Woburn, 2005). Only two small areas are zoned B-I, and for this zoning designation, possible use as a car wash requires a special permit. The two B-I areas are:

- **B-I #1: Woburn Mall and Lowes** - The area bounded by the southern-most portion of the Halls Brook Holding Area (HBHA) to the west, Mishawum Rd. to the south, and Commerce Way to the east, and extending north of Mishawum Rd. approximately 1000 feet (this is basically the area covered by the Woburn Mall and Lowes on the north side of Mishawum Road and the Hampton Inn, Fairfield Inn, 99's Restaurant, D'Angelos Restaurant, Toys 'R Us and the Scrub-a-Dub car wash on the south side of Mishawum Road); and
- **B-I #2: Target and Phillips Pond** - The area bounded to the east by Interstate 93, bounded to the north by the Regional Transportation Center (RTC) exit/entrance to Interstate 93, extending approximately 700 feet south on Commerce Way, and from there, east to the terminus of Commonwealth Ave. The B-I designation also includes the area between Interstate 93 and Commonwealth Ave (approximately 700 feet south along Commonwealth Ave.) that encompasses Phillips Pond.

Therefore, there are only two locations within the Industri-Plex Site and the MSGRP study area where car washes could be located, and only by special permit. Given the fact that a car wash (the Scrub-a-Dub) is already present in one of them (B-1 #1), it is highly unlikely that a second car wash would be constructed in the B-1 #1 zoned area in the MSGRP study area north of Route 128/I-95 or in the B-1 #2 zoned area in the Industri-Plex Site, which is occupied by the Target retail store and its parking lot. It is even more unlikely that the City of Woburn would issue a special permit for installation of a groundwater supply well in an area of impacted groundwater or ignore its limitations on installation of water supply wells on hazardous waste sites, especially since the Scrub-a-Dub car wash uses municipal water. The car wash exposure scenario is made even more inappropriate by the fact that the only two zoning areas where car washes would be allowed are outside the ammonia plume defined by the Agency. For these reasons, the car wash exposure scenario should not be included in the risk assessment.

USEPA used a 95% upper confidence limit (UCL) concentration of ammonia in groundwater of 316 mg/L in their risk calculations. If only data from the B-1 zoned areas (all of which are from the B-1 #1 area) are used, the resulting 95% UCL concentration is 6.54 mg/L, which is two orders of magnitude lower than the USEPA value. If USEPA insists on including a car wash scenario in the risk assessment, this is the

groundwater concentration term that should be used in the air modeling.

In addition to using the appropriate groundwater concentration, USEPA must also consider the form of ammonia that is in the groundwater. USEPA's modeling does not account for the fact that below pH 9.25, ammonia exists largely as the ammonium ion (NH_4^+) in solution (Snoeyink and Jenkins, 1980). At pH 7.25, 99% of the ammonia in solution exists as NH_4^+ (ATSDR, 2004). This is a critical distinction because ammonium ion is not volatile and therefore would not be present in the air due to volatilization. At a groundwater pH of 7, less than 1% of the total ammonia in groundwater would be available for volatilization in a car wash as NH_3 . USEPA's shower modeling incorrectly assumes that all the ammonia in groundwater exists as NH_3 and is available for volatilization. However, the ammonium ion is highly soluble and does not volatilize from solution. We recommend that USEPA rerun the air modeling to address this issue. If the groundwater ammonia concentration is decreased to 1% of its current value, the total hazard index would be 0.85 instead of 85, even without correcting for all other problems with the modeling, which are discussed below. Consequently, ammonia non-cancer risk is below regulatory thresholds.

There are additional problems with the car wash/shower model, which are summarized below:

- A car wash is not an enclosed space; it has two wide openings for cars to enter and exit. Furthermore, modern day car washes are automated and a car wash worker does not stand in the direct spray area. If a worker is present at all, he or she would stand near the entrance or exit where he or she is exposed to fresh air. Thus the modeled air concentrations greatly overestimate the worker's exposure concentration.
- The exposure duration used for the car wash worker (25 years) is likely too high, based on USEPA occupational tenure estimates. A more reasonable value is 9 years, which is based on the median occupational tenure for all workers aged 35-39 years (USEPA, 1997b).
- Under the USEPA exposure scenario, the car wash worker is exposed to the modeled air concentration for 8 hours/day. However, this is an overestimate of the amount of time that the worker is exposed to the modeled air concentration, since the worker does not stand in the direct spray area and may not even stand at the car wash entrance for 8 hours at a time. Furthermore, it is highly unlikely that cars are transiting the car wash on a constant basis. For these reasons, a value of 4 hours is more reasonable, although still very conservative.
- The air modeling using the "shower model" was done with model inputs for a residential bathroom, which are not appropriate for a car wash. This flaw resulted in inhalation risks that are too high as well as PRGs for groundwater that are too low.
- The MSGRP HHRA used a "shower volume" of 6 m^3 in its calculation for the car wash scenario. A more realistic estimate of the volume of a car wash is 1000 m^3 , based on an estimated car wash size of $90 \times 20 \times 15 \text{ feet} = 27,000 \text{ ft}^3$ or 1000 m^3 .
- Per the following website:
http://seattletimes.nwsources.com/html/makeitcount/2002410023_ecoconsumer31.html, it should be assumed that 45 gallons of water is used per car, and that the car wash trip takes one minute. The estimate of 45 gallons is the upper-bound for an automatic car wash. A car wash duration of 1 minute is assumed. This equates to a water flow rate of 170 L/min.
- Commercially available automatic car wash driers can be found on the following website: http://www.sonnysdirect.com/system_models_detail_660.html. The apparatus shown has 4 blowers working at 4000 ft^3 per minute (conservatively assuming 10 HP motors). Assuming this occurs within the $27,000 \text{ ft}^3$ car wash, the air exchange rate in the car wash would be 0.6 min^{-1} ($4 \times 4000 \text{ ft}^3/\text{min} \div 27,000 \text{ ft}^3$).

The effect of applying these more realistic exposure parameters to the car wash "shower model", as described in the following sections, is to decrease the predicted air concentrations by an order of magnitude from 37,000 ug/m³ to 1,200 ug/m³, and to decrease the non-cancer risk from 85 to 1. Use of these parameters in combination with the more appropriate groundwater concentration of 6.54 mg/L further decreases the predicted air concentration by three orders of magnitude to 32 ug/m³, and decreases the non-cancer risk from 85 to 0.04. Finally, if these more appropriate assumptions are used in conjunction with the form of ammonia actually involved, i.e., only 1% of the ammonia in groundwater would be in the volatile NH₃ form at pH 7 in groundwater, all of these values would further decrease by two orders of magnitude.

1.3 Comments on Car Wash Air Modeling

In the Draft Technical Memorandum, USEPA states: "For estimation of air concentrations in a warm water car wash, the shower model approach presented by Foster and Chrostowski...was assumed to be proportionally representative of conditions similar to a car wash" (emphasis added). As stated in the comments submitted previously by the Pharmacia Corporation and the Stauffer Management Company LLC, and reiterated above, the model inputs used by USEPA were not representative of car wash conditions and, therefore, the model results are not proportionally representative of car wash conditions. USEPA has a responsibility to the public to prepare a scientifically defensible risk assessment that uses site-specific and scenario-specific information upon which to base remedial decisions. To continue to apply the model with the shower inputs without providing concrete justification for the use of those inputs is inappropriate. The modeling should be revised using the model inputs previously provided by the Pharmacia Corporation and the Stauffer Management Company LLC and discussed in more detail below.

USEPA modeled groundwater vapor exposure to a future car wash worker using the Foster and Chrostowski Shower Model. USEPA used default inputs that are meant for a residential shower and bathroom; these inputs are not appropriate for modeling air concentrations inside a car wash. Furthermore, even if appropriate inputs are used to determine the air concentrations within the car wash building, a worker is not exposed to these concentrations since he or she is outside the car wash building.

These flaws resulted in predicted inhalation risks that are too high as well as PRGs for groundwater that are too low. Performing the air modeling with a revised groundwater concentration and revised shower parameters, and calculating risk with revised exposure parameters, even while using the very conservative assumption that a worker is inside the car wash, results in much lower calculated health risks. This section discusses the air modeling used to estimate ammonia air concentrations in the car wash, and the impact of using more appropriate model input values.

The model inputs shown in the following table are more appropriate for modeling exposure to a car wash worker. These model inputs were submitted in the Pharmacia Corporation and the Stauffer Management Company LLC comments on August 31, 2005 and are explained below.

Changes to the Shower Model Parameters

Shower Parameter	USEPA Value	Appropriate Value
Shower volume (m ³)	6	1000
Water flow rate (L/min)	10	170
Air Exchange Rate (min ⁻¹)	0.0083	0.6

USEPA used a "shower volume" of 6 m³ in its calculation for the car wash scenario. A more realistic estimate of the volume of a car wash is 1000 m³, based on an estimated car wash size of 90 x 20 x 15 feet = 27,000 ft³ or 1000 m³.

USEPA used a default water flow rate for the shower model of 10 L/min. However, the water flow rate for a car wash is higher than in a shower. An estimate of 45 gallons of water used per car is the upper-bound for an automatic car wash (http://seattletimes.nwsource.com/html/makeitcount/2002410023_ecoconsumer31.html). A car wash duration of 1 minute is assumed. This equates to a water flow rate of 170 L/min.

The shower model default uses an air exchange rate of 0.0083 min⁻¹ (equivalent to half the room volume per hour). However, a car wash, unlike a standard residential bathroom, has two wide openings for cars to enter and exit, which increases the air exchange rate. One example of a commercially available automatic car wash drier (http://www.sonnysdirect.com/system_models_detail_660.html) has four blowers working at 4000 ft³ per minute (conservatively assuming 10 HP motors). Assuming this occurs within the 27,000 ft³ car wash, the air exchange rate in the car wash would be 0.6 min⁻¹ (4 x 4000 ft³/min ÷ 27,000 ft³)

Using the appropriate values from the above table and the USEPA 95% UCL groundwater concentration, the modeled air EPC is 1,200 µg/m³. In addition, using the appropriate values from the above table and the B-1 zoned area 95% UCL groundwater concentration, the modeled air EPC is 32 µg/m³.

1.4 Comments on Car Wash Exposure Assumptions

USEPA overestimated the exposure time and exposure duration for the car wash worker. This section discusses the impact of using more appropriate exposure assumptions. Based on the nature of car wash work, the exposure inputs in the following table are more appropriate:

Revised Exposure Parameters for the Car Wash Worker

Exposure Parameter	USEPA Value	Appropriate Value
Exposure Time (hr/day)	8	4
RME Exposure Frequency (days/yr)	250	250
RME Exposure Duration (years)	25	9
Averaging Time – NC (days)	9,125	3,285

These values, which were included in the comments submitted by the Pharmacia Corporation and the Stauffer Management Company LLC on August 31, 2005 and are discussed below, are still conservative since they assume the worker is in the direct spray area during all hours of exposure.

USEPA used an exposure duration of 25 years for the RME case (USEPA, 1997). However, due to a likely high turnover rate for a car wash worker, a more reasonable yet still conservative value is 9 years, which is based on the median occupational tenure for all workers age 35-39 years (USEPA, 1997, Volume III, Table 15-158, Pages 15 - 172). The change in exposure duration changes the non-cancer averaging time from 9,125 to 3,285 days.

USEPA used an exposure time of 8 hours/day to the modeled air concentration. This value is overly conservative because it fails to consider that 1) the worker is generally standing at one end of the car wash with exposure to fresh air, thereby reducing his direct exposure; 2) the car wash is not in continuous operation throughout those 8 hours per day, but rather runs only when cars are present, and 3) the worker may rotate through different tasks during the day and may not be stationed at the entrance all day. Therefore, while still very conservative, this analysis assumed the worker is exposed to the modeled air concentration for 4 hours/day.

1.5 Comments on Appropriate Modeled Exposure Point Concentration and Risk

The following table lists the revised risks for the car wash worker if both the revised air EPCs and the revised exposure parameters are used (second column), and if the revised groundwater concentration and the revised air EPCs and the revised exposure parameters are used (third column).

Risks to Car Wash Worker Using Revised Air EPCs and Exposure Parameters

Ammonia	USEPA Value	Value Using Appropriate Exposure Parameters	Value Using Appropriate Groundwater Concentration and Exposure Parameters
Groundwater EPC (mg/L)	316	316	6.54
Air EPC ($\mu\text{g}/\text{m}^3$)	37,300	1,200	32
Non-Cancer Risk	85	1	0.04

These revisions result in a non-cancer risk of 1 or 0.04, neither of which exceed USEPA's threshold HQ of 1. Therefore, a PRG for ammonia in groundwater is not necessary. Moreover, both of these values

would decrease by two orders of magnitude if the appropriate form of ammonia in groundwater is considered, i.e., only 1% of the ammonia would be in the volatile NH_3 form at pH 7 in groundwater.

1.6 Comments on Ammonia Toxicity Evaluation

The USEPA Reference Concentration (RfC) for ammonia is 0.1 mg/m^3 ($100 \text{ } \mu\text{g/m}^3$), and is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (USEPA, 2005). The ammonia RfC is based on the absence of pulmonary function effects and subjective symptomatology changes in an occupational study of 58 soda ash production workers exposed to a mean ammonia concentration of 6.4 mg/m^3 for an average of 12.2 years (Holness *et al.*, 1989). This No Observed Adverse Effect Level (NOAEL) of 6.4 mg/m^3 was adjusted to reflect continuous daily exposure (multiplied by $10 \text{ m}^3/\text{day}$ / $20 \text{ m}^3/\text{day}$, and 5 days / 7 days), and divided by an uncertainty factor of 30 (10 for the protection of sensitive individuals, 3 for data base deficiencies) to result in an inhalation RfC of 0.1 mg/m^3 . In developing the RfC, USEPA also considered a Lowest Observed Adverse Effect Level (LOAEL) of 17.4 mg/m^3 (corresponding to a human equivalent concentration of 1.9 mg/m^3 after applying species-specific dosimetric adjustments to estimate an equivalent delivered dose in humans) for increased severity of rhinitis and pneumonia with respiratory lesions in a rat subchronic inhalation study (Broderson *et al.*, 1976). In the IRIS file, USEPA characterizes these rat effects as "mild extrathoracic effects" (USEPA, 2005).

USEPA used the Holness *et al.* (1989) study to derive an RfC because it was a chronic human study and is the only chronic study available. One problem with this study is that it was not possible to determine dose-response effects since the workers were only exposed to one dose. The dose identified as the NOAEL (6.4 mg/m^3 , adjusted to a human equivalent concentration of 2.3 mg/m^3) was the only dose to which workers were exposed. Therefore, the actual NOAEL could be significantly higher, but since workers were not exposed to higher doses the actual NOAEL could not be determined. USEPA divided the NOAEL by an uncertainty factor of 30 (10 for the protection of sensitive individuals, 3 for data base deficiencies) to calculate an inhalation RfC of 0.1 mg/m^3 .

California EPA (http://www.oehha.org/air/chronic_rels/AllChrels.html) developed a chronic reference exposure level (REL) of 0.2 mg/m^3 based on the same study, but using an uncertainty factor of 10 rather than 30. California EPA felt that the uncertainty factor of 3 for database deficiencies was not necessary. Therefore, depending on which uncertainty factors are used, it is possible to determine different inhalation reference levels based on the same study.

USEPA should emphasize the conservatism inherent in the ammonia RfC. The ammonia RfC is based on relatively mild, reversible respiratory effects such as respiratory irritation, and on a single NOAEL

exposure level. These observations, coupled with the use of an uncertainty factor of 30, reflect the conservatism inherent in the ammonia RfC.

1.7 Comments on Modeled Ammonia Air Concentrations vs. Observed Health Effect Levels

USEPA estimated an ammonia exposure concentration of 37 mg/m³ (3.7×10^4 µg/m³) for a car wash worker. As described above, revised ammonia exposure concentrations were derived for a car wash worker of 1.2 mg/m³, and 0.032 mg/m³ using more appropriate modeling parameters. Both the USEPA-derived exposure estimates and the appropriately-derived exposure estimates are well below levels at which serious adverse health effects occur. Therefore, USEPA should provide perspective on the conservatism of the RfC by comparing the calculated ammonia levels with documented health effect levels.

A number of published controlled human studies looked at reversible, "less serious" health effects from ammonia exposures up to 350 mg/m³ (ATSDR, 2004). At concentrations ranging up to 350 mg/m³, varying degrees of irritation were reported in at least some acute or short-term human studies. However, no serious or permanent human health effects were reported at this exposure level in humans (ATSDR, 2004).

For example, in an experimental study, six un-acclimated volunteers were exposed to 17.5, 35, or 70 mg/m³ ammonia in an industrial environment, for 2-6 hours/day, 5 days/wk, 6 weeks (Ferguson *et al.*, 1977). The physician conducting the medical exams noted some transient eye, nose, and throat irritation, but the subjects stated that they were not aware of the irritation and suffered no discomfort as a result of exposures up to 70 mg/m³ after the first week. The mild irritation was significantly less during the last three weeks of the study. Overall, the medical exams found no significant differences between the exposed volunteers and the controls based on measures of respiratory function and neurological tests. The study authors concluded that "continuous exposure to 100 ppm [70 mg/m³], with occasional excursions to 200 ppm [140 mg/m³], is easily tolerated and has no observed effect on general health" (Ferguson *et al.*, 1977). The 70 mg/m³ is about twice as high as USEPA's modeled concentration of 37 mg/m³.

In another experimental study, 16 volunteers were exposed to ammonia concentrations ranging from 35 to 98 mg/m³ for a period of two hours (Verberk, 1977). Although there was slight irritation to the eyes, nose, and throat at 35 mg/m³, and severe irritation at 98 mg/m³ (such that it caused the subjects to leave the testing chamber early), there was no effect on pulmonary function tests at any of the doses tested. In a study by MacEwen *et al.* (1970, as cited in USEPA, 2005; ATSDR, 2004), four out of six volunteers reported moderate irritation (but not "discomforting or painful") when exposed to 35 mg/m³, but not 21 mg/m³, for ten minutes. Lastly, exposure to 350 mg/m³ ammonia for 30 minutes caused reversible respiratory symptoms, including nasal and throat irritation, increased respiratory rates, and lacrimation

(Silverman *et al.*, 1949).

Overall, ammonia exposures at or below 37 mg/m³ (USEPA's estimated exposure concentration) for extended durations are well below levels that cause serious or permanent adverse effects (ATSDR, 2004; Ferguson *et al.*, 1977; Holness *et al.*, 1989). Exposures at 1.2 mg/m³ or 0.032 mg/m³ (the appropriate revised exposure estimates) are unlikely to result even in slight irritation, let alone serious or permanent adverse effects. Brief exposures to ammonia concentrations ranging from about 35 to 350 mg/m³ may cause transient irritation of the eyes, nose, skin, and respiratory tract, but, as noted above, are below levels that cause serious or permanent adverse effects (ATSDR, 2004; Verberk, 1977; MacEwen *et al.*, 1970 (as cited in USEPA, 2005; ATSDR, 2004); Silverman *et al.*, 1949). There are no reported cumulative effects from repeated exposures to ammonia at the concentrations modeled by USEPA or the more appropriate concentrations included in this document.

