

**SITE INSPECTION WORKSHEETS**  
(Region I version 6/30/95)

401098

**WARNING!!**  
EPA has determined that the HRS score of any site that is progressing towards listing on the NPL is confidential. Deliberations regarding scoring or listing issues, the site specific status, and HRS scores cannot be released or discussed with non-Agency persons. For additional guidance see the April 30, 1995 OSWER Directive 9320.1-11.

Covitch / ATF  
1.3  
57602

SITE LOCATION			
Site Name: Covitch Property/ATF Davidson Co. (PMR)			
Street Address: Main Street			
City: Northbridge	State: MA	Zip Code: 01588	Telephone: (508) 234-6301
CERCLIS ID No.: MAD046128559		Coordinates: Latitude: 42° 05' 34.5" N Longitude: 71° 40' 34.0" W	

OWNER/OPERATOR IDENTIFICATION					
Owner: Whitinsville Redevelopment Trust and Arcade Realty Trust			Operator: Whitinsville Redevelopment Trust and Arcade Realty Trust		
Owner Address: 1 Main Street			Operator Address: 1 Main Street		
City: Northbridge			City: Northbridge		
State: MA	Zip Code: 01588	Telephone: (508) 234-6301	State: MA	Zip Code: 01588	Telephone: (508) 234-6301

SITE EVALUATION	
Agency/Organization: WESTON/START	TDD No.: 95-07-0065
Investigator: Michael G. Jennings	Date: 23 October 1997

EPA CONTACT		
EPA SAM: Nancy Smith		
Address: JFK Federal Building		
City: Boston	State: MA	Zip Code: 02203
Telephone: (617) 573-9697		
EPA Reviewer:	Date:	



## GENERAL INFORMATION

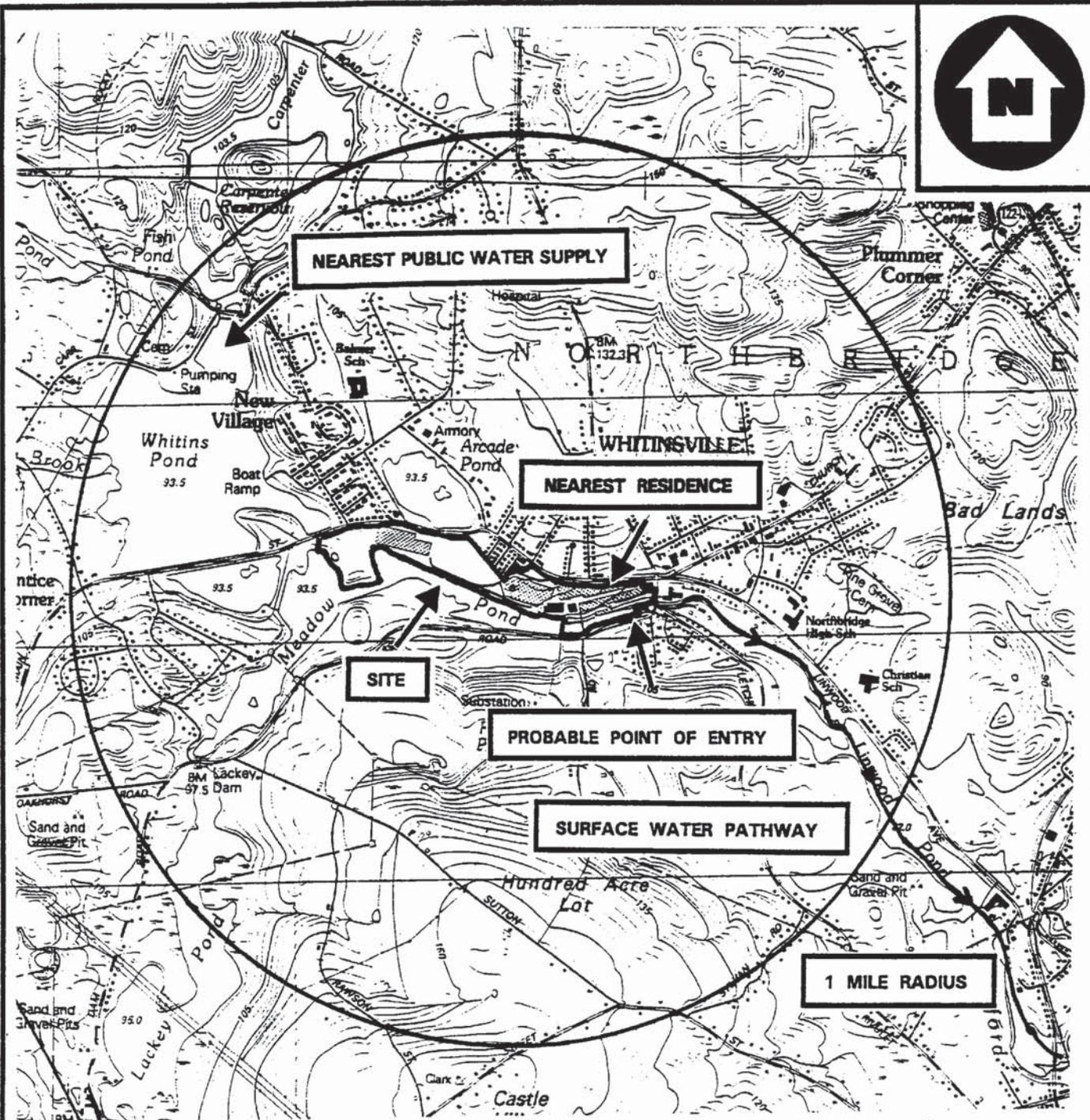
**Site Description and Operational History:** Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references.

