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Aberjona River Study

Comprehensive Multiple Source Groundwater Response Plan Remedial Investigation

Industri-Plex and Wells G & H Sueprfund Sites, Woburn MA

April 2005

The Industri-Plex Superfund Site is a 245-acre industrial park. From 1853 until 1979, the site was used for manufacturing and then developed for industrial use. The by-products and wastes from nearly 130 years of chemical manufacturing, light industry, and glue manufacturing contaminated soil and wetlands with heavy metals including arsenic, lead and chromium. The groundwater is primarily contaminated with arsenic and benzene. The first phase of cleanup at the site included placing a protective cap over more than 100 acres of soils contaminated with heavy metals to prevent people from coming into contact with the contamination. Today the industrial park is home to retail, commercial and light industry as well as the Anderson Regional Transportation Center.

The Aberjona River flows from its headwaters in Reading through Woburn and Winchester before discharging into the Mystic Lakes. The Aberjona River flows through the Industri-Plex site and merges with the surface water flow from Halls Brook Holding Area (HBHA) downstream at Mishawum Road in North Woburn. The river continues south underneath Interstate 95, through the Wells G&H Superfund Site and Cranberry Bog Conservation Area in East Woburn, and follows a well defined channel through Winchester down to the Mystic Lakes.

The second phase of the Industri-Plex Superfund Site cleanup includes the completion of the comprehensive Multiple Source Groundwater Response Plan Remedial Investigation (MSGRP RI) to determine the nature and extent of contamination in the groundwater, surface water, sediment and soil around and including the Industri-Plex Superfund Site and downstream areas along the HBHA and Aberjona River as part of the Industri-Plex Operable Unit 2 (OU-2).

The MSGRP RI incorporates the Wells G&H OU-3, Revised Aberjona River Study Baseline Risk Assessment dated September 2004, which focused on sediments, surface water and soils along the Aberjona River from Interstate 95 in Woburn to the Mystic Lakes in Winchester, Arlington and Medford (known as the Southern Study Area). The MSGRP RI also includes a baseline risk assessment for sediments, surface water, soils and groundwater from Industri-Plex Site to I-95 (known as the Northern Study Area). The southern and northern study areas were further divided by reaches along the river which represented areas of similar habitat, species, and accessibility.

The MSGRP RI identifies potential contaminant migration pathways and the risks to people and the environment associated with contamination in the Northern Study Area (Reach 0) and Southern Study Area (Reaches 1 – 6). Based on the conclusions of this comprehensive report, EPA will evaluate cleanup options for addressing areas that present a significant risk to people or the environment. See Figure 1.