1.8 Comments on Modeled Ammonia Air Concentrations vs. Occupational Levels

Because the exposure scenario involves a potential car wash worker, USEPA should also compare the estimated ammonia exposure concentration to occupational exposure guidelines, to provide additional perspective on the likelihood of adverse health effects. The OSHA Permissible Exposure Limit (PEL) for ammonia is 35 mg/m³, averaged over an eight-hour workday (NIOSH, 2004). The NIOSH Recommended Exposure Limit (REL) for ammonia is 18 mg/m³ (a 10-hour time-weighted average), and the short-term exposure limit (STEL) is 27 mg/m³ (15-minute exposure period) (NIOSH, 2004). These occupational exposure limits are intended to reflect concentrations to which a worker can be repeatedly exposed without significant risk of adverse health effects. Given that USEPA's estimated exposure concentration for a car wash worker (37 mg/m³) is very similar to the OSHA PEL value of 35 mg/m³, and the appropriately derived exposure estimates of 1.2 mg/m³ and 0.032 mg/m³ are even lower, adverse health effects would not be expected for a future car wash worker.

1.9 Conclusion

The use of groundwater in a car wash scenario should not be included in the risk assessment as a complete exposure pathway based on City of Woburn zoning and groundwater use restrictions and the fact that, even if a car wash were built in the site area, it would not be granted a permit to withdraw for use as process water (Brooks, 2005). However, if it is included, it should only be applied to the B-I zoning areas, and only using data from wells located in these areas, not using the summarized data for the Site and study area as a whole. Moreover, if the shower model is correctly applied to the data, whether in the B-I areas or erroneously for site-wide groundwater, no regulatory guidelines are exceeded.

1.10 References

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2.0 Comments on Ecological Risk Assessment

Katherine A. Fogarty, P.E., LSP, Senior Scientist, Menzie-Cura & Associates, Inc. prepared the Section 2.1 comments, and Stephen R. Hansen, Stephen R. Hansen and Associates prepared the Section 2.2 comments on the Draft Final Technical Memorandum, Evaluation of Ammonia and Supplemental Soil Data, Remedial Investigation/Feasibility Study, Industri-Plex Site, Woburn, Massachusetts prepared by Tetra Tech NUS, Inc. for USEPA and dated October 2005 and USEPA's subsequent Fact Sheet on the Site dated October 2005. These comments are based on a review of the portions of the documents that describe work done at or proposed for the HBHA Pond.

2.1 Comments on HBHA Pond as a Stormwater Detention Basin, Not an Aquatic Habitat

The comments made previously on USEPA's proposed plan (Bradley et al., 2005) provided details about the lack of an ecological habitat in the HBHA Pond due to its design as a stormwater detention basin. The addition of ammonia as a contaminant of concern for the HBHA Pond and subsequent remediation will not improve the habitat quality of the pond for benthic invertebrates and many fish species.

USEPA even acknowledges that the HBHA Pond was created to serve as a stormwater retention basin, and not ecological habitat. In USEPA's (TTNUS, 2005) Remedial Investigation (RI) report for the site, they state:

"The HBHA was constructed as a storm water retention area and control structure as part of an area-wide commercial development project. Based on a review of the limited available information, the design effort was directed towards management of flows during storm conditions and not towards developing a viable wetland habitat."

The design of HBHA Pond as a long deep water body with steep sidewalls limits the area of the pond available for a littoral zone, the zone in a pond that provides the highest quality habitat to invertebrates, fish, and wildlife, to a narrow band around the perimeter.

Because of this design, the HBHA Pond becomes thermally stratified in the summer. In thermally stratified ponds, the hypolimnion, or bottom layer, becomes anoxic in the summer months due to biodegradation of naturally occurring organic material. These characteristics of a stratified pond have been observed in HBHA Pond. USEPA's Proposed Plan will not change these characteristics, which are inherent because of the design of HBHA Pond.

As stated in our previous comments, the benthic invertebrate community in the hypolimnion of stratified lakes is usually not abundant or diverse because only a few species of invertebrates are tolerant of low dissolved oxygen concentrations (USEPA, 2003 and Moss, 1980). The main groups of species typically found below the thermocline are chironomid larvae, oligochaete worms, and phantom midge larvae (*Chaoborus*) (Wiederholm, 1980). If anoxia persists in a pond or lake, the invertebrate community in the

hypolimnion can be completely absent (USEPA, 2003). This condition has been observed in HBHA Pond, and will not be improved by remediation.

2.2 Comments on Application of the National Recommended Water Quality Criteria for Ammonia to HBHA Pond

Based on USEPA's Ecological Risk Assessment, USEPA concludes that ammonia is a COC in the Aberjona River Watershed that requires remedial action because the measured concentrations in the watershed exceed the USEPA chronic ambient water quality criterion. In reaching this conclusion, USEPA relies upon an evaluation of ammonia concentration data collected primarily between 1999 and 2001 in the Halls Brook Holding Area Pond (HBHA Pond). No data are presented or analyzed by USEPA for locations further downstream in the Aberjona River watershed. Therefore, the USEPA analysis does not address potential impacts to aquatic life in those portions of the Aberjona River Watershed that are appropriate for aquatic life. As previously discussed, the HBHA Pond is a storm retention basin, not an aquatic habitat.

A recent Master of Science Thesis by M. Cutrofello (August 2005) provides data that permit an initial evaluation of risk to aquatic life from ammonia toxicity in stretches of the Aberjona River Watershed downstream of the HBHA Pond. These data are summarized in Table 2-1 for locations starting at the outlet of the HBHA Pond, continuing through the HBHA Wetland, and proceeding down the Aberjona River to the Mystic Lakes Dam. It should be noted that the data are *limited* because they are instantaneous measures of ammonia and the USEPA chronic criterion (CCC), which is the first-tier yardstick for potential risk to aquatic life, is a 30-day average. However, in spite of the limitations, the data indicate the following:

- Concentrations of total ammonia decrease downstream in the watershed (see Table 2-1).
- Exceedances of the USEPA chronic criterion are probably infrequent at the outlet of the HBHA Pond, rare at the outlet of the HBHA wetland, and extremely rare, if at all, further downstream (see Table 2-2).

The estimation of potential exceedances of the USEPA chronic criterion was made by comparing the measured instantaneous total ammonia concentrations with the calculated CCC (based on measured temperature and pH of the ambient water). This comparison is presented in Table 2-2 and observations made from these data are described below.

At the outlet of the HBHA Pond, Cutrofello made measurements on 8 occasions from March 2004 to March 2005. Of these 8, seven had associated pH and temperature data to permit calculation of the CCC. Comparison of the measured ammonia concentrations and the CCC indicate that on one occasion, the instantaneous measurements exceeded the applicable 30-day average CCC. On three other occasions, the measured concentrations were slightly above the CCC, but within normal analytical certainty of $\pm 10\%$. It is unlikely that these slight exceedances would be statistically or biologically significant. There are insufficient data to determine whether the exceedances based on instantaneous

measurements would have been exceedances of a 30-day average, as specified in the CCC, if data collection had been more frequent.

At the outlet of the HBHA Wetland, Cutrofello made measurements on 10 occasions from March 2004 to March 2005. Of these 10, eight had associated pH and temperature data to permit calculation of the CCC. Comparison of the measured ammonia concentrations and the CCC indicate that on only one occasion did the instantaneous measurement exceed the applicable 30-day average CCC. On two other occasions, the measured concentrations were slightly above the CCC, but within normal analytical certainty of $\pm 10\%$. It is unlikely that these slight exceedances would be statistically or biologically significant. There are insufficient data to determine whether the exceedances detected based on instantaneous measurements would have been exceedances of a 30-day average, as specified in the CCC, if data collection had been more frequent.

On the Aberjona River at Route 128, Cutrofello made measurements on 28 occasions from January 2003 to August 2004. Of these 28, twenty-three had associated pH and temperature data to permit calculation of the CCC. Comparison of the measured ammonia concentrations and the CCC indicate that on no occasion did the instantaneous measurement exceed the applicable 30-day average CCC. On only one occasion was the measured concentration slightly above the CCC, but within normal analytical certainty of $\pm 10\%$. It is unlikely that this slight exceedance would be statistically or biologically significant.

Further downstream on the Aberjona River, there were no instantaneous measurements of total ammonia that exceeded the calculated CCC at any of the stations sampled (see Table 2-3).

2.3 Conclusions

- **USEPA did not take the limited aquatic habitat of HBHA Pond into account in their analysis. Even under the best of conditions, HBHA Pond is a stormwater retention basin and not a quality ecological habitat. Remediation to be conducted under USEPA's Proposed Plan will not improve the quality of the benthic invertebrate habitat in HBHA Pond.**
- **Measured instantaneous ammonia concentrations exceeded the applicable 30-day average CCC in amounts that were statistically significant only during 1 of 7 sampling events at HBHA Pond Outlet and 1 of 8 sampling events at HBHA Wetland Outlet. Of 23 samples collected from the Aberjona River at Route 128, immediately downstream of the HBHA Wetland, none exceeded the applicable 30-day average CCC for ammonia. Further downstream on the Aberjona River, there were no instantaneous measurements of total ammonia that exceeded the calculated CCC at any of the stations sampled.**

2.4 References

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3.0 Comments on Ammonia Removal in HBHA Pond

Dr. Roger L. Olsen, Vice President, Camp, Dresser and McKee Inc. prepared these comments on ammonia degradation in Halls Brook Holding Area Pond.

Water samples from Halls Brook, HBHA Pond Outlet, HBHA Wetlands Outlet and depth profiles in the south and north portions of HBHA Pond were recently collected and analyzed for ammonia ($\text{NH}_4^+ + \text{NH}_3$) and nitrate concentrations (Figure 3-1) (Master of Science Thesis, M. Cutrofello, August 2005). Samples were collected on March 24, 2004; May 7, 2004; June 14, 2004; July 21, 2004; August 17, 2004; August 27, 2004; September 24, 2004; October 22, 2004; November 11, 2004; and March 22, 2005. There are four data sets that can be used to determine a 30-day average for ammonia because these samples were collected within 30 days of each other: samples collected August 17 and 27, 2004; August 27 and September 24, 2004; September 24 and October 22, 2004; and October 22 and November 11, 2004 (Tables 3-1 and 3-2). While two data points in a 30-day period are not an adequate data set for calculation of a 30-day average, it is interesting to note that the shallow oxic waters in the north and south ends of HBHA Pond have an average ammonia chronic criterion quotient of 0.9 and 1.0 while the deep anoxic waters have an average ammonia chronic criterion of 30 and 4.8:

Comparison of August to November 2004 Ammonia Quotients in HBHA Pond to Ambient Water Quality Criteria

Sample Dates	North End HBHA Pond		South End HBHA Pond	
	Shallow Water	Deep Water	Shallow Water	Deep Water
August 17 and 27, 2004	1.0	41	1.2	3.5
August 27 and September 24, 2004	0.8	27	1.1	2.5
September 24 and October 22, 2004	0.7	11	0.8	5.0
October 22 and November 11, 2004	<u>1.0</u>	<u>39</u>	<u>1.0</u>	<u>8.2</u>
Average	0.9	30	1.0	4.8

Similar to the other contaminants of concern for HBHA Pond surface water, arsenic and benzene, the ammonia criterion is exceeded in the anoxic bottom water. However, shallow water in HBHA Pond does not exceed the 30-day ammonia criterion. Clearly, ammonia is attenuating as it moves from deeper anoxic to shallower oxic waters in HBHA Pond.

Evaluation of vertical profile data for the north and south ends of HBHA Pond (Tables 3-1 and 3-2, respectively) and ammonia flux at the Halls Brook inlet to HBHA Pond and at the outlet of HBHA Pond (Table 3-3) indicate that:

- A significant amount of the load of ammonia at the HBHA Pond Outlet is due to Halls Brook (39 to 74 percent, average of 54 percent).
- Concentrations of ammonia decrease dramatically from the bottom of HBHA pond to the surface.

- The concentration decrease in ammonia is consistent with the decrease in arsenic concentration and is associated with the chemocline (specifically the transition from the anoxic to oxic zones).
- The chemocline and anoxic/oxic transition is stable in the northern part of the pond even during high flow events.
- The instantaneous concentrations of ammonia in the shallow layer of HBHA Pond were substantially below the ammonia CMC and typically below or very near the CCC.
- Typically the concentrations of ammonia at the HBHA Wetlands Outlet were lower than the concentrations at the HBHA Pond Outlet. Only one time was the concentration greater at the wetland outlet (March 24, 2004).
- These data provide further evidence that ammonia entrained in groundwater discharging to HBHA Pond is attenuated as it migrates through the surface water column and is below or very near the CCC in the shallow waters of the pond, which discharge through the HBHA Pond Outlet to the HBHA Wetland where additional ammonia removal occurs (see Section 4.0)

Major conclusions related to USEPA's proposed remedial actions include:

- Sediment removal in the HBHA pond would eliminate a sink and attenuation mechanism for the ammonia.
- The flow enhancements proposed in the August 31, 2005 Alternative Remedial Action Plan for HBHA Pond will further enhance ammonia attenuation and reduce concentrations at the pond outlet (eg, longer flow paths, higher hydraulic retention time and enhanced nitrification capacity).
- The reactive cap proposed in the August 31, 2005 Alternative Remedial Action Plan should not substantially affect the chemocline and the attenuation of ammonia in the pond. Selected reactive media may decrease the pH slightly resulting in higher ammonia criteria (less ammonia and more ammonium ion).
- Overall, the enhancements proposed in the August 31, 2005 Alternative Remedial Action Plan should result in concentrations of ammonia below criteria at the HBHA Pond and Wetland Outlets (see Section 4.0).

4.0 Comments on Ammonia Removal in HBHA Wetlands

Mr. Walter H. Eifert, Principal Hydrologist, Roux Associates, Inc. prepared these comments on ammonia removal in HBHA wetlands.

4.1 Ammonia Removal in HBHA Wetlands

As discussed previously, the existing instantaneous data do not indicate that there are statistically significant exceedances of the 30-day average ammonia CCC at the HBHA Pond outlet. Even so, current data indicate that there already is ammonia removal occurring in the HBHA wetlands. A recent study (Cutrofello, 2005) reported that the existing HBHA Wetlands removed approximately 26 percent of ammonia entering the Wetlands from HBHA Pond during normal dry weather flow conditions (Table 4-1). While ammonia removal to these levels is typical in natural wetlands systems, enhancements can be designed and retrofitted to further improve ammonia removal efficiencies. Examples of applicable enhancements could include a lengthening of the hydraulic retention time (HRT) through the creation of more torturous flow paths throughout the system, the installation of strategically sized and placed ponds and micro-pools, and the manipulation and sequencing of vegetation plantings to enhance ammonia removal efficiencies. The design and placement of each enhancement feature would be closely engineered to optimize specific ammonia removal mechanisms such as nitrification/denitrification, volatilization and adsorption. Collectively, such enhancements constitute a highly engineered and designed Constructed Treatment Wetland (CTW) system; a treatment technology widely applied throughout the world for a variety of wastewater treatment applications. The HBHA wetlands enhancements proposed by Pharmacia Corporation and Stauffer Management Company LLC in the August 31, 2005, Alternative Remedial Action Plan (Figure 4-1), are in essence a Free Water Surface type (FWS) CTW. Importantly, the enhancements as initially proposed would further reduce ammonia concentrations in the discharge from the HBHA wetlands outlet. Thus, there presently is no indication that further ammonia remediation is warranted beyond that which would be effected by the August 31, 2005, proposal.

CTWs are recognized as one of the most efficient and cost-effective technologies for ammonia removal in domestic, agriculture and industrial wastewater (WPCF, 1990). Free Water Surface CTWs, such as that proposed by Pharmacia Corporation and Stauffer Management Company LLC in the August 31, 2005, Proposed Plan, have been widely used in the United States to treat animal wastes containing relatively high levels of BOD₅, TSS, and ammonia (Payne Engineering and CH2M Hill, 1997). Kadlec and Knight (1995) report an average first-order nitrification rate constant in FWS treatment wetlands of 0.29 day⁻¹. Demin et al. (2002) found ammonia was removed at a rate of 2.3 g m⁻² day⁻¹ in a 3.5-acre FWS-type CTW (hydraulic retention time (HRT) approximately 2 hours) in a three year study of the treatment of mine water containing 3.5-4.5 mg/L ammonia and 12 mg/L of ferrous iron in West Yorkshire, UK. Horne (1995) reported that a FWS CTW has been used as a polishing step to treat stabilization pond and activated

sludge plant effluent containing 2-14 mg/L nitrate (as nitrogen) and 25 mg/L ammonia (as nitrogen).

Important ammonia removal processes incorporated into the CTW enhancements proposed by Pharmacia Corporation and Stauffer Management Company LLC (August 31, 2005, Proposed Plan) include microbial nitrification and denitrification reactions, plant uptake, matrix adsorption, and ammonia volatilization. Microbial-mediated processes are considered to be responsible for up to 90% of ammonia removal in FWS-type CTWs (Demin et al., 2002; WPCF, 1990). Radial oxygen loss in the plant rhizosphere stimulates aerobic nitrification and also provides a facultative environment for both nitrification and denitrification reactions (Tanner et al., 1995; Brix, 1987). Plant uptake was identified to be the dominant ammonia nitrogen removal mechanism in a laboratory upflow macrophyte system planted with common reed (*Phragmites australis*) (Farahbakhshazad and Morrison, 1997). This is the same dominant species present in the HBHA Wetlands.

Theoretically, the nitrification process requires approximately 4.3 mg/L oxygen to convert 1.0 mg/L ammonia nitrogen to nitrate (Tchobanoglous, 1991). A previous study reported that the soil oxygenation rate in reed bed free water surface (FWS) CTW systems ranged from 0.02 to 12 g of O₂ m⁻²d⁻¹ (Armstrong et al., 1990; Brix and Schierup, 1990). The nitrogen removal efficiency in FWS wetlands can be enhanced through design and configuration modifications, such as alternating shallow water emergent vegetated zones with deeper water zones containing selected species of submerged aquatic vegetation. Such modifications served as the basis for design of the enhancements proposed in the August 31, 2005, Proposed Plan (Figure 4.1). The submerged vegetation provides a completely exposed open water surface for atmospheric re-aeration and root zone aeration through radial oxygen loss mechanisms (USEPA, 2000). The pond-marsh-pond configuration combined with the installation of natural flow deflectors and open water pools in the sequential low-marsh, high-marsh, low-marsh CTW proposed by Pharmacia Corporation and Stauffer Management Company LLC in the August 31, 2005, Proposed Plan (Figure 4-1) would significantly improve ammonia nitrogen removal through oxygenation enhancements, creation of the substrates to support nitrification/denitrification mechanisms, and increased hydraulic retention time. Based upon the reported average nitrification rate constant of 0.29 day⁻¹ (Kadlec and Knight, 1995), the August 31, 2005 proposed HBHA Wetlands Enhancement Plan would provide approximately 1.8 days of hydraulic retention time and reduce ammonia concentrations by up to 40%, as compared to 26% ammonia removal rate reported for the existing HBHA Wetlands (Cutrofello, 2005).

Finally, in the unlikely event that further reductions in ammonia concentrations are required, additional enhancements to the Pharmacia Corporation and Stauffer Management Company LLC Proposed Plan can be installed to achieve up to a 70% ammonia removal rate in the HBHA Wetlands. The potential enhancements would consist of the installation of appropriately designed and sized Subsurface Flow-type (SSF) CTW cells in an area immediately downgradient of the HBHA Pond Outlet. The SSF cells would be

passively operated and create no negative impact on the stormwater management functions of the HBHA system.