The Covitch Property/ATF Davidson Co. (FMR) property (the property) consists of approximately 65 acres of land on numerous parcels in Northbridge, Worcester County, Massachusetts at the following coordinates (measured from the center of the property): 42° 05' 34.5" north latitude and 71° 40' 34" west longitude (Figure 1). Parcels associated with the property are located on both the north and south side of the Mumford River, which bisects the property (Figure 2). The exact chronology of ownership is difficult to determine; however, the following is known. The property was originally developed in the late-1800s as a foundry and metal fabrication mill by Whitin Machine Works (Whitin). Whitin operated on the property for a number of years. At some point Whitin ceased operations on the property and White Consolidated Industries (WCI) commenced on-site operations. A second company, ATF Davidson, Co., a subsidiary of WCI, also operated on the property in the same time frame. WCI and ATF Davidson, Co. ceased operations on the property sometime in the late-1970s or early-1980s. The property is presently owned by the Whitinsville Redevelopment Trust (WRT) and the Arcade Realty Trust (ART). The property is currently operated as leased manufacturing and commercial warehouse space to approximately 30 companies [1; 2; 3; 23].

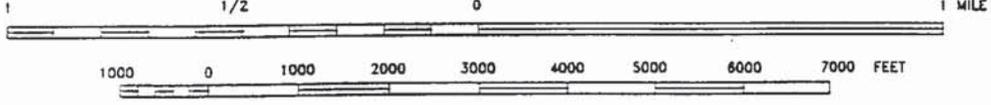
For this evaluation, the eastern developed portion of the property, on the north side of the Mumford River will be referred to as the Covitch property (Figure 3). The remaining portion of the property on the north side of the Mumford River will be referred to as the Arcade property (Figure 4). There are also two parcels of land on the south side of the Mumford River, a small partially paved employee parking lot and a former coal ash disposal area. For this evaluation, the employee parking lot will be considered as part of the Covitch property, while the former coal ash disposal area will be considered part of the Arcade property. The term *the property* refers to both the Covitch property and the Arcade property as a whole [1; 2].

As previously mentioned, the property formerly operated as a foundry. Approximately 30 acres of the property, consisting of the entire Arcade property, is land that has been graded and filled with foundry waste. The 1991 Environmental Protection Agency (EPA) Site Inspection (SI) report for the property, completed 19 June 1991 by the Massachusetts Department of Environmental Protection (MA DEP), describes the landfilled material as consisting of 90% spent foundry sand, 5% coal ash, and 5% paint, plating sludge, plating rinsewater, bromide salt baths, solvents and cutting oils. According to the 1991 EPA SI, the filled area has a surficial extent of approximately 730,000 square feet, containing approximately 40,000 cubic yards of material [2].

The Mumford River flows through the property in an easterly direction. With the exception of the employee parking lot and the former coal ash disposal area, the Mumford River forms the southern boundary of the property. The property is perched approximately 5 feet above the river. A large dam on the Mumford River, connecting the main portion of the property to the employee parking lot, was formerly used to power the on-site manufacturing operations and later to generate hydroelectricity [1; 3].



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' U.S.G.S. QUADRANGLE(S):  
 WORCESTER SOUTH, MA 1983 AND UXBRIDGE, MA 1982



SITE LOCATION MAP  
 COVITCH PROPERTY  
 FORMER ATF DAVIDSON CO.  
 MAIN STREET  
 NORTHBRIDGE, MASSACHUSETTS



REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD # 95-07-0065	DRAWN BY: M. JENNINGS	DATE 2/96
FILE NAME: S:\95070065\FIG1		FIGURE 1



SEE FIGURE 3

SEE FIGURE 4

COVITCH PROPERTY

ARCADE PROPERTY

VICINITY OF FORMER COAL ASH DISPOSAL AREA

SOURCE: CASWELL, EICHLER AND HILL, INC.  
SEPTEMBER 1985

NOT TO SCALE

**WESTON**<sup>®</sup>  
MANAGERS DESIGNERS/CONSULTANTS

REGION 1 SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	95-07-0065	DRAWN BY:	W. SHAW	DATE	6/7/96
FILE NAME:	S:\95070065\FIG2.DWG				