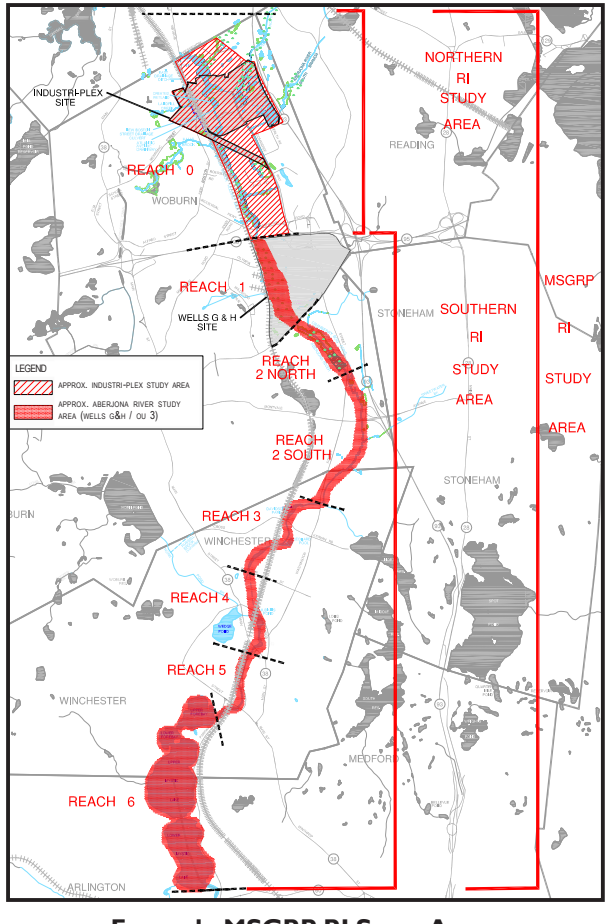

Figure 1: MSGRP RI Study Areas

The MSGRP RI collected and evaluated more than 4,800 samples of soil, groundwater, surface water, sediment, soil gas, and various plant and animal tissues to estimate the potential risks to mammals, birds, fish, and invertebrates exposed to contaminants in surface water, sediment, and soil in the study area. In general, the primary areas of concern are located in the northern portion of the RI study areas (reaches 0, 1 and upper 2). The major conclusions from the RI report include the following:

Fate & Transport:

As shown in Figure 2, groundwater at the Industri-Plex Site is primarily contaminated with arsenic and benzene (called plumes). As these plumes flow south and discharge into the HBHA Pond and HBHA Wetlands, both arsenic and benzene impact the surface water and sediments in the HBHA Pond. While benzene's impact is primarily on the pond; arsenic continues to travel downstream of the HBHA Pond and impacts surface water and sediments in the HBHA Wetlands and Aberjona River.

Concentrations of arsenic in surface water were greatest in the Northern Study Area, north of I-95, with the highest levels exceeding National Ambient Water Quality Criteria (NAWQCs) in the deep surface water of the HBHA Pond. Downstream of I-95, arsenic is present in the surface waters of the Aberjona River, however the concentrations decrease throughout the entire length of the Southern Study Area, as arsenic settles out of the surface water and deposits in the sediment. The highest concentrations of arsenic in sediments are found in the northern portion of the RI study area in portions of the HBHA (Reach 0), Wells G&H Wetland (Reach 1), and Cranberry Bog Conservation Area (Upper Reach 2).

HBHA Pond, a man-made flood storage area approximately 175 feet wide x 900 feet long and up to 20 feet deep with a very shallow outlet (1 to 2 feet deep), helps limit the migration of arsenic downstream. The geological and chemical conditions in this man-made pond have resulted in two distinct layers of surface water. As shown in Figure 2, the shallow surface water in the pond contains low arsenic and benzene concentrations while the deeper surface water contains high concentrations of both chemicals. Between these two layers is a transition layer, called a chemocline, which separates the more contaminated deep surface water from the less contaminated shallow surface water. As long as this chemocline is stable in the HBHA Pond, contaminants are partially sequestered in the deeper surface water and sediments, limiting their migration downstream. However, during significant storm events, contamination throughout the pond becomes mixed causing the chemocline to breakdown and increased concentrations of arsenic to migrate downstream.