4.2 Conclusions

Measured instantaneous ammonia concentrations at the HBHA Pond Outlet only exceeded the applicable 30-day average CCC in a statistically significant manner during 1 of 7 sampling events. Similarly, only 1 of 8 sampling events exceeded the ammonia CCC criterion at the HBHA Wetlands Outlet. Collectively, these findings indicate that ammonia is attenuated in the Halls Brook Holding Area to the point where concentrations are below regulatory criteria a large majority of the time. Furthermore, the HBHA Wetlands are currently removing about 26 percent of the ammonia entering the system from the HBHA Pond. Importantly, the measured instantaneous ammonia concentrations generally meet the applicable 30-day average CCC at HBHA Wetland Outlet with the exception of one exceedance out of 8 measurements from March 2004 to March 2005 (see Section 2.2). Installation of the free water surface CTW system proposed in Pharmacia Corporation's and Stauffer Management Company LLC's August 31, 2005 comments on USEPA's June 2005 Proposed Plan, will further increase ammonia removal in HBHA Wetlands to levels at or below regulatory limits. Based on the observations presented and discussed herein, the following conclusions were developed from this review:

- The current HBHA Wetlands have been reported to reduce ammonia concentrations in HBHA Pond discharge by 26% (Cutrofello, 2005).
- Only one slight exceedance of the 30-day average CCC criteria for ammonia was observed at the HBHA Wetlands outlet under its existing configuration (June 14, 2004 Cutrofello data).
- The wetlands enhancements proposed for the HBHA Wetland system in Pharmacia Corporation's and Stauffer Management Company LLC's, August 31, 2005 Proposed Plan are projected to reduce ammonia concentrations entering the system by 40% under baseflow conditions.
- Realization of this level of ammonia removal would have reduced the single June 14, 2004 ammonia exceedance (i.e., 6.06 mg/L) at the HBHA wetlands outlet to 3.93 mg/L; below the corresponding 4.38 mg/L CCC criteria for ammonia.
- Ammonia is being attenuated in the HBHA Wetlands to levels near or below CCC criteria for baseflow discharges from the HBHA Pond. The proposed enhancements will improve the level of ammonia attenuation by as much as 40% at the HBHA Wetlands Outlet and likely preclude future exceedances under normal base flow conditions.
- In the unlikely event that additional ammonia removal is required, supplemental CTW enhancements (i.e., the installation of SSF-type CTW cells) can be used to increase ammonia removal efficiencies to levels of up to 70% in the proposed HBHA CTW system.

4.3 References

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5.0 Other Comments

5.1 Scouring of Deep Sediments

The Aberjona Study Coalition provided one comment on USEPA's 2005 Proposed Plan that requires a response or additional comment. It is:

- USEPA does not take into account the possible ecological impact of deep sediment contamination.

The text of the comment reads:

"As we commented in October 2003 (Zemba *et al.*, 2003), in the 2003 Baseline Ecological Risk Assessment (BERA), USEPA did not justify its decision not to sample sediment depths lower than 6 inches. In the current BERA, this problem has continued. In Appendix E.4 – Baseline Ecological Risk Assessment Supplemental Data of the Baseline Human Health and Ecological Risk Assessment Report – concentrations of Contaminants of Potential Concern (COPCs) from 1-2 foot, 2-3 foot and 3-4 foot were not presented nor discussed in the text. The concern of resuspension of deep sediments that may be contaminated was not addressed. Deeper contamination in sediments may exist beyond Reach 1, but the data have not been provided. Additionally, no remediation is proposed beyond Reach 0. Risk management actions, such as land use restrictions, could be taken to prevent scouring and erosion of contaminated deeper sediments."

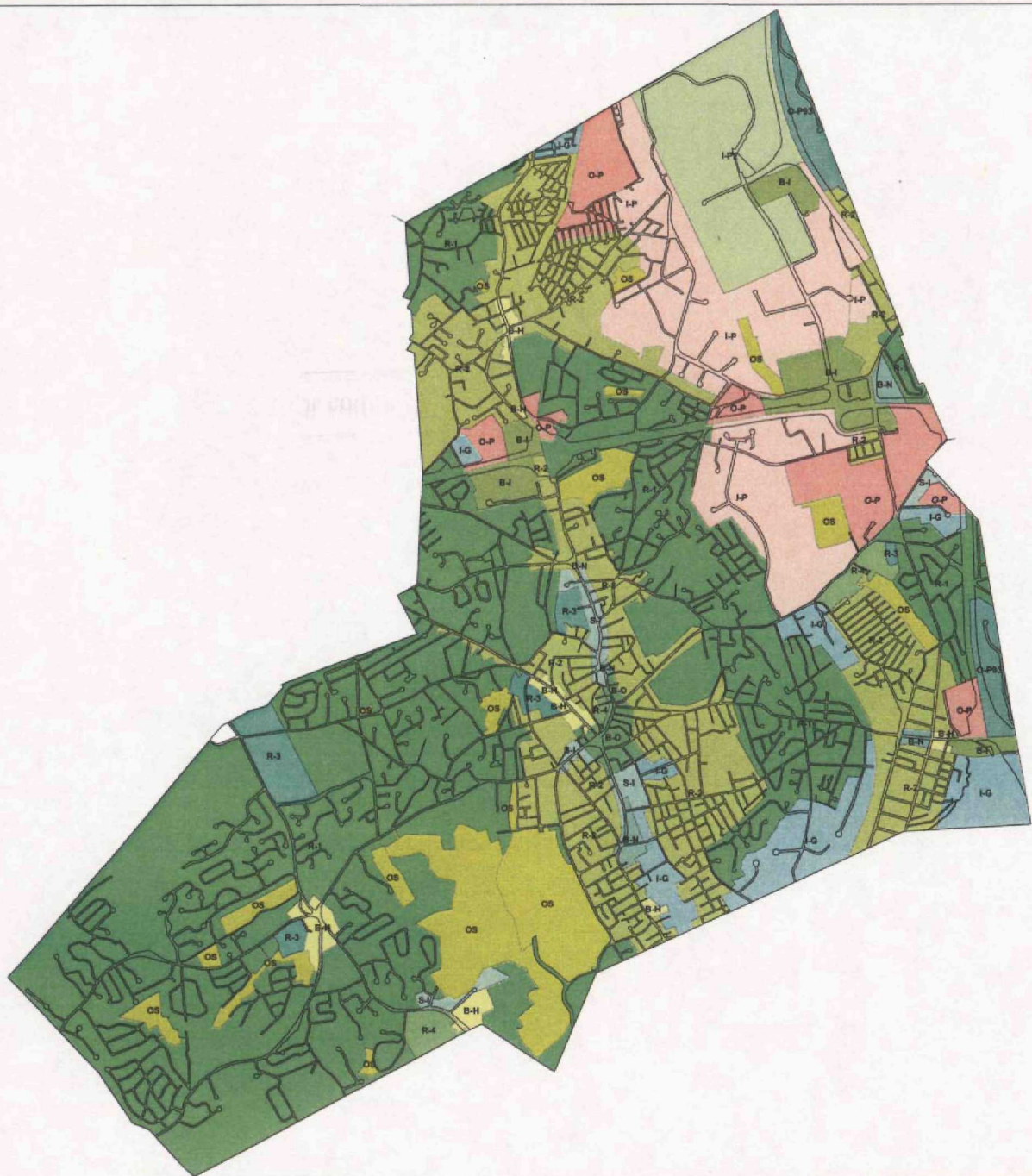
HBHA Pond, the subject of this discussion is in Reach 1. Ample data exist that demonstrate the HBHA Pond was designed to be and is functioning as a stormwater detention basin. As such, it is a depositional environment where some contaminants, such as arsenic associated with iron oxide particles, settle out. Concerns have been raised and addressed in previous comments (Bradley *et al.*, 2005) over the stability of the oxic/anoxic boundary under severe flooding conditions. The oxic/anoxic boundary persists under conditions studied at the pond including flooding conditions (Bradley *et al.*, 2005). Since turbulence due to high flow does not break down this boundary, it will not scour sediment out of the bottom of the pond. Therefore, there is no reason to address scouring in the Baseline Ecological Risk Assessment or in the planned remediation.

5.2 References

Bradley, L.J.N., K.A. Fogarty, R.L. Olsen, W.H. Eifert, A.S. Fowler, and L. McTiernan, 2005. Comments on USEPA's June 2005 Proposed Plan, Multiple Groundwater Source Response Plan Study Area, Woburn, Massachusetts, prepared for Pharmacia Corporation and Stauffer Management Company LLC.

Zemba, S., R. Lester., K. Slatterhorn., J. Durant., R. Gehl, B. Potocki., and S. Smith, 2005. Comments on the Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation and MSGRP Feasibility Study and Proposed Plan, Industri-Plex Site, Woburn, Massachusetts, prepared for the Aberjona Study Coalition, Inc., August 31, 2005.

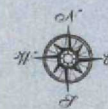
ZONING MAP



Zoning Legend

R-1	Single Family	B-N	Business Neighborhood
R-2	Single & Two Family	I-G	General
R-3	Townhouse & Garden Apts.	I-P	Industrial Park
R-4	Apartment, Other	I-P2	Industrial Park
B-D	Business Downtown	O-P	Office Park
B-H	Business Highway	O-P93	Office Park
B-I	Business Industrial	OS	Open Space
		S-I	Mixed Use

CITY OF WOBURN ENGINEERING DEPARTMENT



0 1,000 2,000 4,000
Feet

Effective April 15, 1985
Revised through March 2, 2004

Revisions	By	Description
August 28, 2002	BFG	Open Space
August 28, 2002	BFG	Dragon Ct R-2
December 20, 2002	BFG	Salem St R-3
March 15, 2003	BFG	Longwood Ave R-2
July 3, 2003	BFG	Salem St R-3 CP
September 26, 2003	BFG	Salem St R-4 CP
March 2, 2004	BFG	Grove St R-2

FIGURE: 3-1

TITLE: USEPA and Tufts University Halls Brook
Holding Area Pond Sampling Locations

LOCATION: Multiple Source Groundwater Response Plan Study Area, Woburn, Massachusetts.



Menzie • Cura & Associates, Inc.
Environmental Consultants

NOTES: Prepared for Pharmacia Corporation and
Stauffer Management Company





OPEN WATER



LOW HEAD DIKE



LOW MARSH



FLOW DEFLECTOR



HIGH MARSH



SILT FENCE



RIPRAP



FLOW DIRECTION

0' 300'



TOP

AUGUST 31, 2005 PROPOSED ENHANCED SEDIMENT RETENTION AND WETLAND ENHANCEMENT CONCEPTUAL PLAN

HALLS BROOK POND HOLDING AREA (HBHA), WOBURN, MA

Prepared For:

PHARMACIA CORPORATION AND
STAUFFER MANAGEMENT COMPANY

ROUX

ROUX ASSOCIATES INC.
Environmental Consulting
& Management

DESIGNED BY: A.L.

PREPARED BY: A.L.

PROJECT MGR: W.E.

DATE: 8/31/05

DATE: 8/31/05

DATE: 8/31/05

DATE: 8/31/05

PROJECT: 114401403

4-1

Table 2.1. Total Ammonia (mg/l) Measured in Aberjona River Watershed (Cutrofello 2005)

Date	HBHA Pond Outlet	HBHA Wetland Outlet	Route 128	Salem & Cedar Sts	Montvale Ave	Swanson St	USGS Gauge	Mystic Lakes Dam
1/16/03			3.74		2.84		1.42	
1/24/03			3.70		3.25		1.63	
2/7/03			3.14		2.40		1.38	
2/21/03			3.22		2.95		1.58	
3/8/03			4.05		2.65		1.21	
3/22/03			3.98		2.83		0.99	
4/16/03			0.62		0.64		0.17	
6/2/03								
6/18/03			0.75		0.42		0.45	
7/2/03								
7/16/03			2.30	2.37	0.48		0.26	0.10
7/30/03			1.12				0.35	0.34
8/13/03			1.95		1.06		0.26	0.03
8/28/03			2.99		0.38		0.26	
9/16/03			3.48		0.75		0.16	0.03
9/19/03			2.52		1.39		0.46	0.04
9/23/03			1.11		0.28		0.38	
10/3/03			5.76		2.36		0.25	0.19
10/24/03			5.22		2.73		0.87	0.24
11/20/03			3.68	3.63	2.47		0.88	0.31
12/17/03			1.92	1.54	1.27		0.54	0.44
2/4/04			8.04	4.92	3.82		1.14	0.47
3/5/04			4.52	3.86	3.24		1.22	0.57
3/12/04							1.19	
3/24/04	5.44	7.92						
3/31/04							0.35	
4/9/04			2.71	2.19	1.71		0.45	0.48
4/23/04			2.38	0.98	0.69		0.32	0.27
5/7/04	4.62	3.91						
5/17/04			2.95	2.03	1.43		0.39	0.20
6/14/04	6.63	6.06						
6/22/04			4.29	3.74	2.08		0.57	0.19
7/8/04							0.37	
7/21/04	6.10	3.61						
7/28/04						0.23	0.15	
8/5/04			3.04	0.80	0.52	0.19	0.11	0.01
8/17/04		2.75						
8/27/04	4.52	3.25						
9/8/04							0.30	
9/24/04	4.25	3.18						
9/28/04					0.37	0.24	0.23	
10/22/04		4.96						
11/11/04	10.79	8.09						
3/22/05	6.29	6.46						

Table 2.2. Total Ammonia in the Aberjona Watershed (Cutrofello 2005)

Date	Total Ammonia Concentrations (mg/l)					
	Measured at HBHA Outlet	Calculated EPA CCC	Measured at Wetland Outlet	Calculated EPA CCC	Measured at Route 128	Calculated EPA CCC
1/16/03					3.74	
1/24/03					3.70	
2/7/03					3.14	10.80
2/21/03					3.22	10.64
3/8/03					4.05	10.89
3/22/03					3.38	10.64
4/16/03					0.62	
6/18/03					0.75	5.69
7/16/03					2.30	4.11
7/30/03					1.12	3.26
8/13/03					1.95	3.65
8/28/03					2.99	3.57
9/16/03					3.48	4.37
9/19/03					2.52	4.82
9/23/03					1.11	4.55
10/3/03					5.76	7.71
10/24/03					5.22	10.06
11/20/03					3.68	8.65
12/17/03					1.92	10.15
2/4/04					8.04	9.01
3/5/04					4.52	10.46
3/24/04	5.44	10.44	7.92	8.73		
4/9/04					2.71	8.31
4/23/04					2.38	7.12
5/7/04	4.62	4.39	3.91	3.90		
5/17/04					2.95	4.58
6/14/04	6.63	4.89	6.06	4.38		
6/22/04					4.29	4.23
7/21/04	6.10		3.61			
8/5/04					3.04	4.61
8/17/04			2.75	3.88		
8/27/04	4.52	4.07	3.25	3.11		
9/24/04	4.25	4.99	3.18			
10/22/04			4.96	6.87		
11/11/04	10.79	10.46	8.09	9.82		
3/22/05	6.29	9.50	6.46	8.02		
# Comparisons	7		8		23	
# of Probably Significant Instantaneous Exceedences	1		1		0	
# of Probably Insignificant Instantaneous Exceedences	3		2		1	

Table 2.3. Total Ammonia (mg/l) Measured in Aberjona River Downstream of Route 128 (Cutrofello 2005)

Date	Measured at Salem & Cedar Sts	Calculated EPA CCC	Measured at Montvale Ave	Calculated EPA CCC	Measured at Swanson St	Calculated EPA CCC	Measured at USGS Gauge	Calculated EPA CCC	Measured at Mystic Lakes Dam	Calculated EPA CCC
1/16/03			2.84				1.42			
1/24/03			3.25				1.63			
2/7/03			2.40	6.86			1.38	10.44		
2/21/03			2.95	10.28			1.58	10.33		
3/8/03			2.65	11.00			1.21	10.48		
3/22/03			2.83	12.12			0.99	10.20		
4/16/03			0.64				0.17			
6/18/03			0.42	5.71			0.45	4.79		
7/16/03	2.37		0.48	7.03			0.26	3.73	0.10	1.99
7/30/03							0.35	3.49	0.34	1.35
8/13/03			1.06	3.59			0.26	3.35	0.03	0.45
8/28/03			0.38	4.19			0.26	3.53		
9/16/03			0.75	4.57			0.16	4.04	0.03	0.29
9/19/03			1.39	5.05			0.46	4.81	0.04	1.27
9/23/03			0.28	4.54			0.38	4.38		
10/3/03			2.36	8.24			0.25	6.58	0.19	3.12
10/24/03			2.73	10.12			0.87	8.22	0.24	5.77
11/20/03	3.63	8.34	2.47	8.37			0.88	7.82	0.31	7.08
12/17/03	1.54	10.23	1.27	10.48			0.54	8.64	0.44	8.07
2/4/04	4.92	7.96	3.82	10.60			1.14	7.38	0.47	5.41
3/5/04	3.86	10.35	3.24	10.64			1.22	9.31	0.57	8.59
3/12/04							1.19	10.56		
3/31/04							0.35	10.37		
4/9/04	2.19	8.36	1.71	9.09			0.45	6.85	0.48	6.32
4/23/04	0.98	7.46	0.69	7.50			0.32	6.51	0.27	2.71
5/17/04	2.03	4.99	1.43	4.73			0.39	3.78	0.20	1.50
6/22/04	3.74	3.80	2.08	4.39			0.57	4.32	0.19	1.99
7/8/04							0.37	4.29		
7/26/04					0.23		0.15			
8/5/04	0.80	4.52	0.52	4.79	0.19	4.40	0.11	4.39	0.01	1.61
9/8/04							0.30	3.85		
9/28/04			0.37		0.24		0.23			
# Comparisons	9		22		1		27		16	
# of Probably Significant Instantaneous Exceedences	0		0		0		0		0	
# of Probably Insignificant Instantaneous Exceedences	0		0		0		0		0	

Table 3-1

Comparison of August to November 2004 Ammonia Quotients in the North End of HBHA Pond to Ambient Water Quality Criteria