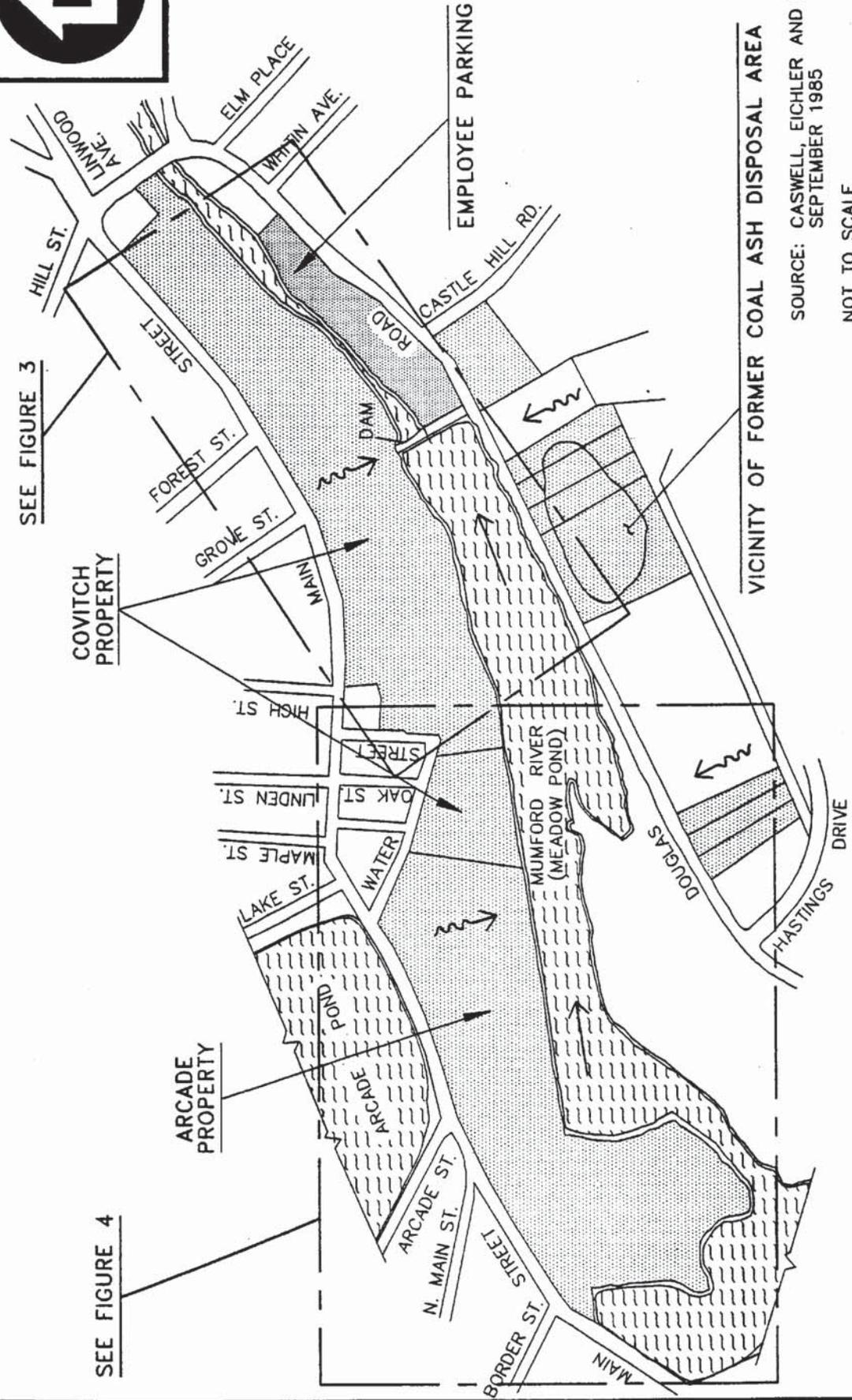
FIGURE 2

SITE MAP

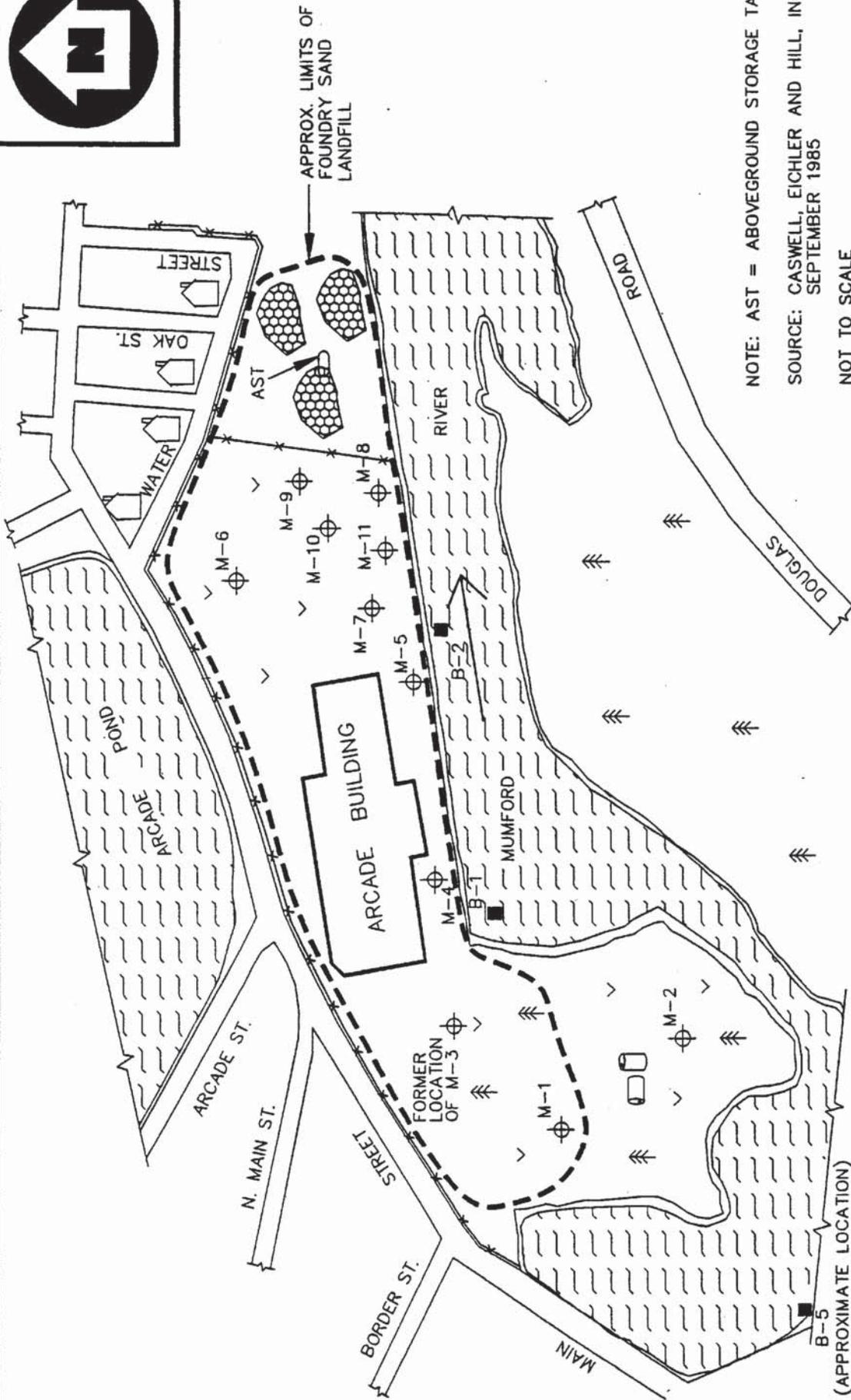
COVITCH PROPERTY/  
FORMER ATF DAVIDSON CO.  
MAIN STREET  
NORTHBRIDGE MASSACHUSETTS

LEGEND

-  SURFACE WATER
-  SITE PROPERTY
-  GROUNDWATER FLOW DIRECTION
-  SURFACE WATER FLOW DIRECTION







NOTE: AST = ABOVEGROUND STORAGE TANK  
 SOURCE: CASWELL, EICHLER AND HILL, INC.  
 SEPTEMBER 1985  
 NOT TO SCALE



REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM	
TDD #	DATE
95-07-0065	M. JENNINGS 6/7/96
DRAWN BY:	
M. JENNINGS	
FILE NAME:	FIGURE 4
S:\95070065\FIG2A.DWG	

ARCADE PROPERTY SITE MAP  
 COVITCH PROPERTY /  
 FORMER ATF DAVIDSON CO.  
 MAIN STREET  
 NORTHBRIDGE MASSACHUSETTS

M-1	MONITORING WELL (SCREENED IN OVERBURDEN)	DRUMS
B-1	DEBRIS PILE	TREES
CEH	SURFACE WATER	RESIDENCE
SEDIMENT SAMPLE	FENCE	GRASS
FLOW DIRECTION		

## GENERAL INFORMATION (Continued)

The dam creates an impoundment reservoir which stretches to the western extent of the property and beyond. This portion of the Mumford River is commonly referred to as Meadow Pond. A man-made "Raceway" and a series of locks and gates, which were formerly utilized to divert water from the impoundment reservoir in order to directly power the manufacturing equipment, runs beneath the property and several of the on-site buildings. When the power generation system was in use, the diverted water would be returned to the Mumford River below the dam. The dam, Raceway, locks, and gates still exist on the property; although the locks and gates are currently closed isolating the Raceway from the Mumford River [1; 2; 3].

On 24 April 1985, an oil sheen was observed on the surface water in the Raceway by an unnamed party. The Massachusetts Department of Environmental Quality Engineering (MA DEQE) conducted an investigation of the oil release. On 30 April 1985, the MA DEQE issued a Written Notice of Responsibility (WNOR) to ATF Davidson Co. The WNOR stated that "there is/has been a release/threat of release of oil/hazardous materials including waste oil and mercury at the former ATF Davidson Co. facility, Main Street, Northbridge, Massachusetts." No further reference to mercury contamination could be found by START personnel. START personnel also could not find any analytical evidence indicating that mercury contamination was present at the property. Therefore, the mercury contamination reported in the 30 April 1985 WNOR will not be discussed further in this evaluation. [4].