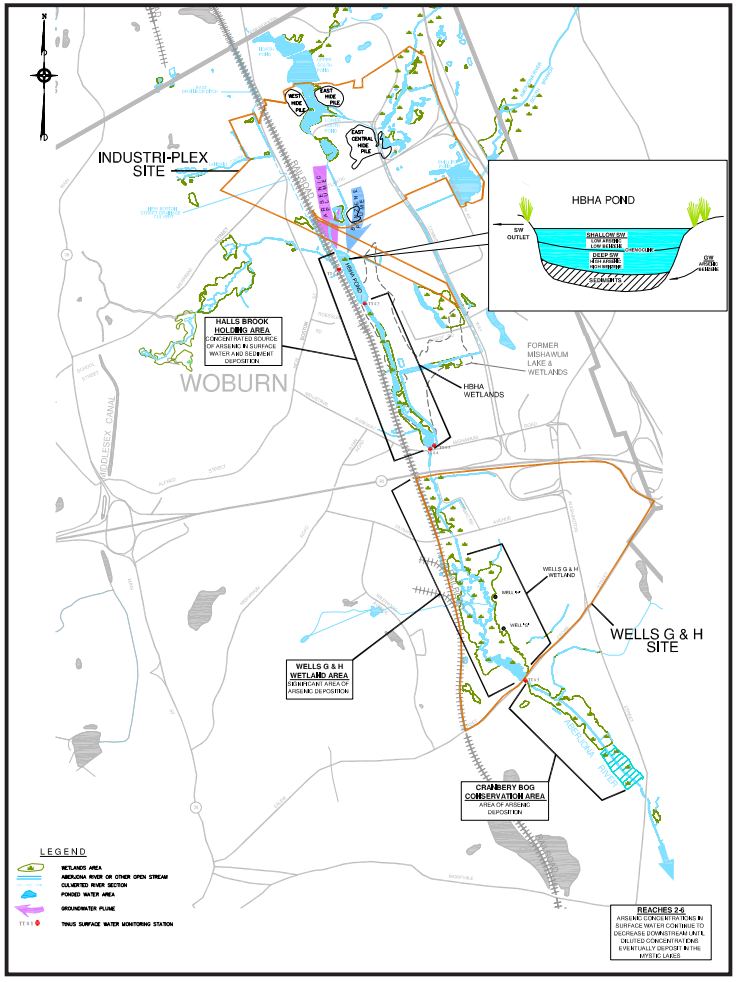

Figure 2: Summary of Key Contaminant Migration Pathways

As shown in the table, different reaches of the study area pose risks to people or the environment under certain scenarios. The table highlights which media present a risk and whether these risks are carcinogenic or non-carcinogenic. EPA's Feasibility Study will evaluate potential cleanup alternatives to address these areas of concern.

Risk Area	Scenario/Receptor	Impacted Media	Major Contaminant Contributing to Risk
HUMAN HEALTH RISK			
Industri-Plex Site (Reach 0)	Future Construction Worker	Groundwater	(NC) - Arsenic
Industri-Plex Site / HBHA Pond Area (Reach 0)	Future Industrial Worker	Groundwater,Indoor air	(NC) - Benzene, naphthalene, arsenic (C)- Trichloroethene
Former Mishawum Lake & South of Cabot Road Area (Reach 0)	Future Industrial Worker	Groundwater,Indoor air	(C)- Trichloroethene
Industri-Plex Site / HBHA Pond Area (Reach 0)	Future Car Wash Worker	Indoor air	(C)- Trichloroethene (NC) - Benzene, naphthalene
Former Mishawum Lake & South of Cabot Road Area (Reach 0)	Future Car Wash Worker	Indoor air	(C)- Trichloroethene
Wells G&H Wetland (Reach 1); and Former Cranberry Bog (upper Reach 2)	Current/ Future Recreational Exposure	Sediment	(C) – Arsenic (NC) - Arsenic
HBHA (Reach 0); and Wells G&H Wetland (Reach 1)	Future Dredger/ Construction Worker	Sediment	(NC) – Arsenic
Former Mishawum Lake Area (Reach 0)	Future Day Care Child (surface soil)	Soil	(C) – Arsenic
	Future Day Care Child (subsurface soil)	Soil	(C) – Arsenic
	Future Const. Worker (subsurface soil)	Soil	(NC) - Arsenic
ECOLOGICAL RISK			
HBHA Pond	Benthic Invertebrate Communities	Sediment, Deep surface water	Arsenic and Benzene

(NC) Non-Carcinogenic Hazard (C) - Carcinogenic Risk

Risks Presented to People and the Environment:

- The arsenic and benzene plumes beneath the Industri-Plex site may cause future health risks to people who come into contact with the water. See Figure 3.
- The arsenic plume from the Industri-Plex Site, contributes to the migration of arsenic downstream where its presence in shoreline sediments presents a health risk to people who might come into contact with the sediment. See Figure 3.
- High concentrations of arsenic in both the surface and deep soils in the area of the former Mishawum Lake Bed may cause future health risks to people who come into contact with the soils. See Figure 4.
- High concentration of arsenic in sediments located in three distinct areas along the shoreline of the Wells G&H Wetland and Cranberry Bog Conservation Area present a current and/or future health risk to people recreating along the shoreline. See Figure 4.
- The arsenic and benzene plumes contribute to significant environmental risks in the HBHA Pond sediments and deep surface water. Contamination in the sediment presents significant environmental risk to the benthic invertebrate community (organisms residing in the sediments) in the HBHA Pond. High concentrations in the deep surface water presents a risk to aquatic organisms in the HBHA Pond. See Figure 4.