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

HBHA Pond Sampling Location	Surface or Bottom	Date	Depth in cm	Depth in feet	Temperature °C	pH	Specific Conductance uS/cm	Dissolved Oxygen mg/l	Ammonia Nitrogen mg N/L	Chronic Ammonia Criterion	Chronic Criterion Quotient	Acute Ammonia Criterion	Acute Criterion Quotient	Average Chronic Quotient Top Layer	Average Chronic Quotient Bottom Layer
North Basin	S	17-Aug-04	25	0.8	19.97	6.63	483	5.9	4.61	4.60	1.0	46	0.10	1.0	41
	S	17-Aug-04	200	6.6	17.4	6.36	696	3.4	3.83	5.63	0.68	51	0.07		
	S	27-Aug-04	25	0.8	22.5	6.55	683	6.8	4.95	3.96	1.3	48	0.10		
	S	27-Aug-04	175	5.7	18.08	6.26	725	4	6.36	5.44	1.2	52	0.12		
	D	27-Aug-04	200	6.6	16.4	6.05	1,850	1.5	24.84	6.14	4.0	55	0.45		
	D	17-Aug-04	225	7.4	16.6	6.55	1,500	1.4	27.28	5.79	4.7	48	0.57		
	D	17-Aug-04	275	9.0	14.85	6.91	9,250	0.4	429.37	5.97	72	39	11		
	D	27-Aug-04	225	7.4	14.75	6.09	3,000	0.41	61.20	6.82	9.0	54	1.1		
North Basin	D	27-Aug-04	275	9.0	14.47	6.58	9,850	0.38	750.00	6.61	114	47	16	0.8	27
	S	27-Aug-04	25	0.8	22.5	6.55	683	6.8	4.95	3.96	1.3	48	0.10		
	S	27-Aug-04	175	5.7	18.08	6.26	725	4	6.36	5.44	1.2	52	0.12		
	S	24-Sep-04	25	0.8	20.13	6.77	711	6.71	1.10	4.42	0.25	43	0.026		
	S	24-Sep-04	175	5.7	15.32	6.39	757	3.63	3.67	6.42	0.57	51	0.07		
	D	27-Aug-04	200	6.6	16.4	6.05	1,850	1.5	24.84	6.14	4.0	55	0.45		
	D	27-Aug-04	225	7.4	14.75	6.09	3,000	0.41	61.20	6.82	9.0	54	1.1		
	D	27-Aug-04	275	9.0	14.47	6.58	9,850	0.38	750.00	6.61	114	47	16		
North Basin	D	24-Sep-04	200	6.6	14.54	6.42	2,530	0.82	12.41	6.72	1.8	50	0.25	0.7	11
	D	24-Sep-04	225	7.4	13.99	6.53	3,070	0.56	26.07	6.87	3.8	48	0.54		
	D	24-Sep-04	275	9.0	13.64	6.91	10,110	0.42	177.68	6.45	28	39	4.6		
	D	22-Oct-04	200	6.6	10.67	6.61	770	5.9	11.58	8.40	1.4	47	0.25		
	D	22-Oct-04	225	7.4	12.62	6.5	2,970	3.81	158.06	7.53	21	49	3.2		
	S	24-Sep-04	25	0.8	20.13	6.77	711	6.71	1.10	4.42	0.25	43	0.026		
	S	24-Sep-04	175	5.7	15.32	6.39	757	3.63	3.67	6.42	0.57	51	0.07		
	S	22-Oct-04	25	0.8	10.59	6.96	619	7.7	7.64	7.73	0.99	37	0.20		
North Basin	S	22-Oct-04	175	5.7	10.27	6.92	663	7.4	7.45	7.99	0.93	39	0.19	1.0	39
	S	11-Nov-04	25	0.8	6.3	6.58	1,050		10.91	10.70	1.0	47	0.23		
	S	11-Nov-04	175	5.7	6.22	6.7	930		12.76	10.46	1.2	45	0.29		
	D	22-Oct-04	200	6.6	10.67	6.61	770	5.9	11.58	8.40	1.4	47	0.25		
	D	22-Oct-04	225	7.4	12.62	6.5	2,970	3.81	158.06	7.53	21	49	3.2		
	D	11-Nov-04	225	7.4	8.7	6.58	3,600		254.15	9.59	27	47	5.4		
	D	11-Nov-04	250	8.2	11.4	6.64	6,900		558.52	7.97	70	46	12.2		
	D	11-Nov-04	300	9.8	12.3	6.75	9,600		569.69	7.35	77	43	13.2		

Table 3-2

Comparison of August to November 2004 Ammonia Quotients in the South End of HBHA Pond to Ambient Water Quality Criteria

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

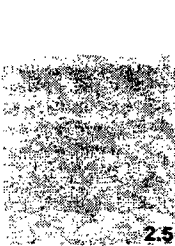
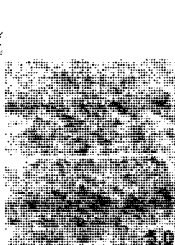
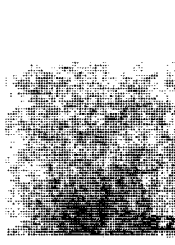
HBHA Pond Sampling Location	Surface or Bottom	Date	Depth in cm	Depth in feet	Temperature °C	pH	Specific Conductance uS/cm	Dissolved Oxygen mg/l	Ammonia Nitrogen mg N/L	Chronic Criterion	Chronic Quotient	Acute Ammonia Criterion	Acute Criterion Quotient	Average Chronic Quotient Top Layer	Average Chronic Quotient Bottom Layer
South Basin	S	17-Aug-04	25	0.8	21.43	6.71	479	5.72	3.58	4.12	0.87	44	0.08	1.2	
	S	27-Aug-04	25	0.8	24.84	6.6	692	7.3	4.98	3.37	1.5	47	0.11		
	D	17-Aug-04	375	12.3	18.37	6.55	667	3	4.21	5.16	0.82	48	0.09		
	D	17-Aug-04	400	13.1	17.57	7.11	1,730	0.35	28.93	4.63	6.2	33	0.89		
	D	27-Aug-04	200	6.6	18.03	6.15	763	2.46	8.73	5.50	1.6	54	0.16		
	D	27-Aug-04	225	7.4	18.02	6.13	809	0.88	16.68	5.51	3.0	54	0.31		
	D	27-Aug-04	275	9.0	17.74	6.11	928	1.065	18.07	5.61	3.2	54	0.33		
	D	27-Aug-04	375	12.3	16.91	6.39	1,373	0.29	34.58	5.79	6.0	51	0.68		
South Basin	S	27-Aug-04	25	0.8	24.84	6.6	692	7.3	4.98	3.37	1.5	47	0.11	1.1	
	S	24-Sep-04	25	0.8	19.01	6.89	737	7.14	3.48	4.59	0.76	39	0.09		
	D	27-Aug-04	200	6.6	18.03	6.15	763	2.46	8.73	5.50	1.6	54	0.16		
	D	27-Aug-04	225	7.4	18.02	6.13	809	0.88	16.68	5.51	3.0	54	0.31		
	D	27-Aug-04	275	9.0	17.74	6.11	928	1.065	18.07	5.61	3.2	54	0.33		
	D	27-Aug-04	375	12.3	16.91	6.39	1,373	0.29	34.58	5.79	6.0	51	0.68		
	D	24-Sep-04	225	7.4	14.62	6.5	795	2.35	4.32	6.62	0.65	49	0.09		
	D	24-Sep-04	250	8.2	14.63	6.49	911	0.83	12.6	6.63	1.9	49	0.26		
	D	24-Sep-04	275	9.0	14.63	6.5	1,036	0.4	4.89	6.62	0.74	49	0.10		
	D	24-Sep-04	375	12.3	14.7	6.65	1,610	0.34	20.76	6.43	3.2	46	0.45		
South Basin	S	24-Sep-04	25	0.8	19.01	6.89	737	7.14	3.48	4.59	0.76	39	0.09	0.8	
	S	22-Oct-04	25	0.8	10.49	7.07	620	7.8	6.59	7.45	0.88	34	0.19		
	D	24-Sep-04	225	7.4	14.62	6.5	795	2.35	4.32	6.62	0.65	49	0.09		
	D	24-Sep-04	250	8.2	14.63	6.49	911	0.83	12.6	6.63	1.9	49	0.26		
	D	24-Sep-04	275	9.0	14.63	6.5	1,036	0.4	4.89	6.62	0.74	49	0.10		
	D	24-Sep-04	375	12.3	14.7	6.65	1,610	0.34	20.76	6.43	3.2	46	0.45		
	D	22-Oct-04	225	7.4	10.44	6.83	658	5.9	7.27	8.12	0.89	41	0.18		
	D	22-Oct-04	275	9.0	11.85	6.76	1,400	3.2	56.50	7.55	7.5	43	1.3		
	D	22-Oct-04	325	10.7	13.05	6.91	1,905	2.8	80.02	6.70	12	39	2.1		
	D	22-Oct-04	350	11.5	13.11	6.9	1,970	3.3	90.77	6.70	14	39	2.3		
South Basin	S	22-Oct-04	25	0.8	10.49	7.07	620	7.8	6.59	7.45	0.88	34	0.19	1.0	
	S	11-Nov-04	25	0.8	6.39	6.7	1,000	7.6	10.79	10.46	1.0	45	0.24		
	D	22-Oct-04	225	7.4	10.44	6.83	658	5.9	7.27	8.12	0.89	41	0.18		
	D	22-Oct-04	275	9.0	11.85	6.76	1,400	3.2	56.50	7.55	7.5	43	1.3		
	D	22-Oct-04	325	10.7	13.05	6.91	1,905	2.8	80.02	6.70	12	39	2.1		
	D	22-Oct-04	350	11.5	13.11	6.9	1,970	3.3	90.77	6.70	14	39	2.3		
	D	11-Nov-04	200	6.6	6.1	6.73	870	7.6	12.75	10.39	1.2	44	0.29		
	D	11-Nov-04	275	9.0	8.1	6.5	1,900	0.8	71.35	10.08	7.1	49	1.5		
	D	11-Nov-04	400	13.1	11.2	6.75	3,400	0.6	122.49	7.89	16	43	2.8		

Table 3-3

Ammonia Mass Into and Out of HBHA Pond from July 2004 to March 2005

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

Date	Ammonia Mass from Halls Brook into HBHA Pond (kg/day)	Ammonia Mass at HBHA Pond Outlet leaving HBHA Pond (kg/day)	Percent of Ammonia Mass due to Halls Brook (%)²
21-Jul-04	6.3	16.3	38.6
17-Aug-04	44.1	92.1	47.9
27-Aug-04	19.1	35.1	54.4
24-Sep-04	13.2	27.1	48.7
22-Oct-04	29.9	45.2	66.1
11-Nov-04	22.8	47.7	47.8
22-Mar-05	78.3	105.1	74.5

Notes:

- 1) Data from page A-61, Michele Cutrofello, Sources and Load of Ammonia in Aberjona River Watershed, Master of Science Thesis, Tufts University, August 2005
- 2) Calculated: example calculation = $(6.3/16.3)(100\%) = 38.6\%$

Table 1. Total Ammonia (mg/l) Measured in Aberjona River Watershed (Cutrofello 2005)

Date	HBHA Pond Outlet	HBHA Wetland Outlet	Route 128	Salem & Cedar Sts	Montvale Ave	Swanson St	USGS Gauge	Mystic Lakes Dam
1/16/03			3.74		2.84		1.42	
1/24/03			3.70		3.25		1.63	
2/7/03			3.14		2.40		1.38	
2/21/03			3.22		2.95		1.58	
3/8/03			4.05		2.65		1.21	
3/22/03			3.98		2.83		0.99	
4/16/03			0.62		0.64		0.17	
6/18/03			0.75		0.42		0.45	
7/16/03			2.30	2.37	0.48		0.26	0.10
7/30/03			1.12				0.35	0.34
8/13/03			1.95		1.06		0.26	0.03
8/28/03			2.99		0.38		0.26	
9/16/03			3.48		0.75		0.16	0.03
9/19/03			2.52		1.39		0.46	0.04
9/23/03			1.11		0.28		0.38	
10/3/03			5.76		2.36		0.25	0.19
10/24/03			5.22		2.73		0.87	0.24
11/20/03			3.68	3.63	2.47		0.88	0.31
12/17/03			1.92	1.54	1.27		0.54	0.44
2/4/04			8.04	4.92	3.82		1.14	0.47
3/5/04			4.52	3.86	3.24		1.22	0.57
3/12/04							1.19	
3/24/04	5.44	7.92						
3/31/04							0.35	
4/9/04			2.71	2.19	1.71		0.45	0.48
4/23/04			2.38	0.98	0.69		0.32	0.27
5/7/04	4.62	3.91						
5/17/04			2.95	2.03	1.43		0.39	0.20
6/14/04	6.63	6.06						
6/22/04			4.29	3.74	2.08		0.57	0.19
7/8/04							0.37	
7/21/04	6.10	3.61						
7/28/04						0.23	0.15	
8/5/04			3.04	0.80	0.52	0.19	0.11	0.01
8/17/04		2.75						
8/27/04	4.52	3.25						
9/8/04							0.30	
9/24/04	4.25	3.18						
9/28/04					0.37	0.24	0.23	
10/22/04		4.96						
11/11/04	10.79	8.09						
3/22/05	6.29	6.46						

Table 2. Total Ammonia in the Aberjona Watershed (Cutrofello 2005)

Date	Total Ammonia Concentrations (mg/l)					
	Measured at HBHA Outlet	Calculated EPA CCC	Measured at Wetland Outlet	Calculated EPA CCC	Measured at Route 128	Calculated EPA CCC
1/16/03					3.74	
1/24/03					3.70	
2/7/03					3.14	10.80
2/21/03					3.22	10.64
3/8/03					4.05	10.89
3/22/03					3.98	10.64
4/16/03					0.62	
6/18/03					0.75	5.69
7/16/03					2.30	4.11
7/30/03					1.12	3.26
8/13/03					1.95	3.65
8/28/03					2.99	3.57
9/16/03					3.48	4.37
9/19/03					2.52	4.82
9/23/03					1.11	4.55
10/3/03					5.76	7.71
10/24/03					5.22	10.06
11/20/03					3.68	8.65
12/17/03					1.92	10.15
2/4/04					8.04	9.01
3/5/04					4.52	10.46
3/24/04	5.44	10.44	7.92	8.73		
4/9/04					2.71	8.31
4/23/04					2.38	7.12
5/7/04	4.62	4.39	3.91	3.90		
5/17/04					2.95	4.58
6/14/04	6.63	4.89	6.06	4.38		
6/22/04					4.29	4.23
7/21/04	6.10		3.61			
8/5/04					3.04	4.61
8/17/04			2.75	3.88		
8/27/04	4.52	4.07	3.25	3.11		
9/24/04	4.25	4.99	3.18			
10/22/04			4.96	6.87		
11/11/04	10.79	10.46	8.09	9.82		
3/22/05	6.29	9.50	6.46	8.02		
# Comparisons	7		8		26	
# of Probably Significant Instantaneous Exceedences	2		1		0	
# of Probably Insignificant Instantaneous Exceedences	2		2		1	

Table 3-1

Comparison of August to November 2004 Ammonia Quotients in the North End of HBHA Pond to Ambient Water Quality Criteria

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

HBHA Pond Sampling Location	Surface or Bottom	Date	Depth in cm	Depth in feet	Temperature °C	pH	Specific Conductance uS/cm	Dissolved Oxygen mg/l	Ammonia Nitrogen mg N/L	Chronic Ammonia Criterion	Chronic Criterion Quotient	Acute Ammonia Criterion	Acute Criterion Quotient	Average Chronic Quotient Top Layer	Average Chronic Quotient Bottom Layer
North Basin	S	17-Aug-04	25	0.8	19.97	6.63	483	5.9	4.61	4.60	1.0	46	0.10		
	S	17-Aug-04	200	6.6	17.4	6.36	696	3.4	3.83	5.63	0.68	51	0.07		
	S	27-Aug-04	25	0.8	22.5	6.55	683	6.8	4.95	3.96	1.3	48	0.10		
	S	27-Aug-04	175	5.7	18.08	6.26	725	4	6.36	5.44	1.2	52	0.12		1.0
	D	27-Aug-04	200	6.6	16.4	6.05	1,850	1.5	24.84	6.14	4.0	55	0.45		
	D	17-Aug-04	225	7.4	16.6	6.55	1,500	1.4	27.28	5.79	4.7	48	0.57		
	D	17-Aug-04	275	9.0	14.85	6.91	9,250	0.4	429.37	5.97	72	39	11		
	D	27-Aug-04	225	7.4	14.75	6.09	3,000	0.41	61.20	6.82	9.0	54	1.1		
North Basin	D	27-Aug-04	275	9.0	14.47	6.58	9,850	0.38	750.00	6.61	114	47	16		
	S	27-Aug-04	25	0.8	22.5	6.55	683	6.8	4.95	3.96	1.3	48	0.10		
	S	27-Aug-04	175	5.7	18.08	6.26	725	4	6.36	5.44	1.2	52	0.12		
	S	24-Sep-04	25	0.8	20.13	6.77	711	6.71	1.10	4.42	0.25	43	0.026		
	S	24-Sep-04	175	5.7	15.32	6.39	757	3.63	3.67	6.42	0.57	51	0.07		0.8
	D	27-Aug-04	200	6.6	16.4	6.05	1,850	1.5	24.84	6.14	4.0	55	0.45		
	D	27-Aug-04	225	7.4	14.75	6.09	3,000	0.41	61.20	6.82	9.0	54	1.1		
	D	27-Aug-04	275	9.0	14.47	6.58	9,850	0.38	750.00	6.61	114	47	16		
	D	24-Sep-04	200	6.6	14.54	6.42	2,530	0.82	12.41	6.72	1.8	50	0.25		
	D	24-Sep-04	225	7.4	13.99	6.53	3,070	0.56	26.07	6.87	3.8	48	0.54		
	D	24-Sep-04	275	9.0	13.64	6.91	10,110	0.42	177.68	6.45	28	39	4.6		
North Basin	S	24-Sep-04	25	0.8	20.13	6.77	711	6.71	1.10	4.42	0.25	43	0.026		
	S	24-Sep-04	175	5.7	15.32	6.39	757	3.63	3.67	6.42	0.57	51	0.07		
	S	22-Oct-04	25	0.8	10.59	6.96	619	7.7	7.64	7.73	0.99	37	0.20		
	S	22-Oct-04	175	5.7	10.27	6.92	663	7.4	7.45	7.99	0.93	39	0.19		0.7
	D	24-Sep-04	200	6.6	14.54	6.42	2,530	0.82	12.41	6.72	1.8	50	0.25		
	D	24-Sep-04	225	7.4	13.99	6.53	3,070	0.56	26.07	6.87	3.8	48	0.54		
	D	24-Sep-04	275	9.0	13.64	6.91	10,110	0.42	177.68	6.45	28	39	4.6		
	D	22-Oct-04	200	6.6	10.67	6.61	770	5.9	11.58	8.40	1.4	47	0.25		
	D	22-Oct-04	225	7.4	12.62	6.5	2,970	3.81	158.06	7.53	21	49	3.2		
North Basin	S	22-Oct-04	25	0.8	10.59	6.96	619	7.7	7.64	7.73	0.99	37	0.20		
	S	22-Oct-04	175	5.7	10.27	6.92	663	7.4	7.45	7.99	0.93	39	0.19		
	S	11-Nov-04	25	0.8	6.3	6.58	1,050		10.91	10.70	1.0	47	0.23		
	S	11-Nov-04	175	5.7	6.22	6.7	930		12.76	10.46	1.2	45	0.29		1.0
	D	22-Oct-04	200	6.6	10.67	6.61	770	5.9	11.58	8.40	1.4	47	0.25		
	D	22-Oct-04	225	7.4	12.62	6.5	2,970	3.81	158.06	7.53	21	49	3.2		
	D	11-Nov-04	225	7.4	8.7	6.58	3,600		254.15	9.59	27	47	5.4		
	D	11-Nov-04	250	8.2	11.4	6.64	6,900		558.52	7.97	70	46	12.2		
	D	11-Nov-04	300	9.8	12.3	6.75	9,600		569.69	7.35	77	43	13.2		39

Table 3-2

Comparison of August to November 2004 Ammonia Quotients in the South End of HBHA Pond to Ambient Water Quality Criteria