WCI and ATF Davidson Co. retained Caswell, Eichler, and Hill, Inc. (CEH) to conduct an auger probe investigation of the oil release. As part of their investigation, CEH chose five sampling locations based on their proximity to the Raceway. Three of the locations (AP-101, AP-102, and AP-103) met refusal prior to reaching the desired depths and were abandoned. The other two locations (AP-104 and AP-105) were advanced to the desired depth and numerous soil source samples were collected in 2-foot increments from each location between the depths of 8 and 17 feet below grade. None of the soil/source samples were collected from depths of 24 inches or less. The samples were analyzed by RAI for oil and grease, total phenols, barium, and priority pollutant metals. Three of the samples, AP-104 (S-4), AP-105 (S-1), and AP-105 (S-3), were also analyzed for volatile organic compounds (VOCs) by EPA Method 624 [5].

START personnel chose soil/source sample AP-105/S-3 as the reference sample due to its minimal contamination. No VOCs were detected in any of the soil/source samples which received VOC analysis. The soil/source samples indicated that there was a layer of oil and grease present on the property, with the highest concentration present in sample AP-104/S-2 at 12,000 ppm. This sample was collected approximately 11 feet below grade. Arsenic, barium, beryllium, nickel, and zinc were detected at concentrations greater than reference concentrations in sample AP-104/S-5, which was collected approximately 16 feet below grade. Maximum concentrations for these elements ranged from 1.5 parts per billion (ppm) for beryllium to 560 ppm for barium [5].

In a letter report dated 30 May 1985, CEH reported that in the area between Building No. 9 and the Raceway the soil was saturated with oil, both above and below the water table. As a result of this report, MA DEQE requested that a hydrogeological investigation of the property be conducted, due to the presence of oil contamination on the property. CEH conducted the

## GENERAL INFORMATION (Continued)

investigation in two parts, with the Covitch property and Arcade property investigated separately [5].

The Covitch property hydrogeological investigation, which included the proposed installation of 15 groundwater monitoring wells, was completed first. Of the 15 proposed wells, five were unable to be completed, primarily due to drill refusal above the water table. The 10 overburden groundwater monitoring wells which were completed are referred to by the "MC" designation on Figure 3 and throughout this evaluation. Two of the monitoring wells (MC-1 and MC-2) were installed on the former coal ash disposal area. Due to the fact that the exact location of MC-1 and MC-2 could not be determined by START personnel, these wells are not located on Figure 3 [5].

Groundwater samples were collected from the 10 completed wells by CEH on 30 July 1985. The samples were analyzed by RAI for VOCs, priority pollutant metals, barium, and total cyanide. Two well samples (MC-7 and MC-14) were also analyzed for oil and grease, and phenols. CEH reported the results of the groundwater analyses in a September 1985 report. The September 1985 report indicated that no significant levels of VOCs, priority pollutant metals, cyanide, barium, or phenol were detected. However, CEH further stated that monitoring well MC-14 contained 24 milligrams per liter (mg/L) of oil and grease. This well is located northwest and upgradient of the Raceway [5].

CEH detailed the findings of the Covitch property investigation in the September 1985 report. In the report CEH addressed possible sources of oil contamination near the Raceway. According to CEH, there have been documented oil releases on both the north and south side of the Raceway. The northern release, occurring over a period of years, was a result of the temporary outdoor storage of oil-soaked metal turnings in the vicinity of Building No. 9 prior to their off-site disposal. The southern release occurred in the basement of the powerhouse, Building No. 19. CEH stated in the report that a source on the powerhouse side of the Raceway was strongly suspected of causing the oil and grease contamination. No further information regarding the oil releases was given in the CEH report [5].

CEH collected sediment samples from the Mumford River on 18 July 1985 and 13 November 1985. The July 1985 sediment samples were analyzed for priority pollutant metals and barium. The November 1985 sediment samples were analyzed for chromium via EPA Method 3050 and were also subjected to an Extraction Procedure for Toxicity (EP Toxicity) test for chromium. All of the sediment analyses were conducted by RAI. Six metals, including chromium, were detected in one or more of the sediment samples. Results of the sediment analyses will be discussed in the Surface Water Pathway section of this evaluation [7;8].

On 9 December 1985, New England Pollution Control Corporation, Inc. (NEPCCO) was contracted by WCI to install a cut-off trench/well system with a double pump recovery unit in order to remediate the groundwater contamination problem in the vicinity of Building No. 9, the Raceway, and the Mumford River. The system was installed between 23 December 1985 and 20 June 1986. Three observation wells (OW-1 through OW-3) were also installed in the vicinity of the cut-off trench/well system in order to monitor the effectiveness of the treatment system [6].