INDUSTRI-PLEX SITE

RX-19
WEST HIDE PILE
EAST HIDE PILE
RX-18
EAST CENTRAL HIDE PILE
B5-01
B5-02
B4-04
See Inset
B7-02
B7-03
SO. HIDE PILE
B6-03
B7-01
W5-05
B8-04
W5-03
W5-06
B9-01
B9-02
PHILLIPS POND
ABERJONA RIVER
HIBIA POND

Map Inset
RX-17
RX-16
RX-15
RX-8
RX-9
RX-10
RX-7
RX-6
RX-5
RX-3
RX-4
RX-2
RX-1

HALLS BROOK HOLDING AREA
AE-06
AE-02
AE-03
AE-04
COMMERCE WAY
I-93
ROUTE 128
OLYMPIA AVE
MISHAWUM ROAD

Reach 0
Reach 1
Reach 2

• Well H
WELLS G & H WETLAND
• Well G
WELLS G & H SUPERFUND SITE
SALEM STREET

LEGEND

- Rail Lines
- Study Area Reach
- Superfund Site Boundary
- Wetlands
- Former Cranberry Bog
- Interim Wellhead Protection Area
- Monitoring Well
- Aberjona River
- Bodies of Water
- Former Mishawum Lakebed
- B6-03 Arsenic
- W5-03 Trichloroethene
- W5-05 Benzene
- W5-05 Napthalane

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Metcalf & Eddy

N

0 300 600 1,200 1,800 2,400
Feet

FACT SHEET FIGURE 3. MONITORING WELLS WITH FUTURE HUMAN HEALTH RISK

INDUSTRI-PLEX SITE

WEST HIDE PILE

EAST HIDE PILE

EAST CENTRAL HIDE PILE

SO. HIDE PILE

PHILLIPS POND

ABERJONA RIVER

I-93

HBHA POND

SO-3

SO-11

HBHA WETLANDS

HALLS BROOK HOLDING AREA

SC02

SO-13

SO-14

SO-16

COMMERCE WAY

ROUTE 128

Reach 0

OLYMPIA AVE

MISHAWUM ROAD

WH

NT-3

SC05

• Well H

WELLS G & H WETLAND

13/TT-27

SC06

Reach 1

WELLS G & H SUPERFUND SITE

• Well G

SC08

SALEM STREET

Reach 2

CB-03

Locations with Human Health Risk

- Sediment Locations with Current and Future Risk
- Sediment Locations with Future Risk
- Sediment Core Locations with Future Risk
- SO-11 Soil Locations with Future Risk
- Represents the Same Sediment Area

Locations with Ecological Risk

- Unacceptable Ecological Risk

LEGEND

- Rail Lines
- Study Area Reach
- Superfund Site Boundary
- Wetlands
- Former Cranberry Bog
- Aberjona River
- Bodies of Water
- Former Mishawum Lakebed

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Metcalf & Eddy

N

0 300 600 1,200 1,800 2,400

Feet

FACT SHEET FIGURE 4. SEDIMENT AND SOIL LOCATIONS WITH HUMAN HEALTH RISK AND ECOLOGICAL RISK AREAS

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Next Steps

The Multiple Source Groundwater Response Plan Remedial Investigation will be used to formulate a comprehensive strategy, called a Feasibility Study and Proposed Plan, to address human health and environmental risks from the Industri-Plex Superfund Site to the Mystic Lakes. The Feasibility Study and Proposed Plan are being prepared as separate documents and are expected to be completed by May 2005. Once the Feasibility Study and Proposed Plan have been released, EPA will be accepting comments from the public on the RI, FS and Proposed Plan documents during 30 day public comment period.

Copies of the Comprehensive MSGRP Remedial Investigation Report are available at the following locations:

Woburn Public Library
45 Pleasant St.
Woburn, MA

Winchester Public Library
80 Washington St.
Winchester MA

The Comprehensive MSGRP Remedial Investigation Report can also be found on EPA's web site:

www.epa.gov/ne/superfund/sites/industriplex/213091_Industri-Plex%20Draft%20MSGRP%20RI.pdf

All documents may be downloaded and printed
(Adobe Acrobat Reader is required)

EPA United States Environmental Protection Agency New England