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

HBHA Pond Sampling Location	Surface or Bottom	Date	Depth in cm	Depth in feet	Temperature °C	pH	Specific Conductance uS/cm	Dissolved Oxygen mg/l	Ammonia Nitrogen mg N/L	Chronic Criterion	Chronic Quotient	Acute Ammonia Criterion	Acute Criterion Quotient	Average Chronic Quotient Top Layer	Average Chronic Quotient Bottom Layer
South Basin	S	17-Aug-04	25	0.8	21.43	6.71	479	5.72	3.58	4.12	0.87	44	0.08		
	S	27-Aug-04	25	0.8	24.84	6.6	692	7.3	4.98	3.37	1.5	47	0.11	1.2	
	D	17-Aug-04	375	12.3	18.37	6.55	667	3	4.21	5.16	0.82	48	0.09		
	D	17-Aug-04	400	13.1	17.57	7.11	1,730	0.35	28.93	4.63	6.2	33	0.89		
	D	27-Aug-04	200	6.6	18.03	6.15	763	2.46	8.73	5.50	1.6	54	0.16		
	D	27-Aug-04	225	7.4	18.02	6.13	809	0.88	16.68	5.51	3.0	54	0.31		
	D	27-Aug-04	275	9.0	17.74	6.11	928	1.065	18.07	5.61	3.2	54	0.33		
	D	27-Aug-04	375	12.3	16.91	6.39	1,373	0.29	34.58	5.79	6.0	51	0.68		
South Basin	S	27-Aug-04	25	0.8	24.84	6.6	692	7.3	4.98	3.37	1.5	47	0.11		
	S	24-Sep-04	25	0.8	19.01	6.89	737	7.14	3.48	4.59	0.76	39	0.09	1.1	
	D	27-Aug-04	200	6.6	18.03	6.15	763	2.46	8.73	5.50	1.6	54	0.16		
	D	27-Aug-04	225	7.4	18.02	6.13	809	0.88	16.68	5.51	3.0	54	0.31		
	D	27-Aug-04	275	9.0	17.74	6.11	928	1.065	18.07	5.61	3.2	54	0.33		
	D	27-Aug-04	375	12.3	16.91	6.39	1,373	0.29	34.58	5.79	6.0	51	0.68		
	D	24-Sep-04	225	7.4	14.62	6.5	795	2.35	4.32	6.62	0.65	49	0.09		
	D	24-Sep-04	250	8.2	14.63	6.49	911	0.83	12.6	6.63	1.9	49	0.26		
	D	24-Sep-04	275	9.0	14.63	6.5	1,036	0.4	4.89	6.62	0.74	49	0.10		
	D	24-Sep-04	375	12.3	14.7	6.65	1,610	0.34	20.76	6.43	3.2	46	0.45		
South Basin	S	24-Sep-04	25	0.8	19.01	6.89	737	7.14	3.48	4.59	0.76	39	0.09		
	S	22-Oct-04	25	0.8	10.49	7.07	620	7.8	6.59	7.45	0.88	34	0.19	0.8	
	D	24-Sep-04	225	7.4	14.62	6.5	795	2.35	4.32	6.62	0.65	49	0.09		
	D	24-Sep-04	250	8.2	14.63	6.49	911	0.83	12.6	6.63	1.9	49	0.26		
	D	24-Sep-04	275	9.0	14.63	6.5	1,036	0.4	4.89	6.62	0.74	49	0.10		
	D	24-Sep-04	375	12.3	14.7	6.65	1,610	0.34	20.76	6.43	3.2	46	0.45		
	D	22-Oct-04	225	7.4	10.44	6.83	658	5.9	7.27	8.12	0.89	41	0.18		
	D	22-Oct-04	275	9.0	11.85	6.76	1,400	3.2	56.50	7.55	7.5	43	1.3		
	D	22-Oct-04	325	10.7	13.05	6.91	1,905	2.8	80.02	6.70	12	39	2.1		
	D	22-Oct-04	350	11.5	13.11	6.9	1,970	3.3	90.77	6.70	14	39	2.3		5.0
South Basin	S	22-Oct-04	25	0.8	10.49	7.07	620	7.8	6.59	7.45	0.88	34	0.19		
	S	11-Nov-04	25	0.8	6.39	6.7	1,000	7.6	10.79	10.46	1.0	45	0.24	1.0	
	D	22-Oct-04	225	7.4	10.44	6.83	658	5.9	7.27	8.12	0.89	41	0.18		
	D	22-Oct-04	275	9.0	11.85	6.76	1,400	3.2	56.50	7.55	7.5	43	1.3		
	D	22-Oct-04	325	10.7	13.05	6.91	1,905	2.8	80.02	6.70	12	39	2.1		
	D	22-Oct-04	350	11.5	13.11	6.9	1,970	3.3	90.77	6.70	14	39	2.3		
	D	11-Nov-04	200	6.6	6.1	6.73	870	7.6	12.75	10.39	1.2	44	0.29		
	D	11-Nov-04	275	9.0	8.1	6.5	1,900	0.8	71.35	10.08	7.1	49	1.5		
	D	11-Nov-04	400	13.1	11.2	6.75	3,400	0.6	122.49	7.89	16	43	2.8		

Table 4-1

Halls Brook Holding Area Ammonia Inflow and Outflow, July 21, 2004, to March 22, 2005

Multiple Source Groundwater Response Plan, Woburn, Massachusetts

Location	Date	Q (m3/s)	NH4 (mg/l)	NH4 Flux (kg/d)	Removal (%)
Halls Brook	21-Jul-04	0.021	3.54	6.3	
	17-Aug-04	0.248	2.05	44.1	
	27-Aug-04	0.063	3.49	19.1	
	24-Sep-04	0.090	1.70	13.2	
	22-Oct-04	0.098	3.54	29.9	
	11-Nov-04	0.058	4.56	22.8	
	22-Mar-05	0.257	3.53	78.3	
HBHA Pond Outlet	21-Jul-04	0.031	6.10	16.3	
	17-Aug-04	0.248	4.3	92.1	
	27-Aug-04	0.090	4.52	35.1	
	24-Sep-04	0.074	4.25	27.1	
	22-Oct-04	0.075	7.00	45.2	
	11-Nov-04	0.051	10.79	47.7	
	22-Mar-05	0.193	6.29	105.1	
HBHA Wetland Outlet	21-Jul-04	0.031	3.61	9.8	40
	17-Aug-04	0.246	2.75	58.3	37
	27-Aug-04	0.093	3.25	26.1	26
	24-Sep-04	0.074	3.18	20.4	25
	22-Oct-04	0.074	4.96	31.8	30
	11-Nov-04	0.052	8.09	36.3	24
	22-Mar-05	0.192	6.46	107.1	-2
				Average Removal	26

Notes:

- 1) Data from page A-61, Michele Cutrofello, Sources and Load of Ammonia in Aberjona River Watershed, Master of Science Thesis, Tufts University, August 2005



Aberjona Study Coalition, Inc.

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November 18, 2005



SDMS DocID

240371

Joseph F. LeMay
Remedial Project Manager
US EPA – New England
One Congress Street, Suite 1100 (HBO)
Boston, MA 02214-2023

RE: Draft Final Technical Memorandum – Evaluation of Ammonia and Supplemental Soil Data Report, October 2005, Industri-plex Site, Remedial Investigation/Feasibility Study

Dear Mr. LeMay:

As a joint effort of the Aberjona Study Coalition, Inc. (ASC), and our technical advisor, Cambridge Environmental, Inc. we are submitting sixteen pages of comments attached regarding the above reports.

The Aberjona Study Coalition represents a broad group of citizens – more that 225,000 residents in Woburn, Winchester, Wilmington, Medford and Arlington Massachusetts – who have diverse and long-standing interest in the Aberjona River and surrounding areas. The ASC has three goals with respect to the EPA's Efforts:

- To ensure that the investigation is technically sound;
- To ensure that the investigation is complete; and, most importantly,
- To insure that the investigation is adequately protective of human health and the environment.

Since EPA has not yet developed its final remediation and monitoring plans, we cannot offer specific favorable comment to the public we represent or to the EPA on this matter. However, we expect that, consistent with their goal of human health protection, the ASC will be an active, interested stakeholder in evaluating the final remediation and monitoring plans.

We recognize the need to present the results of our assessments in simple terms to communicate to the widest fraction of the public as is possible.

Thank you for giving us the vehicle in which to voice our comments and concerns. We look forward to your response.

Sincerely,


Linda A. Raymond, Treasurer
Aberjona Study Coalition, Inc.

Cc:

Senator John F. Kerry, Congressman Edward J. Markey, State Representative, Patrick Natale, EPA Regional Administrator, Robert W. Varney, DEP superfund Project Manager, Anna Mayor, Woburn Mayor Elect, Thomas McLaughlin, Woburn City Council President, Paul Medeiros Woburn Daily Times Chronicle

Comments on the
Evaluation of Ammonia and Supplemental Soil Data
and further comments on the
Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation
and the
MSGRP Feasibility Study and Proposed Plan
Industri-Plex Site
Woburn, Massachusetts

Prepared on behalf of the
Aberjona Study Coalition, Inc.

by

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November 18, 2005

Introduction and Summary

Cambridge Environmental Inc. and colleagues offer additional comment on the Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation and the MSGRP Feasibility Study and Proposed Plan, including the October 2005 Technical Memorandum "Evaluation of Ammonia and Supplemental Soil Data" and comments on the MSGRP recently added to the administrative record by the U.S. Environmental Protection Agency (EPA). Cambridge Environmental Inc. provides technical assistance to the Aberjona Study Coalition (ASC), a stakeholder in EPA's investigation of chemical contamination of the Aberjona River. The ASC represents a broad group of citizens – more than 225,000 residents in Woburn, Winchester, Wilmington, Medford, and Arlington, Massachusetts – who have diverse and long-standing interests in the Aberjona River and surrounding areas. The ASC has three goals with respect to EPA's efforts:

- to ensure that the investigation is technically sound;
- to ensure that the investigation is complete; and, most importantly,
- to ensure that the investigation is adequately protective of human health and the environment.

Our comments emphasize five themes:

- First, we reiterate our previous opinion that we consider EPA's proposed plan to border on the minimum acceptable level necessary to protect human health and the environment. In terms of protecting human health, EPA's proposed target risk criterion of one hundred in a million as an acceptable incremental cancer risk is ten times less stringent than allowed under the Massachusetts Contingency Plan (MCP), and EPA could choose to be ten to one hundred times more stringent (protective) and remain within its target risk range.
- Second, the novel nature of EPA's proposed plan, in conjunction with the choice of regulating at its least stringent level of risk (as described above), makes it imperative that EPA design robust, comprehensive monitoring programs to ensure that the proposed plan will work as designed and remain protective of human health. Since EPA has not yet developed its monitoring plans, we cannot offer specific comment on this matter. However, we expect that, consistent with their goal of human health protection, the ASC will be an active, interested stakeholder in evaluating monitoring plans.
- Third, we note that various institutional controls are an integral part of EPA's proposed plan. Several comments on the proposed plan questioned the potential practicality and enforceability of EPA's intended use of institutional controls, many of which may extend to areas well outside the control of parties responsible for the contamination from the Industri-Plex and Wells G&H sites. Measures such as restrictions on groundwater use are at odds with the MCP, which explicitly bars such actions.

- Fourth, we concur with EPA's decision to include ammonia as a contaminant of concern in its Superfund investigation. We feel, however, that the last-minute nature of ammonia's inclusion has prevented EPA from evaluating the potential effects of ammonia, particularly as a contributing source to overall eutrophication of the Aberjona River watershed. The Aberjona River is classified as an impaired stream on the Clean Water Act's §303(d), and two of the stated reasons – unionized ammonia and nutrients – receive potential contributions from the Industri-Plex site. We recognize that there are other potential sources of nitrogen loading to the Aberjona, but it is incumbent upon EPA to assess the role of the Industri-Plex site contamination as part of the Total Maximum Daily Load (TMDL) for the Aberjona River. Satisfying the §303(d) requirements of Clean Water Act is an Applicable or Relevant and Appropriate Requirement (ARAR). We encourage EPA to further consider the role of ammonia as a nutrient source potentially detrimental to the health of the Aberjona's ecosystems.
- Last, we emphasize the critical importance of all of the elements of EPA's plan, which will allow levels of arsenic to remain in place in soils along the Aberjona River that exceed Upper Concentration Limits (UCLs), concentrations that indicate a potential significant risk of harm to public welfare and the environment as defined by the MCP. It is imperative that EPA execute its proposed plan, make sure it works, and maintain it for as long as necessary (perpetuity, if need be) to ensure that human health and the environment are sufficiently protected.

General Comments

EPA still has not adequately addressed requests from all parties including the Town of Woburn, citizens groups, and PRPs for an extension to the comment period.

Cambridge Environmental received EPA's notice of re-opening the public comment period for comment on ammonia data and additional comments on the proposed plan on November 2, 2005. While Cambridge Environmental did receive notice of the re-opening of the comment period through the Aberjona Study Coalition approximately one week earlier, the short re-opening of the comment period with little notice of the additional period, does not allow sufficient time for an in-depth review of the very large volume of information supporting the proposed plan. Moreover, not all stakeholders have the same opportunity to comment. While we and others who previously filed comments are perhaps in a position to file additional comments, entities such as the City of Woburn cannot hope to provide meaningful comments. To do so, the City would have to (1) identify and hire a technical consultant, (2) allow the consultant to conduct their independent analysis and develop comments, then (3) review, finalize, and submit their comments. Given the time allotted for comments, there could be no realistic expectation of performing these activities in the time frame allotted for comments.

It has long been known that groundwater associated with the Industri-Plex site is contaminated with ammonia.

It has long been known that groundwater beneath the Industri-Plex Superfund site is significantly contaminated with ammonia. In 1994, Davies et al. (1994) reported ammonia levels of nearly 8,000 mg/l in groundwater moving downgradient from hide waste piles on the Industri-Plex site toward the HBHA pond. In 1999-2001, EPA scientists found high ammonia levels in groundwater and in water samples from HBHA pond (Ford, 2005). Presumably, EPA decision-makers knew of this data; thus, it is unclear why it took EPA so long to determine that ammonia is a contaminant of concern at Industri-Plex.

Although EPA has listed ammonia as an additional contaminant of concern at the Industri-Plex site, it has concluded that the presence of ammonia “does not alter the remedial alternatives selected for the June 2005 Proposed Plan, which would also adequately address ammonia concentrations” (Tetra Tech NUS, 2005). Furthermore, EPA concluded that

“Preferred Alternative GW-2 – Pond Intercept and Monitoring with Institutional Controls – would incorporate ammonia and remain protective; Preferred Alternative GW-4 for the West Hide Pile, In-situ Enhanced Bioremediation, would reverse observed reducing conditions to oxidizing conditions, thereby decreasing ammonia concentrations; and Preferred Alternative HBHA-4 would also intercept ammonia plumes, continue to sequester/treat contaminants (including ammonia) below the chemocline, and further reduce contaminants below NRWQC via an appropriately designed aeration treatment system” (Tetra Tech NUS, 2005).

The centerpiece of EPA’s preferred remediation system for ammonia is HBHA-4, which relies on the construction of a low head cofferdam across the width of the Halls Brook Holding Area (HBHA) pond to provide greater hydraulic separation between the north and south basins. In doing so, EPA argues that the preservation of the chemolimnion (a layer of dense, salty water at the bottom) behind the cofferdam in the north basin will trap high concentrations of ammonia entering the pond via groundwater, and thereby significantly reduce ammonia levels in water discharging from the north basin.

Interestingly, while it took EPA years to determine that ammonia is a contaminant of concern at Industri-Plex, EPA needed only a few months (between receiving comments at a public meeting in late June of 2005 and the release of the Ammonia report in October 2005) to decide that ammonia would be adequately addressed by the remedial alternatives described in the Proposed Plan. This apparent oversight followed by an uncharacteristically rapid correction leads us to question if EPA has got it right. While EPA may be correct in its conclusions that the cofferdam treatment system described in HBHA-4 will work according to design, EPA has not provided any convincing evidence that these technologies will work. It is equally probable that the design will fail to meet the Preliminary Remedial Goals (PRGs). The cofferdam treatment system is not a widely

used, proven technology; therefore, to be prudent EPA should regard the treatment system as experimental and should assume the burden of proof in ensuring that the system will work as described in the RI-FS and recent ammonia report (Tetra Tech NUS, June, 2005, and October, 2005). This will require the EPA to articulate clear and effective monitoring plans for the system, as well as contingency plans in the event that the system does not meet the PRGs.

Comments on the Evaluation of Ammonia and Supplemental Soil Data

Several issues need to be answered before the feasibility of the cofferdam system to treat ammonia can be fully assessed.

The north basin of HBHA pond is fed by groundwater from the Industri-Plex site that contains high levels of arsenic, benzene, ammonia, and conductivity. The high conductivity groundwater has created an anoxic chemolimnion in the north basin. The chemolimnion is periodically disrupted by storms causing water from the chemolimnion to spill over to the south basin, where the water is able to mix and be transported downstream to the Aberjona River.

The Proposed Plan for HBHA pond, described in Alternative HBHA-4, is to build a cofferdam between the north and south basins, which would both increase the volume of the north basin, and prevent the natural flushing of pollutants in the chemolimnion. As part of the design, it is anticipated that as ammonia is transported to overlying oxygen-containing waters (epilimnion), it will be oxidized to nitrite and nitrate (nitrification), which are both less toxic forms of inorganic nitrogen. Thus, for the cofferdam system to be effective, it must preserve the chemolimnion and promote oxidation of ammonia in the epilimnion.

However, because the chemolimnion cannot mix with the south basin, the volume of the chemolimnion will likely increase as saline ground water enters the north basin. The volume of the north basin is fixed by the height of the cofferdam; thus, the increase in volume of the chemolimnion will occur at the expense of the epilimnion, and as a result the residence time of ammonia in the epilimnion will be reduced. In addition, as the epilimnion thins, upwelling of chemolimnetic waters will be favored, particularly during sustained periods of wind and cold air temperatures. The combined effects of reduced residence times in the epilimnion and upwelling will favor higher rates of ammonia transport over the cofferdams to the south basin.

EPA should address the following issues to better assess the feasibility of the cofferdam system to treat ammonia:

- In designing the cofferdam system EPA should carefully consider likely changes (e.g., due to inputs of salts to the hypolimnion, seasonal effects, and large storms) in the physical and chemical constraints that govern the reactions that are hoped will occur in the north basin (i.e., nitrification, oxidation of arsenic and sorption onto ferric iron, biodegradation of benzene).

- EPA should consider adopting concentration-based standards for contaminants of concern in waters discharging from the cofferdams. In setting the standards, EPA should mandate both regular and event monitoring to capture the range of anticipated flow conditions and pollutant discharges.
- EPA should consider mandating that contingency plans be developed in the event that the cofferdam system does not meet the concentration-based standards.

EPA should also answer the following questions regarding the treatment system and cofferdam/aeration system:

- How long will it take for the treatment system to achieve the ammonia PRG of 4 mg/L in groundwater entering the north basin?
- What is the design life of the cofferdam and aeration system?
- If the PRGs for arsenic and benzene are achieved before that of ammonia, will the treatment system be maintained and operated until the ammonia PRG is achieved?

Conversion of ammonia to gaseous nitrogen is not likely to occur at significant rates and EPA's conjecture that it may occur is misleading and unsupported.

Page 3-4 of the October 2005 "Evaluation of Ammonia and Supplemental Soil Data" states the following:

"As ammonia diffuses towards the chemocline, the bacteria *Nitrosomonas europea* can oxidize the ammonia to nitrite. Other bacteria, such as *Nitrobacter* can then convert the nitrite to nitrate. Plants or microorganisms can assimilate nitrate (assimilatory nitrate reduction) or facultative anaerobic bacteria may further reduce nitrate (denitrification) to gaseous nitrogen (N₂) when nitrate diffuses into the deeper anoxic water of the HBHA Pond. The gaseous nitrogen can volatilize and disperse into the ambient air or be absorbed into organic matrices. Thus, the alternating reduced and oxidized conditions of the HBHA Pond both below and at the chemocline completes the nitrogen cycle."

Does EPA imply that the ammonia is being transformed to nitrate above the chemocline and then to gaseous nitrogen as the nitrate goes back below the chemocline? If so, one might expect to observe nitrogen bubbling out of the HBHA! The complete "nitrogen cycle" is not likely to be significant. For this process to be a significant removal mechanism, there would need to be a significant flux downward across the chemocline. Diffusion is a very slow process relative to other transport mechanisms. The notion of significant downward transport contradicts EPA's conceptual site model for the HBHA. EPA should either dismiss this possibility of the "complete nitrogen cycle" as unlikely based upon the evidence it has collected thus far, or collect additional data to evaluate the relevance of the mechanism.