## GENERAL INFORMATION (Continued)

The only analytical data that START personnel were able to obtain relative to the observation wells indicated that samples were collected on 17 February 1987 and analyzed for VOCs via EPA Methods 601 and 602. Seven VOCs were detected above reference values at concentrations ranging from 3 to 57 parts per billion (ppb). The information START obtained does not indicate who collected the samples or who analyzed the samples. However since the sampling information was contained in a NEPCCO project report, START personnel assume that the groundwater samples were collected by NEPCCO personnel. Additional information concerning the remediation system and the observation wells is presented in the Groundwater Pathway section of this evaluation [6].

The NEPCCO project report indicated that the recovery system was operational from 13 June 1986 until approximately 11 February 1987. The recovery and treatment system was shut down in the spring of 1987 at the request of NEPCCO due to decreased levels of VOCs detected in the influent groundwater samples collected from the recovery system [6].

NEPCCO theorized that no petroleum was recovered during the operation of the recovery system because most of the oil detected during the CEH auger probe investigation was removed during the excavation for the installation of the cut-off trench. START personnel estimate that approximately 15,000 cubic feet of soil was removed during the installation of the remediation system. The removed soil was sent to an asphalt batch plant for treatment. START personnel were unable to locate any additional information concerning the treatment system [2; 6].

The Arcade property hydrogeological investigation was conducted during summer 1985. Groundwater samples were collected by CEH from eight monitoring wells (M-1 through M-8) installed for the Arcade property investigation. These samples were analyzed by RAI for VOCs (EPA Method 624), priority pollutant metals, barium, and total cyanide. CEH detailed the findings of the investigation in a report entitled *Monitoring Well Installation and Ground Water and River Bottom Sediment Quality Analyses, ATF Davidson Company Arcade Facility* (October 1985 CEH report) [7].

The October 1985 CEH report indicated that the groundwater below the Arcade property contained detectable levels of four VOCs. Vinyl chloride, trans-1,2-dichloroethene, trichloroethene, and tetrachloroethene were detected in one or more of the groundwater samples at concentrations greater than the reference concentrations. Detected concentrations ranged from 10 ppb to 950 ppb. Barium was also detected in several groundwater samples at concentrations three times greater than reference values. Detected barium concentrations ranged to 2,900 ppb. Additional information concerning the summer 1985 groundwater sampling event is presented in the Groundwater Pathway section of this evaluation [7].

As a result of the detection of VOCs in the groundwater below the Arcade property, an additional round of groundwater samples were collected by CEH on 13 November 1985 and sent to RAI for VOC analysis by EPA Method 624. The groundwater samples were also analyzed by RAI for arsenic, barium, and zinc. CEH detailed the results of the analysis conducted on the November 1985 groundwater samples in a report entitled *Additional Investigations ATF/Davidson Arcade Facility, Covitch Properties, Mumford River* (January 1986 CEH report). The January 1986 CEH report indicated that some of the VOCs previously detected in several of the monitoring wells were not detected in the 13 November 1985 samples collected from the

## GENERAL INFORMATION (Continued)

same wells. However, the January 1986 CEH report further indicated that the concentrations of vinyl chloride and trans-1,2-dichloroethene detected in monitoring well M-8 were increasing. The results of the November 1985 groundwater sampling event are presented in the Groundwater Pathway section of this evaluation [8].

A third round of groundwater samples was collected by CEH from the Arcade property on 24 January 1987, as part of an additional investigation of the area around monitoring well M-8. This investigation included the installation and sampling of three additional overburden groundwater monitoring wells (M-9 through M-11). The new wells are located radially in the vicinity of monitoring well M-8. The groundwater samples collected on 24 January 1987 were submitted to RAI for VOC analysis by EPA Method 624. Results of the analysis of the 24 January 1987 groundwater samples were documented in a CEH report entitled *Additional M-8 Investigations, ATF Davidson Arcade Facility* (March 1987 CEH report) [9].

The March 1987 CEH report stated that only one of the newly installed wells (M-9) contained VOC contamination. Tetrachloroethene was detected in this monitoring well at a concentration of 48 ppb. This compound had previously only been detected in monitoring well M-6 [9]. Additional details concerning the results of the CEH sampling program are presented in the Groundwater Pathway section of this evaluation [9].

Five soil/source samples were collected by CEH from the Arcade property in December 1986, during the installation of monitoring wells M-9, M-10, and M-11. CEH collected two soil/source samples during the installation of monitoring well M-10. One sample was from above the water table and one sample was from below the water table. CEH collected two soil/source samples during the installation of monitoring well M-11. Again, one sample was from above the water table and one sample was from below the water table. CEH also collected one soil/source sample from above the water table during the installation of monitoring well M-9. All of the soil/source samples were analyzed by RAI for VOCs by EPA Method 8240. CEH detailed the results of the VOC analysis in the March 1987 report. The March 1987 report does not indicate the depth at which groundwater was found during the December 1986 sampling event. However since groundwater has historically ranged between 3 and 7 feet below grade on the Arcade property, START personnel assume for this evaluation that all of the December 1986 soil/source samples were collected from depths greater than 24 inches below grade [9].