The more likely possibility is that the nitrogen remains in nitrate form in surface water and contributes to the known nitrification problem that exists in the Aberjona and has led in part to the river's classification as an impaired stream under Clean Water Act's §303(d).

EPA did not collect sufficient data to assess ammonia transport, and the available groundwater data are not sufficient to justify contouring.

EPA's assessment of ammonia appears to be based on mixed sampling rounds of groundwater and surface water data, collected at different points in time, and the data appear not to have been collected in a systematic manner amenable to assessing temporal trends and variability. Some stations were sampled only in one sampling round (July 2005, in Table 2-3). Other surface water and groundwater data were collected in different years (mainly 2000 and 2001) with no regular pattern of seasonal sampling. By presenting mismatched and incongruent data, clear trends and patterns cannot be discerned. Some data may be amenable to seasonal analysis, but EPA has made no attempt at such an analysis.

In addition, the contours of ammonia concentration drawn in Figure 3-1 of the *October 2005 Technical Memorandum* lack justification in some places. For example, the contour that encircles the West Hide Pile appears to be based on no data at all. Also, the extent of the small contour drawn over the southeast portion of the Easement appears to be based on sparse data, and may not reflect its own source but rather an extension of the larger ammonia plume.

All of these factors point to a less-than-careful consideration of ammonia as a contaminant of concern. The data make it clear that the hide piles are likely a significant source of ammonia contamination, but the lack of clarity in the data limits its use in characterizing the nature and extent of the contamination and hence justifying remedial decisions.

EPA is ignoring potentially significant sources of ammonia contamination upgradient that may significantly affect the ammonia budget in the HBHA.

The Olin Chemical Site, located to the north of the Industri-Plex site, has also introduced ammonia contamination into groundwater and surface water. A recent (August 2005) Hazard Ranking System (HRS) scoring of the Olin Chemical site by EPA (available at <http://www.epa.gov/superfund/sites/docrec/pdoc1741.pdf>) confirms that the site is a source of ammonia to the Aberjona River watershed (*italics added, references internal to the HRS document*):

“The Olin Chemical facility is located on a ground water divide (Reference 1B, Figure 3 and Ref. 9, p. 17). The largest component of ground water flow away from the Olin Chemical facility is westward toward the MMB wetlands and the Town of Wilmington's closed municipal water supply wells (Refs. 29, pp. 9-10; 9, p. 17). East of the divide, ground water flows locally towards the Ditch System and the East

Ditch (Ref. 9, p. 17). *Overall, flow from much of the facility is to the southeast within the Aberjona River watershed, whereas flow from the rest of the facility and much of the area to the west of the facility is toward the west within the Ipswich River watershed* (Ref. 9, p. 17). Ground water flow patterns are similar for both shallow and deep ground water in the area (Ref. 9, p. 17). These flow patterns do not change significantly on a seasonal basis (Ref. 9, p. 17). As a result of this divide, there are only two areas from which ground water can flow onto the Olin facility (Ref. 3, p. 221). First, ground water from the City of Woburn landfill can enter the southeast corner of the Olin facility, near the Calcium Sulfate Landfill (Ref. 3, p. 221). However, ground water flow from the southern portion of the Calcium Sulfate Landfill prevents ground water from the City of Woburn landfill from migrating further onto the Olin facility (Ref. 30, p. 1). Second, ground water can flow from the Cook Avenue residential area onto the Olin Chemical facility (Ref. 3, p. 221)."

Moreover, surface water upstream of the HBHA contains ammonia that, based on groundwater flow directions, does not likely originate from the Industri-Plex site. Sampling stations RR-01, RR-02, RR-03, LF-01, and LF-02 each contain ammonia concentrations of the order of 10 mg/l. These values indicate an active source of ammonia discharge, most likely the defunct Woburn Landfill or the Olin Chemical Site. Figures 3-1 and 3-2 and other maps in the *October 2005 Technical Memorandum* should identify the locations of these potential sources.

Figure 3-1 does not indicate consideration of potential ammonia plumes that might be originating from the Olin Chemical site. One of the references in EPA's HRS of the Olin Chemical site emphasizes the following salient facts that suggest its potential role as a source of ammonia discharge to the HBHA watershed (Geomega, 2001):

- The Olin contamination is located on a groundwater divide, with flow from much of the property to the southwest within the Aberjona River watershed;
- The major DAPL constituents are ammonia, chloride, sodium, and sulfate; and
- Because the Olin Site is in a recharge area (groundwater divide) and the contaminants are dense, it is reasonable to consider that fractured bedrock could be a transport mechanism.

Clearly, the Olin site could be playing a major role in the ammonia budget in the HBHA, and EPA should gather additional data to assess the importance of all ammonia sources that may be leading to impairment of the Aberjona River watershed.

EPA should ensure that the response actions taken with respect to ammonia comply with the requirements of the Clean Water Act.

Ammonia and related nitrogenous compounds are nutrients that promote the growth of species such as algae that overpopulate and make it impossible for other organisms to

flourish (e.g., fish). Nitrification is a known issue in the Aberjona, which the DEP has classified as "impaired." Hence any additional potentially significant sources of ammonia to the river are important. While ammonia is not regulated under the Superfund program, stream nitrification issues are regulated under the Clean Water Act. EPA should consider the requirements of the Clean Water Act as Applicable or Relevant and Appropriate Requirements (ARARs) and should demonstrate that the proposed plan complies.

As required by the Clean Water Act, EPA should perform an assessment of nitrogen loading to the Aberjona River including contamination from the Industri-Plex and Wells G&H Superfund sites.

Section 303(d) of the Clean Water Act requires a list of impaired waterbodies that are not expected to meet standards if additional controls are not put in place. The Aberjona River is on the Clean Water Act's list for impairment, and the reasons for its listing include unionized ammonia and nutrients (DEP, 2004), both of which receive potential contributions from the discharge of ammonia-contaminated groundwater from the Industri-Plex site. The Aberjona River is listed in Category 5, which requires the development of a Total Maximum Daily Load (TMDL) for the waterbody. A TMDL establishes the maximum loadings (of pollutants of concern, ammonia in this case) from all contributing sources that a water body may receive while still meeting water quality standards and allowing designated uses. The TMDL development process comprises the following four steps:

1. Description of water bodies and priority ranking: determination and documentation of whether or not a water body is presently meeting its water quality standards and designated uses.
2. Problem assessment: assessment of present water quality conditions in the water body, including estimation of present loadings of pollutants of concern from both point (discernable, confined, and concrete sources such as pipes) and non-point sources (diffuse sources that carry pollutants to surface waters through runoff or groundwater).
3. Linking water quality and pollutant sources: determination of the loading capacity of the water body. EPA regulations define the loading capacity as the greatest amount of loading that a water body can receive without violating water quality standards. If the water body is not presently meeting its designated uses, then the loading capacity will represent a reduction relative to present loadings.
4. Total maximum daily loads: specification of load allocations, based on the loading capacity determination, for non-point sources and point sources that will ensure that the water body will not violate water quality standards.

After public comment and final approval by EPA, TMDLs serve as a guide for future activities involving the waterbody. EPA and state governments work with towns to

develop specific implementation strategies to reduce pollutant loadings, and assist in developing a monitoring plan for assessing the success of pollutant reduction strategies.

Hence, the Clean Water Act requires that EPA perform a problem assessment, specifically an assessment of ammonia/nitrogen loadings in the Aberjona River. The problem assessment should include estimation of present loadings of nitrogen from both point and non-point sources associated with the Industri-Plex and Wells G&H Superfund sites, including the assessment of groundwater discharge to the Halls Brook Holding Area.

A recent Master of Science thesis performed at Tufts University identified and quantified principal sources of ammonia to the Aberjona River and identified physical and chemical mechanisms that control its mobilization to the river (Cutrofello, 2005). Data from this study may be useful in developing the required TMDL for the Aberjona River.

Cutrofello's sampling program of almost two years in length involved collecting and analyzing both wet and dry weather samples from nine different sites on the Aberjona River. The results of the watershed-scale study of load estimations indicate that the Upper Aberjona subbasin appears to be a significant source of dissolved inorganic nitrogen (DIN) to the Aberjona River. Two of the sampling sites in the study were located (1) just upstream of route 128 on the Aberjona River and (2) at the culvert draining the Halls Brook Holding Area. Cutrofello (2005) identified the HBHA pond as the principal source area of DIN, estimating that the pond can account for over 68 kg of nitrogen per day. As some ammonia is lost through volatilization and conversion to nitrate during nitrification, the ammonia load at the outlet of the watershed is approximately 50kg N/day. In a second phase of the investigation, two fixed monitoring locations were established on HBHA to measure temporal changes in the levels ammonia, nitrate, and other water quality parameters. Results of the second phase indicate that the pond is meromictic and ammonia levels are persistently elevated above 200 mg N/l in the chemolimnion of the north basin, which suggests that groundwater inputs rather than in-lake processes control the accumulation of ammonia in the pond. Mass balances are used to estimate an ammonia load of greater than 38 kg N/d from the groundwater to the north basin. Profiles and mass balances expose a flushing of up to 50% of ammonia from the south basin during storm events resulting in ammonia loads measured at up to 360 kg N/d entering the Aberjona River.

Cutrofello's study indicates that DIN loading from the HBHA is the major source of DIN and ammonia to the Aberjona River. The Horn Pond subbasin, encompassing the main tributary to the Aberjona River, and the Lower Aberjona subbasin are shown to contribute DIN loads that are insignificant as compared to the loads generated by the whole watershed, indicating that almost DIN of the load observed at the watershed outlet originates in the Upper Aberjona subbasin. Within the Upper Aberjona subbasin DIN loads from the HBHA tributary are more than three times the DIN loads in the Aberjona River upstream of its confluence with HBHA, indicating that the holding area is the major source of DIN and ammonia.

Ammonia data from Cutrofello (2005) indicate that ammonia is likely adversely affecting aquatic life in the Aberjona River.

EPA (2005) concludes in Section 4.2 of the ammonia evaluation that there are numerous exceedances of the ammonia AWQC throughout HBHA. Cutrofello (2005) data support this conclusion for the Aberjona River as well. Concentrations of ammonia from Cutrofello (2005) with corresponding pH and temperature measurements were compared to the 1999 ambient water quality criterion (AWQC) for ammonia. The criterion considered was the chronic criterion for early life stages of fish. On February 4, 2004 and June 22, 2004, ammonia levels measured at the site near Route 128 were greater than the appropriately calculated pH-and temperature-dependent AWQC. During this study, all ammonia concentrations measured at the outflow to HBHA exceeded the ammonia AWQC. Five of seven ammonia concentrations measured at the sampling location "Wetout" also exceed the ammonia AWQC. These exceedances indicate that ammonia should be considered a contaminant of concern and are most likely adversely affecting juvenile fish in the Aberjona River.

Given Cutrofello's finding of exceedances of the AWQC corroborating EPA's finding, additional sampling is recommended to characterize the seasonal nature of AWQC exceedances, and uncertainty regarding the performance of the proposed coffer dam suggests that frequent monitoring will be necessary to ensure that the ammonia AWQC does not continue to be exceeded after remediation.

The SPARROW model could be used to assess nitrogen loads into the Aberjona River and to assess management options for nitrogen loading from HBHA.

EPA has assisted in the development of a model for the determination of a TMDL for nitrogen for a particular subbasin or watershed. As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a waterbody can receive without violating water quality standards. Because there are no numerical water quality standards for nitrogen, the U.S. Geological Survey, in cooperation with EPA and the New England Interstate Water Pollution Control Commission, has developed a water-quality model, called SPARROW (Spatially Referenced Regressions on Watershed Attributes), to assist in regional TMDL and nutrient-criteria activities in New England. SPARROW is a spatially detailed, statistical model that uses regression equations to relate total nitrogen and phosphorus (nutrient) stream loads to nutrient sources and watershed characteristics. The statistical relations in these equations are then used to predict nutrient loads in unmonitored streams.

Applications of SPARROW for evaluating nutrient loading in New England waters include estimates of the spatial distributions of total nitrogen and phosphorus yields, sources of the nutrients, and the potential for delivery of those yields to receiving waters. This information can be used to (1) predict ranges in nutrient levels in surface waters, (2) identify the environmental variables that are statistically significant predictors of nutrient levels in streams, (3) evaluate monitoring efforts for better determination of nutrient

loads, and (4) evaluate management options for reducing nutrient loads to achieve water-quality goals.

A report on the model (USGS Scientific Investigations Report 2004-5012, "Estimation of total nitrogen and phosphorus in New England streams using spatially referenced regression models," by R.B. Moore and others) is available at <http://pubs.water.usgs.gov/sir2004-5012>. Additional information on the model is available at <http://water.usgs.gov/nawqa/sparrow>.

This model could be used for the Aberjona River watershed to assess nitrogen loads into the river and identify what other remedial or management options could be used to control nitrogen loading from HBHA.

Comments on EPA's Proposed Plan

EPA's acceptable risk levels are less stringent than those generally used by the Massachusetts DEP.

EPA's human health risk assessment defines an incremental lifetime cancer risk of 100 in a million as an acceptable risk of cancer. Massachusetts DEP regulations define 10 in a million as the acceptable risk of cancer. EPA's cancer risk criterion is a factor of 10 less stringent than DEP's criterion. The use of less conservative risk criteria by EPA makes it even more imperative for EPA to use upper end exposure parameters in the risk calculations to ensure that the risk estimates are protective of individuals with upper end exposure to contaminants of concern.

EPA's proposed plan leaves concentrations of arsenic in soil on the site greatly exceeding arsenic concentrations typically allowed to remain in soil by the Massachusetts DEP.

Table 1 summarizes the soil data used to derive exposure point concentrations for soil in the human health risk characterization. EPA's proposed plan would leave all of this soil in place, controlling access to the soil primarily through the use of institutional controls. As can be seen in the table, much of this soil contains arsenic at concentrations exceeding those typically allowed to remain in soil by the Massachusetts DEP.

The Massachusetts MCP Method 1 soil standard for arsenic is 30 mg/kg. While the Method 1 soil standards are not strictly applicable in a site-specific risk characterization such as that performed for the Industri-Plex site, they provide a guideline for concentrations of arsenic that are generally considered to be acceptable in soil in Massachusetts. The average arsenic concentration at four of the six exposure points and the 95% UCL at five of the six exposure points summarized in Table 1 exceed the Method 1 standards, in some cases by more than an order of magnitude.

The Massachusetts MCP upper concentration limit for arsenic is 300 mg/kg. The upper concentration limit represents a concentration that by definition (in the MCP) indicates the potential for significant risk of harm to public welfare and the environment under

future conditions. The average arsenic concentration at one of the six exposure points and the 95% UCL at three of the six exposure points in Table 1 exceed this upper concentration limit. By definition, these concentrations indicate the potential for significant risk of harm to public welfare and the environment under future conditions.

Table 1 Summary of soil data used to derive exposure point concentrations for arsenic in the human health risk characterization

Description of exposure point	Average arsenic concentration (mg/kg)	95% UCL arsenic concentration (mg/kg)	Maximum detected arsenic concentration (mg/kg)
Surface soil in unpaved developed areas associated with the former Lake Mishawum Lake bed; groundskeeper exposure (Area SO; current and future conditions)	46	92	190
Surface soil in unpaved developed areas associated with the former Lake Mishawum Lake bed; child daycare exposure (Area SO; current conditions)	27	62	64
Subsurface soil in unpaved developed areas associated with the former Lake Mishawum Lake bed (Area SO; future conditions)	360	1900	2700
Surface soil along the banks of HBHA (Area A6; current and future conditions)	280	600	720
Subsurface soil along the banks of HBHA (Area A6; future conditions)	240	770	740
Surface soil in an upland undeveloped area along Cabot road, near the HBHA (Area HB04; current and future conditions)	22	26	33

Comments made by others erroneously calculate – and greatly exaggerate – the effects of combining upper-bound assumptions in the human health risk characterization.

As stated in the previous two comments, EPA's proposed plan is based on the highest levels of risk permissible within the Superfund program – levels that exceed those allowed by DEP under its MCP program – and will leave significant levels of contamination in place – levels that would require remediation under the MCP. It is therefore appropriate that the risk assessment be based on conservative assumptions to ensure that human health is protected – assumptions that cover all possible present and future exposure scenarios, and do so in a way that ensures that potential exposures are not underestimated. EPA has received various comments regarding the overly conservative nature of the risk assessment, but a conservative risk assessment is necessary in this case. Moreover, some of the comments made on the nature of EPA's conservatism are incorrect. In particular, Section 1.3 of the comments prepared for Pharmacia Corporation and the Stauffer Management Company by its consultants (Bradley et al., 2005) greatly exaggerates the effects of combining upper-bound assumptions in the human health risk

characterization and makes an argument that is completely false. It is true that excessive combination of upper bound exposure factors may result in an unreasonable estimate of risk, but the use of just a few upper bound exposure parameters does not result in an unreasonable risk estimate, and in fact, results in a very reasonable estimate for an individual with greater than average exposure.

The aforementioned commenters state that combining just three 95th percentile upper bound exposure parameters overestimates risk for 99.99% of the population (because $0.05 \times 0.05 \times 0.05 = 0.000125$ or 0.0125%). This is incorrect. Using this argument, one could make the claim that using three 50th percentile exposure parameters (median parameters) would overestimate risk for 87.5% of the population because $0.5 \times 0.5 \times 0.5 = 0.125$ or 12.5%. This is also incorrect. Proper combinations of factors to estimate risk demonstrate that combining the 95th percentile of three independent lognormal variability distributions multiplicatively will overestimate risk for between 95% and 99.78% of the population, depending on the standard deviations of the distributions.

EPA should be more specific regarding the types of institutional controls proposed for the site.

EPA should provide additional information about the specific institutional controls being proposed in the remedial plan. While institutional controls can restrict access to areas with the highest levels of contamination and hence, limit risk, it is not always possible or appropriate to place such controls on all properties. Citizens owning property near the Industri-Plex site need to know what types of controls are proposed, on which properties the controls will be placed, and who is going to be responsible for obtaining and maintaining the controls. EPA's proposed plan should not include any mandatory requirement for institutional controls on properties whose owners are not in any way responsible for contamination of the property.

Furthermore, the Massachusetts DEP does not allow permanent institutional controls to be placed on groundwater, while part of the proposed plan (notably GW-2 "Pond Intercept with Monitoring and Institutional Controls") uses institutional controls to prevent or control potential exposures to groundwater. This conflicts with the DEP policy of not allowing institutional controls on groundwater.

Potential flooding problems related to the proposed plan should be thoroughly studied and addressed.

The Halls Brook Holding Area was created in the 1970's for flood-control purposes. The proposed plan significantly alters the movement of water through the HBHA during storm events through the construction of a stormwater bypass that allows a portion of stormwater to flow directly into the southern portion of the HBHA. Has EPA evaluated the effects of the proposed remedial activities on the storm water capacity of the HBHA and surrounding wetlands? Flooding has, in the recent past, has been a significant concern for downstream properties adjacent to the Aberjona River. It is essential that remedial activities do not increase flooding downstream of the HBHA.

The Rifle Range soil sampling is inadequate to characterize arsenic.

On page 3-5 of the October 2005 "Evaluation of Ammonia and Supplemental Soil Data," EPA states that arsenic was not detected in any of the twelve soil samples collected at the Rifle Range. The detection limits of these samples, however, ranged from 19 to 32 mg/kg. These detection limits are too high to judge whether these soils may have been impacted above background levels, as the "natural" concentration of arsenic in soils in Massachusetts averages about 5 mg/kg. These samples should be re-analyzed to obtain better detection limits for arsenic.

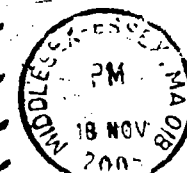
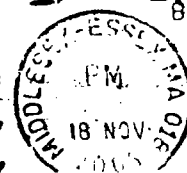
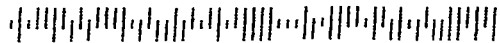
Odor-causing compounds should be investigated.

Based on sampling conducted by one of our team members (Prof. John Durant), surface waters from beneath the chemocline in the HBHA emit strong odors when brought to the surface. The usual source of strong odors is reduced sulfur compounds, the simplest (and frequently most abundant) of which is hydrogen sulfide (H_2S). Has EPA tested for the presence of H_2S in groundwater, and evaluated the possibility that H_2S off-gassing might present potential health risks to receptors such as the car wash workers (and other potential users of groundwater), especially since the Reference Concentration for H_2S is quite small (about $2 \mu\text{g}/\text{m}^3$)? If H_2S is potentially present, it should be added as a contaminant of potential concern.

References

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- TetraTech, "Evaluation of Ammonia and Supplemental Soil Data", Tetra Tech NUS, Inc., Wilmington, MA, October, 2005.

Aberjona Study
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www.aberjonastudy.org



Joseph F. LeMay
Remedial Project Manager
US EPA - New England
One Congress Suite 1100 (HBO)
Boston, MA 02114-2023



FITWALKER1@aol.com
11/18/2005 11:15 AM

To Joe Lemay/R1/USEPA/US@EPA
cc Gail.T.French@nae02.usace.army.mil,
KBARRY4PT@aol.com, FITWALKER1@aol.com,
JCirie4188@aol.com, FSMedeiros@aol.com,
bcc

Subject Aberjona Study Coalition, Inc Comments

Mr. LeMay,
Attached are the Aberjona Study Coalition, Inc. Comments on the *Evaluation of Ammonia and Supplemental Soil Data* and further comments on the *Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation* and the *MSGRP Feasibility Study and Proposed Plan* Industri-Plex Site
Woburn, Massachusetts

A hard copy was sent to your office Via US mail on 11/18/05

Linda A Raymond Treasurer
Aberjona Study Coalition, Inc.



November 18-05 comments.doc Report cover.pdf



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Bryan Clancy
<BClancy@NatDev.com>

11/18/2005 05:02 PM

To Joe Lemay/R1/USEPA/US@EPA

cc Tom Alperin <TAlperin@NatDev.com>

bcc

Subject June 2005 Proposed Plan and October 2005 Comments

Hi Joe –

I'm sorry I didn't get to see you before you left last night. Attached please find our comments and letter from Haley & Aldrich. I hope to see you soon.

Bryan J. Clancy
Vice President
National Development
2310 Washington Street
Newton, MA 02462
Direct Dial: 617-559-5070
Fax: 617-965-7361
Web: www.natdev.com



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**NATIONAL
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November 18, 2005

Mr. Joseph F. LeMay
Remedial Project Manager
U. S. EPA – New England
One Congress Street, Suite 1100 (HBO)
Boston, MA 02114-2023

**RE: Comments regarding Proposed June 2005 Plan and Fact Sheet
October 2005 – MetroNorth Business Center LLC 74-110 Commerce Way**

Dear Joe:

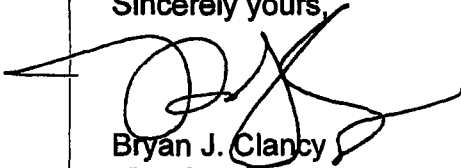
In the limited time allotted, National Development has tried to review the volumes of data and reports that the EPA has had years to develop. We have had our consultant, Haley & Aldrich, review some of the data, previous comment letters as well as reports that we had done prior to acquisition of the property to help us draw scientific conclusions about the EPA's plan and its effect on our property.

I have attached a comment letter prepared by Haley & Aldrich that draws some conclusions with the scientific evidence available to us. First, Haley & Aldrich questions as to whether the assumptions and potential risk exposure scenarios are overly conservative. These questions lead us to wonder whether many of the properties are being needlessly brought under the jurisdiction of the EPA when there may be alternative, more appropriate ways to accomplish the protection of public health while reducing the impact on property owners and the City.

More importantly, from what we have been able to study, from data in our possession that National Development commissioned prior to the purchase of our property, and the data set forth in the EPA reports, we have concluded that the scientific evidence available does not support the estimated groundwater plume under our properties and buildings shown on Figure 2 of the proposed plan. In fact, the magnitude and location of the plumes has been overstated, especially with respect to the MetroNorth Business Center. Attaching our property without sound scientific evidence will be needlessly damaging to the value of our property, it will create an unnecessary burden and expense on leasing and financing transactions and it will re-introduce the superfund stigma to an area that we have all worked together to eliminate.

In the absence of meaningful dialog between us and the EPA, we find there is no explanation or technical basis to include our property in the plan and the EPA institutional controls. In the spirit of cooperative conservation, not unilateral imposition, we ask the EPA to engage us (and others) in the dialog we have been asking for repeatedly over the past several months before any Record of Decision is filed. This is reasonable and appropriate request for a plan that proposes such far reaching impact. I look forward to your response.

Sincerely yours,



Bryan J. Clancy
Vice President



**NATIONAL
DEVELOPMENT**

Haley & Aldrich, Inc.
465 Medford St.
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Tel: 617.886.7400
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HaleyAldrich.com

**HALEY &
ALDRICH**

MEMORANDUM

18 November 2005
File No. 32829-000

TO: National Development
Bryan J. Clancy, Vice President

FROM: Haley & Aldrich, Inc.
John R. Kastrinos, P.G., LSP
Elliot I. Steinberg, P.E., Vice President

SUBJECT: Comments on USEPA June 2005 Proposed Plan and October 2005 Aberjona
Study Fact Sheet, Industri-Plex Superfund Site
MetroNorth Business Center
Woburn, MA

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This memorandum provides our preliminary comments on the information that National Development has provided concerning the Industri-Plex Site in Woburn, MA, and the MetroNorth Business Center (MNBC), which is owned and managed by National Development.

In their June 2005 Feasibility Study and Proposed Plan for the Industri-Plex Site, and the subsequent October 2005 Fact Sheet, the U.S. Environmental Protection Agency (EPA) proposed implementing Institutional Controls over the Industri-Plex contaminant plumes, including a plume that extends across the MNBC property. The interpreted plume of arsenic, benzene, and ammonia, extends from the northern section of the Industri-Plex Site, across the MNBC property, and across the Boston Edison Company Easement to the south, which is also part of the Industri-Plex site. The interpretation that the plume extends across the "tail" area of the MNBC property, which extends to the west/northwest from the main area of the property, toward the Massachusetts Bay Transit Authority (MBTA) commuter rail tracks appears consistent with EPA's groundwater data. It is our opinion, however, that the majority of the plume, which impacts the main area of the MNBC property, including areas under buildings, is not supported by the Industri-Plex data, based on the following observations:

- According to a March 2005 Report (the NUS Report) by Tetra-Tech/NUS, entitled "Multiple Source Groundwater Response Plan Remedial Investigation Report, Operable Unit 2," data supporting the plume delineation is provided. According to Figure 2-4 of the Report, four monitoring wells were installed within the MNBC property, or on the northern border of the MNBC property – B7-02, B7-04, B7-05, and B7-07. Well B7-02 is in the tail area; the other wells are on the main portion of the property or at the northern border of the property. Only one of these wells – B7-02, at the tail of the property – is included among the monitoring wells with contaminant concentrations that pose future human health risk (Figure 8-3 of the

NUS report). This is consistent with groundwater data for arsenic and benzene collected in previous assessment work at MNBC by National Development. These two parameters were detected sporadically on the MNBC property, at low-part per billion (ppb) levels (and below applicable MCP Reportable Concentrations), which would not support an interpretation that the Industri-Plex plume extends across the MNBC property

- The plume appears to be delineated based on interpreted groundwater flow directions, combined with the detection of contaminants at concentrations that pose human health risk in isolated wells to the north of MNBC, near the Southern Hide Pile source area, and to the south of MNBC in the Boston Edison Company Easement, another documented source of contamination at the Industri-Plex site. An equally plausible interpretation is that the contaminants are confined to these two source areas, and are absent or detectable at very low concentrations on the MNBC property, consistent with the aforementioned groundwater data collected as part of the Industri-Plex investigations and National Development's own investigations on the MNBC property.

Notwithstanding the questionable database supporting the groundwater plume delineation, it is our opinion that the potential for exposure to groundwater has been over-stated by EPA. For example, in a report dated 31 August 2005, a group of consultants (hereafter referred to as the consultant group) working on behalf of Pharmacia Corporation (f.k.a. Monsanto Company and Stauffer Management Company), commented on the June 2005 EPA Proposed Plan for the Multiple Source Groundwater Response Plan Study Area (MSGRP, which comprises the Northern Study Area of the Industri-Plex Site), Woburn, MA. With respect to exposure to groundwater at the Industri-Plex site, the consultant group opined that the EPA used unrealistic exposure scenarios and overly-conservative (i.e. worst-case) exposure assumptions and parameters in assessing risk of exposure of the public to groundwater. The consultant group included the following examples to support their opinion:

- "The use of groundwater in a car wash scenario should not have been included in the risk assessment as a complete exposure pathway based on City of Woburn zoning and groundwater use restrictions."
- "Future use of groundwater as industrial process water should be identified as an incomplete pathway, and no risks or hazards should be calculated for this scenario, because special permits are required for well installation in Woburn and wells cannot be installed on hazardous waste sites."

These examples were based on discussions the consultant group had with Mr. John Fralick, Woburn Health Department Health Agent. Specifically, Mr. Fralick provided the following information:

- "Wells and the use of city water are mutually exclusive;"
- "Special permits are required for well installation; and"

- “Wells should not be installed on hazardous waste sites; there are approximately 250 hazardous waste sites in Woburn.”

The consultant group accordingly concluded:

- “....it is entirely unlikely and unreasonable to assume that well water would be used for any purpose with in (*sic*) the Industri-Plex Site and MSGRP study area. Therefore, the future groundwater use scenarios (industrial worker process water use and car wash worker) should not be included in the MSGRP HHRA (*Human Health Risk Assessment*) as exposure to groundwater used for industrial or commercial purposes is not a complete exposure pathway.”

Regarding potential exposure to groundwater by future construction workers, the consultant group concluded that the exposure assumptions used by EPA in assessing risk were unrealistic and overly conservative, as follows:

- “USEPA also assumed that the construction worker would ingest shallow groundwater encountered in an excavation trench at a rate of 50 ml per day (slightly less than a quarter cup of water per day). Again, this is the same high intensity water ingestion rate that is assumed for a swimming scenario, where someone is completely submerged in water. This assumption is not reasonable, and is not consistent with USEPA’s assumption concerning water ingestion for the recreational teenager in the MSGRP HHRA.”

In summary, we conclude the following, based on our review of the available information:

1. We do not concur with EPA’s interpretation that the plume extends onto the MNBC property, with the possible exception of the “tail” area that extends northwest from the main area of the property. Data from the Industri-Plex site indicate the contaminants of concern were not detected on the MNBC property at concentrations that pose human health risk, with the exception of the monitoring well located in the tail area of the property.
2. Based on groundwater data for arsenic and benzene collected in previous assessment work at MNBC by National Development, the parameters were detected sporadically, at low-part per billion (ppb) levels. These data do not, therefore, support an interpretation that the Industri-Plex plume extends across the main portion of the MNBC property.
3. The Institutional Controls proposed by EPA are based on a risk assessment that, in our opinion, greatly over-states the risk of exposure to contaminants in the IndustriPlex plume. Furthermore, because it is our opinion that the Industri-Plex plume does not extend across the main area of the MNEC property, Institutional Controls are not needed, with the possible exception of the tail area, where Industri-Plex contaminants have been detected in groundwater.

- 4. In accordance with the above conclusions, it is our opinion that the proposed Institutional Controls presents an inappropriate and unnecessary burden on future management and development of the MNBC property. Should contaminants be present in soil or groundwater at the MNBC property, it is our opinion that it would be more appropriate to manage this condition through the State regulations (the Massachusetts Contingency Plan [MCP]).**

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"Hogan, Larry"
<LHogan@ensr.com>

11/18/2005 04:44 PM

To Joe Lemay/R1/USEPA/US@EPA

cc Heather_O'Donnell@spauldslye.com

bcc

Subject Comments to the Industri-Plex October 2005 Technical Memorandum

Joe:

On behalf of DEK Portfolio, LP, owner of the properties at 32 and 36 Cabot Rd in Woburn MA, ENSR has prepared and is submitting the attached comment letter related to the October 2005 Fact Sheet and Technical Memorandum that have added ammonia as a COPC for the Industri-Plex Superfund site.

We appreciate this opportunity to provide input to the proposed remedy for the site

Sincerely,

Lawrence M. Hogan, PG, LSP, LEP
Program Manager
ENSR Corporation
2 Technology Park Drive
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(978) 589-3705 (f) EPA Ammonia Pro Rem com ltr 11_18_05.pdf



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November 18, 2005

Mr. Joseph F. LeMay, P.E.
US EPA
1 Congress Street Suite 1100 (HBO)
Boston, MA 02114

**RE: Comments on the Industri-Plex Proposed Remedy Relative to Ammonia
ENSR Project Number 06250-134-0006**

Dear Mr. LeMay

At the request of DEK Portfolio Limited Partnership (DEK), ENSR has performed a review of the Federal Environmental Protection Agency's (EPA) Supplement to the Proposed Cleanup Plan for the Industri-Plex Superfund Site Operable Unit 2 (OU-2) and Draft Final Technical Memorandum for the Evaluation of Ammonia and Supplemental Soil Data which were dated October 2005. The primary focus of ENSR's review, was to evaluate the effects of the proposed clean up plan on the DEK properties located at 32 and 36 Cabot Road in Woburn, Massachusetts. The 245 acre Industri-Plex Site abuts the DEK properties to the north. ENSR originally provided a comment letter to the June 2005 Proposed Cleanup approach on August 31, 2005. As stated in that letter, it appears that portions of the DEK property would be affected by the following Cleanup Plan elements: imposed institutional controls (restricted land usage), storm water bypass, pond dredging, sediment retention construction activities, long term groundwater and sedimentation monitoring, and periodic retention pond maintenance dredging operations. According to the October 2005 Proposed Plan Supplement and Technical Memorandum, the addition of ammonia to the site as a Compound of Potential Concern (COPC) does not change the Proposed plan as the selected remedies will be effective in addressing ammonia at the site.

DEK's two primary concerns relative to the June 2005 proposed plan were as follows:

- Alternative GW-2-Pond Intercept with Monitoring and Institutional Controls within the Halls Brook Holding Area (HBHA) is essentially a passive remediation technique that will utilize the pond's existing dynamics to sequester contaminants in the northern portion of the HBHA and is in reality a component of sediment remedial alternative HBHA-4 which is designed to prevent continued downstream migration of arsenic-impacted sediment within the Aberjona River basin. Since it is essentially a passive method there will be limited effects/impacts to the subject property from implementation of this alternative alone. However, this remedy does not address the source of the contamination to groundwater entering the DEK property and discharging to the HBHA from the Industri-Plex site to the north. EPA plans to implement in-situ remediation (proposed groundwater remedy GW-4) in the West Hide Pile Area of the Industri-Plex site. It is ENSR's opinion that treatment or control of the source of the groundwater contamination upgradient of the HBHA should also be included to reduce offsite plume concentrations. The



November 18, 2005
Mr. Joseph F. LeMay, P.E.
Page 2

GW-2 remedy does not actually remediate groundwater at the site and Applicable or Relevant and Appropriate Requirements (ARARs) are not met until the point of compliance specified in the Draft Final Feasibility Study, which is at the discharge point of the cofferdam structures installed within the HBHA as part of sediment remedy HBHA-4. Therefore, with the exception of the institutional control and monitoring components, proposed alternative GW-2 is not effectively different from alternative GW-1, No Action. A reactive barrier installed as part of proposed remedy GW-4 along the NStar Easement to the north of the DEK property should be re-considered to protect the DEK property, the HBHA and the downstream sediments in the Aberjona River in the long term, while still retaining remedy GW-2 combined with sediment remedy HBHA-4 to eliminate downstream migration of arsenic bearing sediment in the short term. Concerns relative to proposed remedy HBHA-4 are discussed below.

- Implementation of Alternative HBHA-4-Storm Water Bypass and Sediment Retention with Partial Dredging and Providing an Alternative Habitat directly affects the DEK properties. The alternative includes construction of the sheet pile cofferdam and aeration zone, the dredging and dewatering of ~6,200 cubic yards of sediment from the southern portion of the HBHA Pond, capping and stabilizing the soils adjacent to the NSTAR and MBTA rights of way with permeable cap, and construction of the storm flow bypass structure. At this time, based on the information available, we can not fully evaluate or provide comment on the actual impacts to the current and/or future users of the DEK properties from construction and O&M until the final design, installation, and maintenance procedure for this proposed alternative are developed. As discussed above in our comments to proposed remedy GW-2, if groundwater impact to the HBHA could be eliminated through upgradient treatment or control of the plume through installation of a reactive barrier as part of remedial alternative GW-4, then the long term impacts of operation and maintenance of HBHA-4 could also be eliminated.

With regard to ENSR's earlier comment in our August 31, 2005 letter to the EPA that the upgradient treatment or control of the plume north of the HBHA pond should be re-considered under alternative GW-4 to the north of the DEK properties, the October 2005 Technical Memorandum states in Section 5.0 that it is highly uncertain that a reactive wall material exists that is effective in removing ammonia. However, oxygen injection is pointed out as being effective in reversing reducing conditions observed in the West Hide Pile. Although not considered specifically in the Feasibility Evaluation as a barrier technique for the area of the site upgradient of the HBHA, a remedial alternative that could be evaluated to limit migration of the plume would be oxygen injection in a curtain configuration. Such a configuration may be effective in reducing volatile constituents, and reverse reducing conditions to decrease the amount of ammonia and could limit the mobility of arsenic.

Retaining oxygen injection under GW-4 for either the West Hide Pile or the area upgradient of the HBHA Pond also requires an evaluation of the effects/byproducts created by the implementation this remedial alternative. The most notable byproduct would be nitrate and nitrite with the introduction of air into the groundwater. The effects of nitrate-nitrite generation should be considered to ensure no adverse effects to the environment are created.

The October 2005 Technical Memorandum also states that a pre-design study should be conducted to



November 18, 2005
Mr. Joseph F. LeMay, P.E.
Page 3

determine the optimum configuration of the selected remedy. During evaluation of data for the pre-design study, a limited additional evaluation of plume control techniques and effects the byproducts of remediation should also be considered.

On behalf of DEK Portfolio LP, ENSR thanks you for the opportunity to provide additional comment on the Proposed Plan for remediation of the Industri-Plex Superfund Site and once again we applaud your efforts to move the remedy forward.

Sincerely,

Lawrence M. Hogan, PG, LSP, LEP
Program Manager

David Macone, P.E.
Project Manager

cc: Heather O'Donnell- DEK Portfolio
J. Lerner- Lerner & Holmes



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Facsimile Cover Sheet

TO: Joseph F. LeMay EPA Region 1 (617) 918-1291
Name Firm/Location Fax Number

FROM: Larry Hogan Westford PPS 3131
Name Division/Dept. Tel. Ext.

DATE: 11/18/05 4:45 pm
Date Time

RE: Additional Comment to the Proposed Remediation Plan for the Industri-Plex Superfund Site

COMMENTS:

Attached please find comments to the October 2005 Fact Sheet and Technical Memorandum regarding the addition of Ammonia as a COPC for the Industri-Plex Superfund Site. Note that this letter was also sent in PDF format by e-mail and this fax provides hard copy. No copies will be submitted by US Mail.