START personnel chose soil/source sample B-11 collected from below the water table during the installation of monitoring well M-11 as the reference sample due to its uncontaminated condition. Two VOCs (toluene and tetrachloroethene) were present in one or more of the soil/source samples at concentrations greater than the reference values. Toluene was present in all of the soil/source samples at concentrations ranging from 0.6 to 4.8 ppm. Tetrachloroethene was present at 1.2 ppm in the soil/source sample collected during the installation of monitoring well M-9. This sample was collected from above the water table [9].

In July 1987, CEH submitted a risk assessment report entitled *Risk Assessment of Area Surrounding M-8 at the ATF/Davidson Arcade Facility* (July 1987 CEH report). The July 1987 CEH report stated that the VOC-contaminated plume in the vicinity of monitoring well M-8 covered approximately 13,100 square feet. In the July 1987 CEH report, CEH theorized that the plume consisted predominantly of a parent compound (trichloroethene) and two "weathered"

## GENERAL INFORMATION (Continued)

species (vinyl chloride and trans-1,2-dichloroethene). The report further stated that the mass balance of chemical compounds present in monitoring well M-8 shifted towards the "weathered" species. CEH attributed this to a long period of emplacement or an accelerated weathering process. According to the July 1987 CEH report, the chemicals detected in the Arcade property groundwater samples were migrating towards the Mumford River where the contamination would ultimately be diluted, diminishing its impact on human health and the environment [10].

On 2 May 1996, START personnel conducted an on-site reconnaissance of the property. During the on-site reconnaissance START personnel observed that the nearest residence is located within the mill complex on the Covitch property. Four people reside in this residence: an employee of WRT, his wife, and their two children. The residence is located in Building No. 4 [3].

During the reconnaissance, START personnel attempted to locate the former coal ash disposal area. According to historical information, the former coal ash disposal area is located south of Douglas Road and west of Castle Hill Road. An area of landfilled material was observed in the general vicinity of the historical location of the former coal ash disposal area. The landfilled material consisted of a black uniform grained, non-native material with a surficial extent of approximately 7,500 square feet. However, START personnel were unable to locate monitoring wells MC-1 and MC-2, installed on the former coal ash disposal area in conjunction with the September 1985 CEH report. Locating the two monitoring wells would have verified that the area in question was the former coal ash disposal area. START personnel also observed that the location of monitoring well M-3, located on the Arcade property had been paved, obliterating the well [3].

START personnel observed that the Mumford River flows through the property in an easterly direction. With the exception of the employee parking lot and the former coal ash disposal area, the Mumford River forms the southern boundary of the property. The property is perched approximately 5 feet above the river. A large dam on the Mumford River, which connects the main portion of the property to the employee parking lot was formerly used to power the on-site manufacturing operations and later to generate hydroelectricity [3].

START personnel observed that there is a general lack of vegetation on the Covitch property due to extensive development, with the exception being a small strip of land bordering the northern bank of the Mumford River. Grass, shrubs, and some small trees are found in this area. The Arcade property which is located on a foundry sand landfill also contains a general lack of vegetation. The surficial soils of the foundry sand landfill tend to support sporadic grasses and some small trees and shrubs. A former island, which is now connected via landfilled material to the northern shore of the Mumford River at the western extent of the Arcade property, shows thick vegetation, consisting of large trees and shrubs. This condition can be considered typical of the native vegetation of the area [3].

START personnel noted several piles of debris on both the Covitch property and Arcade property during the on-site reconnaissance. On the Covitch property several piles of concrete, brick, metal, and wood debris, associated with the ongoing renovation of the property were observed south of the Mumford River on the unpaved portion of the employee parking lot. The total surficial extent of these piles was approximately 300 square feet [3].

## GENERAL INFORMATION (Continued)

On the Arcade property several piles of scrap metal were observed on the foundry sand landfill. These piles were also associated with the ongoing renovation of the property. Several electric motors and an aboveground storage tank (AST) were strewn in among the debris. The tank volume appeared to be approximately 300 gallons. The total surficial extent of the debris piles was approximately 30,000 square feet. The surficial soils of the foundry sand landfill in the vicinity of the metal debris piles appeared stained with an oily type material [3].

During the on-site reconnaissance, START personnel observed an additional AST in the northwest corner of the Covitch property. The volume of the AST appeared to be 275 gallons. The AST is used to store diesel fuel for vehicles utilized on the property. The AST was situated on a concrete pad. Access to the AST was restricted by a 6-foot high chain-link fence [3].

During the on-site reconnaissance, START personnel observed several 55-gallon drums in various conditions, throughout the property. Outside, six 55-gallon metal drums and one 55-gallon plastic drum were observed. Of these seven drums, one crushed and rusted metal drum was observed under a metal walkway in the vicinity of the former powerplant (Building No. 19), two empty and rusted metal drums were observed on the western extent of the property, and three empty metal and one empty plastic 55-gallon drums were observed on the unpaved portion of the employee parking lot located on the south side of the Mumford River [3].