Cover Page + 3 Pages

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Chris Perkins
<CPerkins@eri.uconn.edu>
11/18/2005 03:55 PM

To Joe Lemay/R1/USEPA/US@EPA, Chris Perkins
<CPerkins@eri.uconn.edu>
cc "paulderman@prodigy.net" <paulderman@prodigy.net>,
"pmedeiros@sigcom.com" <pmedeiros@sigcom.com>
bcc

Subject RE: comments

Joe;
Here are the comments.
Chris

-----Original Message-----
From: Lemay.Joe@epamail.epa.gov
To: Chris Perkins
Sent: 11/18/05 3:00 PM
Subject: Re: comments

The comment period closes today, November 18th, at midnight.

Chris Perkins
<CPerkins@eri.uconn.edu>
11/18/2005 02:42
PM

To
Joe Lemay/R1/USEPA/US@EPA
cc
Subject
comments

Joe;
I am still getting feedback from the City council of Woburn. I would like to email you the comments first thing Monday morning, if acceptable. Thanks.
Chris Perkins



Comments on the Remedial Plan supplement.doc

**Comments on the Evaluation of Ammonia and Supplemental Soil Data
Remedial Investigation/ Feasibility Study for the
Wells G & H Superfund Site
Industriplex Superfund Site
Operable Units 2&3
Woburn, Massachusetts**

**Christopher Perkins and Kevin Hood
University of Connecticut
Technical Outreach Service to Communities (TOSC)
USEPA Center for Hazardous Substances in Urban Environment**

The TOSC program was requested to conduct a third party review of the "Evaluation of Ammonia and Supplemental Soil Data for the Industriplex Operable Unit 2 and Wells G&H Sites- October 2005" by the Woburn City Council. We have critically reviewed the document and the associated draft final feasibility study and are comments are detailed below.

The specific comments regarding this document and the supporting information were similar to the comments previously supplied for our review of the document "Proposed Cleanup Proposal for the Industriplex Operable Unit 2 and Wells G&H Sites- June 2005". In light of this we will not go into great detail on our comments. We reviewed the proposed cleanup proposal in light of our overarching criteria of 1) will it work; and 2) is it protective of human health and the environment. While we believe that the remedial alternatives proposed by the USEPA will theoretically meet these two criteria, for ammonia as well as the other contaminants of concern as detailed in the previous document, the lack of specifics and background information for some alternatives give us some cause for concern, but primarily as a result of the previous document.

Unfortunately, we have been unable to conduct as comprehensive of a review of the plan and supplemental information as we would have liked, due to the short time frame, large volume of documents to assimilate, and funding constraints of the Technical Outreach Services to Communities (TOSC) program.

Our primary concern with the proposed alternatives relates to the use and long term maintenance of institutional controls to act as the primary method to minimize the risk related to human activities. We will detail these concerns and questions below.

1) Sufficiency of the five year review period. As stated in our comments to the previous plan, it is our belief that the five year review period is inadequate to

monitor/ ensure the effectiveness of some of the proposed remedies and also to keep a properly informed public. Since there is a heavy reliance on institutional controls and some *in-situ* remediation activities rather than removal actions, we believe that it would be in the best interest to have annual reviews of the monitoring data generated with an accompanying public meeting

2) The adequacy and ambiguity associated with proposed institutional controls (ICs): As we have previously stated, our primary concerns with the proposed activities on this site, are the heavy reliance upon un-named institutional controls to ensure protection of human health by minimizing exposure. Although there are minimal scenarios where exposure could lead to exceedence of health thresholds for ammonia (i.e. car wash), our concern lies with the lack of specifics on these proposed controls. This is especially the case because there is minimal information regarding which organizations would be responsible for implementation, monitoring and enforcement, and their long term viability. In the case of ammonia, the ICs will most likely be the onus of the City of Woburn and they will need to implement and monitor their effectiveness. Will the annual O&M costs associated with institutional controls, as listed in Table 4-29 of the original feasibility document, be provided to the city or other entity to whose responsibility this will be delegated to, or are these monies to be used for monitoring and analysis? How often will the USEPA review the ICs and their effectiveness? The September 2004 USEPA IC strategy states a five year review, but this may be inadequate (see comment 1). By not detailing or proposing which controls would be appropriate, we are unable to determine if these will be effective in the long term or in the best interests of the public and the City of Woburn.

In summary, we believe that the methods listed in the proposed remediation plan will be adequate to minimize human and ecological risk via reducing exposure pathways, but the "devil is in the details". We wish that the proposed plan was more detailed, which would allow for a more thorough analysis of the document.

Sincerely;

Christopher Perkins
And
Kevin Hood

Technical Outreach Services to Communities
ERI; Longley Bldg; U-5210
University of Connecticut
Storrs, CT 06269
Ph: 860-486-4015



Massachusetts Bay Transportation Authority

Mitt Romney
Governor

Kerry Healey
Lt. Governor

John Cogliano
Secretary and MBTA Chairman

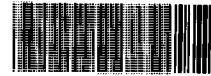
Daniel A. Grabauskas
General Manager

Via Email and Certified Mail, Return Receipt Requested

November 18, 2005

Joseph F. LeMay, Remedial Project Manager
US EPA – New England
One Congress Street, Suite 1100 (Mail Code: HBO)
Boston, MA 02114-2023

Industri-Plex
S.3
240379



SDMS DocID

240379

Re: **Aberjona Study – Industri-Plex Superfund Site - Woburn, MA**

Dear Mr. LeMay:

On August 31, 2005, the Massachusetts Bay Transportation Authority (“MBTA”) submitted comments to the United States Environmental Protection Agency (“EPA”) on the Proposed Plan (“Plan”) for the cleanup of Industri-Plex Superfund Site, Operable Unit 2 (including Wells G&H Operable Unit 3). This Plan was developed to address soil, sediment, groundwater, and surface water contamination. In its letter, the MBTA asserted that it was a Potentially Interested Party because of its concerns about the remedial measures to be implemented to clean up Operable Unit 2; however, the MBTA is not a Potentially Responsible Party. The MBTA was especially concerned with the preferred alternative remediation measure for Halls Brook Holding Area (“HBHA”) Pond Sediments, which is identified in the Plan as “Alternative HBHA-4”.

In October 2005, the EPA issued the Aberjona Study as a supplement to the Plan. The Aberjona Study dealt with ammonia contamination in various locations on the Industri-Plex Superfund Site (“Site”). Additionally, the Evaluation of Ammonia and Supplemental Soil Data Draft Final Technical Memorandum (“Supplemental Memorandum”) dated October 2005 was referenced as supplemental documentation to the Aberjona Study

- **The MBTA is a Potentially Interested Party, and not a Potentially Responsible Party**

Again, the MBTA asserts that it is a Potentially Interested Party, and not a Potentially Responsible Party because it owns a railroad Right-of-Way (“ROW”), which is part of the Lowell Commuter Rail Line. Its operations are limited to trains passing along its ROW.

Without admitting any liability under CERCLA or any other theory for Operable Unit 2 (including Wells G&H Operable Unit 3) or the ammonia contamination on the Site, the MBTA acknowledges it has some current ownership interests in part of the land in the Industri-Plex Superfund Site that makes it a “Potentially Interested Party”.

As previously stated in the prior comment letter, the MBTA is a public entity. It has limited control over its funding, and currently faces a multi-million dollar deficit. These reasons also support it having a no financial responsibility for the cleanup cost.

- **Area located west of the Lower South Pond and north of the intersection of Merrimac and New Boston Streets**

It does not appear that the EPA characterized soil and groundwater in this area. Due to the likely presence of high ammonia concentrations in this area, which is located west of three hide piles (hide piles are the known source of ammonia), our comments/concerns are as follows:

- The EPA should collect additional ammonia data in this area.
- Using the additional data, the EPA should assess the risk associated with the potential ammonia contamination and should specifically address the risk posed to a construction worker (for example working within a trench) who could be exposed to ammonia contaminated soil and groundwater/surface water while working in this area.

- **The need for appropriate ammonia-related remedial measures**

The MBTA understands that the EPA will conduct pre-design studies to address remediation of ammonia-impacted groundwater/surface water. However, depending on the results of the risk assessment discussed above, the EPA should identify ammonia-related remedial measures, as appropriate. Our comments/concerns are as follows:

- If it is determined that ammonia poses excessive risk to a construction worker, the proposed enhanced bioremediation process in the West Hide Pile Area (Preferred Alternative GW-4) should be evaluated to determine if it is the appropriate remedial measure for reducing ammonia related risk to acceptable levels.
- The chosen remedial measure by the EPA should take into account the depth of the hide piles, which was reported to be over 40 feet deep in areas.
- The MBTA would like to review the pre-design work plan prior to its implementation.

- **On-going source of ammonia**

The documentation provided by the EPA indicates that the hide piles will continue to be an on-going source of ammonia following the implementation of any remedial measures. Additionally, the Supplemental Memorandum specifically states that ammonia could increase over time due to the presence of reduced conditions in the groundwater. Our comment/concern is as follows:

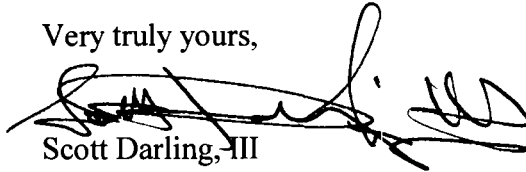
- The EPA should require that post-remediation monitoring for ammonia be conducted, to ensure that levels are maintained within acceptable limits.

- **Conclusion**

The MBTA submits this letter to comment on the ammonia contamination at the Site. This letter and comments are made without waiver of any applicable defenses to liability under CERCLA or any other applicable theory of liability, and all such defenses are hereby explicitly preserved. Nothing in this letter is intended to be, and should not be construed by any party for any purpose to be, an admission for any purpose, including but not limited to an admission of liability under CERCLA.

On behalf of the MBTA, I look forward to working with EPA on these important issues at the Industri-plex Superfund Site. If you have any questions or concerns about the content of this letter, please contact me at 617.222.3174 or sdarling@mbta.com.

Very truly yours,



Scott Darling, III
Environmental Counsel

cc: William Mitchell, Esq., MBTA; Dennis DiZoligo, MBTA; Debra Darby, MBTA;
Janis Kearney, Esq., MBTA; Andrew Brennan, MBTA; Maeve Bartlett, MBTA;
Mary Ellen Boyle, Esq., MBTA; Prasanta Bhunia, W&S



Scott Darling
<SDarling@mbta.com>
11/18/2005 03:34 PM

To Joe Lemay/R1/USEPA/US@EPA
cc
bcc
Subject MBTA Comments on the Industri-plex - Aberjona Study

Mr. LeMay,

Attached are the comments from the MBTA on the Aberjona Study. You will receive the actual letter in the mail. If you have any questions, please do not hesitate to call me at 617.222.3174.

scott d.



MBTA Comments Aberjona Study.pdf

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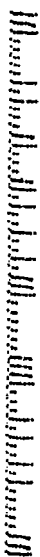


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Scott Darling
<SDarling@mbta.com>
11/28/2005 06:11 PM

To Joe Lemay/R1/USEPA/US@EPA
cc
bcc
Subject Fwd: MBTA Comments on the Industri-plex - Aberjona Study

Mr. LeMay,

I am resending this email because my computer tells me that you never received it.

scott d.

scott darling, III
Environmental Counsel
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Ten Park Plaza, Suite 7760
Boston, MA 02116
ph: 617.222.3174
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>>> Scott Darling 11/18/2005 3:34:36 PM >>>
Mr. LeMay,

Attached are the comments from the MBTA on the Aberjona Study. You will receive the actual letter in the mail. If you have any questions, please do not hesitate to call me at 617.222.3174.

scott d.



MBTA Comments Aberjona Study.pdf



Cynthia Brooks
<cb@g-etg.com>
11/18/2005 12:35 PM

To Joe Lemay/R1/USEPA/US@EPA, Susan
Studlien/R1/USEPA/US@EPA
cc "'Marc Weinreich"' <mw@g-etg.com>, Marc Weinreich
<marc2@earthlink.net>

bcc

Subject Public Comments for Industri-plex OU-2/Wells G&H OU-3

Attached are the comments respectfully submitted by Resources for Responsible Site Management, Inc., as Trustee for the Industri-plex Superfund Site Custodial Trust. Thank you for your consideration of our input.

Cindy Brooks

Cynthia Brooks
President, GETG, Inc.
Greenfield Environmental Trust Group, Inc. &
Resources for Responsible Site Management, Inc. (RRSM)
(617) 448-9762



Custodial Trust Comments 11-18-05.pdf

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By Electronic & U.S. Mail

November 18, 2005

Joseph LeMay
Remedial Project Manager
Massachusetts Superfund Section
Office of Site Remediation & Restoration
U.S. EPA – New England (Region I)
One Congress Street
Suite 1100 (mail code: HBO)
Boston, MA 02114-2023

Susan Studlien
Director
Office of Site Remediation & Restoration
U.S. EPA – New England (Region I)
One Congress Street
Suite 1100 (mail code: HBT)
Boston, MA 02114-2023

RE: Public Comments on the Supplement to the Proposed Cleanup Plan for the Industri-plex Superfund Site, Operable Unit-2, and including Wells G&H Superfund Site, Operable Unit-3, Aberjona River Study, Woburn, Massachusetts (the "Proposed Cleanup Plan")

Dear Joe and Susan:

This letter sets forth the written comments of Resources for Responsible Site Management, Inc. (RRSM), as Trustee of the Industri-plex Superfund Site Interim Custodial Trust (the "Custodial Trust"), to the U.S. Environmental Protection Agency (EPA) in connection with the public comment period for the Proposed Clean-up Plan which was re-opened by the EPA for thirty days beginning October 18, 2005.

The recommendations set forth in our letter of August 31, 2005 remain substantially unchanged. The Custodial Trust respectfully reiterates its appeal to EPA for: (i) sufficient time and technical resources for the City of Woburn to be able to participate meaningfully in a public review of the Proposed Clean-up Plan; and (ii) more important, a transparent, open, and substantive pre-ROD dialogue with the City of Woburn (the City) and the Industri-plex Site Remedial Trust (ISRT) who, along with the EPA and DEP, comprise the three beneficiaries of the Custodial Trust.

More than ever, the Custodial Trust is convinced that the success of this final stage of clean-up critically depends on the EPA's willingness to engage in a meaningful, responsible dialogue, individually and jointly, with the ISRT and the City. The Custodial Trust is equally certain that such a dialogue would undoubtedly be in the best interests of the environment, the general public, and the three Custodial Trust beneficiaries, including EPA. The remainder of this letter enumerates some of the reasons why the Custodial Trust advocates this approach, any one of which, by itself, would justify re-opening the channels of communication between EPA and the other stakeholders.

- (1) An open, meaningful dialogue between EPA, the ISRT and the City could help avoid potentially adversarial and unnecessary litigation that would only result in the worst case outcome for all beneficiaries of the Custodial Trust, re-stigmatizing the City of Woburn and needlessly delaying clean-up of the Aberjona River.
- (2) Such a meaningful exchange of ideas would ensure that these three critical stakeholders—stakeholders that are certain to have a role in the Proposed Clean-up Plan—both understand and buy-in to the final clean-up plan for the Aberjona River. Any decision to proceed without that understanding and buy-in would eclipse the prospects for a timely and successful clean-up and damage the legacy of goodwill that made possible the remarkable accomplishments at Industri-plex to date.
- (3) Responsible dialogue would foster the collaboration that would lead to the most expeditious and efficient implementation of the Proposed Clean-up Plan, thereby resulting in greater protection of public health and the environment—which would better align with EPA's statutory and regulatory mission. As suggested in the Custodial Trust's August 31, 2005 letter, choosing to collaborate would affirm our understanding of EPA's true commitment to building community alliances and public-private partnerships. Furthermore, it would dispel current concerns that public comments will not be taken seriously because the EPA has already made its final decision about the clean-up.
- (4) Engaging in meaningful dialogue would enable the stakeholders to build upon, rather than abandon the unprecedented cooperation and collaboration among and between the public and private sectors and all three levels of government. It was precisely that collaboration that helped create what has become a national model for redeveloping federal superfund sites and a considerable source of pride for all stakeholders, including, quite appropriately, the EPA.
- (5) There is no risk or downside to EPA's engaging in open, meaningful pre-ROD communications with the ISRT and the other beneficiaries of the Custodial Trust. In fact, it can only benefit these three stakeholders, if for no other reason than the goodwill that such a process would engender.

- (6) The Custodial Trust urges EPA to pursue honest, substantive dialogue with the ISRT, the City, the Landowners, and other stakeholders, if for no other reason, than they have requested such dialogue—in some instances, apparently many times. These requests are not unreasonable.
- (7) Finally, while EPA is certainly vested under CERCLA with the authority to proceed in a unilateral fashion, in the absence of any imminent health risk and given the time taken to study the river, there is no obvious or understandable reason why EPA would choose such an approach. Such an approach seems, on its face, one-sided and imbalanced and would run entirely counter to prevailing agency practices and thinking. In the unlikely event that Region 1 opted not to communicate openly with the ISRT and the City of Woburn about the Proposed Clean-up Plan before the agency makes its final decision and issues a Record of Decision, the Custodial Trust believes that Region 1 leaves itself open to questions, doubts and challenges about the whether its decisions were made without meaningful stakeholder and community input, especially when that input was well within reach. Ultimately, such stakeholder questions and doubts would undermine EPA's credibility and seriously derail the implementation of any clean-up plan for the river.

With deference, respect and continued optimism, the Custodial Trust again exhorts the EPA to consider the Custodial Trust's recommendations in the spirit of cooperation that has characterized our collective achievements at the Industri-plex Site thus far. While it is a privilege to serve the EPA's fiduciary and other needs with respect to Industri-plex property—as we have for the last sixteen years—the Custodial Trust is hopeful that this final clean-up phase can be accomplished in much less time.

We are mindful of the number and volume of comments you have received and we are grateful for the time and consideration you may give to the comments from the Custodial Trust. Please do not hesitate to call me with any questions (617-448-9762).

Sincerely,

Cynthia N. Brooks
President, RRSM
Trustee for the Custodial Trust
Industri-plex Superfund Site

cc: Tom Alperin – National Development, President
John Beling – US EPA – I – Office of Regional Counsel
Angela Bonarrigo – US EPA – I – Community Relations
Susan Brand – Cummings Properties, General Counsel
Bob Cianciarulo – US EPA – I – Office of Site Remediation & Restoration
Bryan Clancy – National Development, Vice President
Dennis Clarke – Cummings Properties, President & CEO
Andy Cohen – MA DEP – Office of General Counsel
The Honorable John Curran – Mayor, City of Woburn
Christopher Gordon – Massachusetts Port Authority, RTC
Jack Marlowe – Woburn Redevelopment Authority
Anna Mayor – MA DEP – Bureau of Waste Site Clean-up
Luke Mette – Stauffer Management Company
Linda Raymond – Aberjona Study Coalition, Inc.
Jerry Rinaldi – Solutia Inc.
Randy White – Monsanto Company
Marc Weinreich – RRSM, Custodial Trust
Woburn City Council:
President Paul Medeiros, Alderman, Ward 5 & City Council President
Alderman Charles E. Doherty, Ward 1
Alderman James E. McSweeney, Ward 2
Alderman Scott D. Galvin, Alderman Ward 3
Alderman William N. Booker, Ward 4
Alderman John A. Ciriello, Ward 6
Alderman Thomas L. McLaughlin, Ward 7
Alderman-at-Large Paul J. Denaro
Alderman-at-Large Joanna Gonsalves