START personnel observed several large pipes (plastic, metal, and reinforced concrete) protruding from the northern shoreline of the Mumford River, where the shoreline borders the property. The large pipes were noted above and below the water surface. Past occupants of the property are known to have discharged both treated and untreated industrial wastewater to the Mumford River. The present owners of the property were unable to provide any additional information concerning the discharge of industrial wastewater to the Mumford River. START personnel were unable to find any additional information concerning the discharge of treated or untreated wastewater to the Mumford River [3].

Inside the mill complex, approximately 70 55-gallon drums were observed in the manufacturing areas of several of the current tenant companies. Labels on the drums indicated that the drums contained both virgin material and waste products associated with the various operations conducted on the premises by each business. Approximately 50 metal drums were observed with labels indicating that they contained "hazardous waste" or "waste oil." According to the representative of WRT, the material is hauled offsite by a licensed waste hauler [3].

## GENERAL INFORMATION (Continued)

Many of the companies leasing space within the property utilize flammable material in their manufacturing operations. Numerous explosion-proof flammable materials storage cabinets were observed in various buildings throughout the property. Additionally, several spray booths were observed operating in many of the manufacturing areas located throughout the on-site buildings. An assortment of hazardous materials were observed in use during the on-site reconnaissance. These materials consisted of paints, thinners, solvents, inks, wood stains, adhesives, and cutting fluids/coolants [3].

According to START on-site observations and information START personnel received from WRT in September 1996, at least six underground storage tanks (USTs) and four additional ASTs exist and/or existed on the property. The information was compiled by Kroll Environmental Enterprises, Inc. (Kroll) on behalf of WRT. Some of the tanks have been removed, some have been filled in place, and some are still in use. A summary of the information concerning the ASTs and USTs is presented in the following table [11]. Approximate locations of the tanks are shown on Figure 3 and 4.

**Summary of Underground and Aboveground Storage Tanks on the  
Covitch Property/ATF Davidson Co. (FMR)**

Location	Size (gallons)	Contents	Status
<b>Underground Storage Tanks</b>			
Adjacent to Bldg. 4	500	Fuel Oil	Removed 1985
Adjacent to Bldg. 23	1,000	No. 6 Fuel Oil	Filled 1987
Adjacent to Bldg. 23	1,000	No. 6 Fuel Oil	Filled 1987
Adjacent to Bldg. 23	1,000	No. 6 Fuel Oil	Filled 1987
Adjacent to Bldg. 12	20,000	Fuel Oil	Filled 1984
Adjacent to Bldg. 4	5,000	Fuel Oil	Active
<b>Aboveground Storage Tanks</b>			
Adjacent to Bldg. 16	30,000	No. 6 Fuel Oil	Removed 1995
North of Bldg. 12	275	Diesel Fuel	Active
Adjacent to Bldg. 11	5,000	No. 6 Fuel Oil	Removed 1984
Debris pile on Arcade property	300	Unknown	Unknown

Bldg = Building  
[11]

The information START personnel received from WRT, via Kroll, after the on-site reconnaissance also indicated that at least eight transformers which contained polychlorinated biphenyls (PCBs) were formerly located on the property. These transformers were verified by Transformer Service, Inc. (TSI) to contain PCBs. A TSI inspection on 15 April 1989, indicated

### GENERAL INFORMATION (Continued)

that a transformer located adjacent to Building No. 19 appeared to have leaked. No further information concerning transformer leakage was available to START personnel. According to a representative of WRT, all of the PCB-containing transformers have been removed from the property. A summary of the transformers formerly located on the property and their date of removal from the property is presented in the following table [11].

**Summary of Transformers Formerly Located on the Covitch Property/ATF Davidson Co. (FMR)**

Location	Capacity (gallons)	Date Removed from Property
Bldg. 9, Floor 2	380	17 December 1993
Bldg. 9, Floor 3	380	6 June 1996
Bldg. 10	445	27 October 1994
Bldg. 12, Floor 1	300	28 June 1995
Bldg. 12, Floor 2	Unknown	Unknown
Bldg. 16	445	6 June 1996
Between Bldg. 16 and Bldg. 4	Unknown	6 June 1996
Bldg. 19	840	27 October 1994

Bldg = Building  
[11]

On 5 June 1997, START personnel received additional background information concerning the property from the MA DEP-Central Regional Office (MA DEP-CRO). The information was submitted to the MA DEP-CRO in March 1997 as part of two separate Tier Classification, Licensed Site Professional Opinion, and Numerical Ranking Scoresheets packages which had been prepared for the property by two different environmental consultants. CEH-Jacques Whitford (CEH-JW) prepared a package for the Covitch property and Kroll Environmental Enterprises, Inc. prepared a package for the Arcade property. The additional background information that START received from the MA DEP-CRO indicated that additional sampling had taken place since the START on-site reconnaissance of 2 May 1996, in order to better characterize the property for the Tier Classification [22].

On 20 December 1996, CEH-JW collected three source samples for PCB analysis from areas of obvious staining associated with transformers which had formerly been located on the Covitch property. TRANS-3, a six point composite sample, was collected adjacent to a former transformer pad located along the southern edge of Building No. 12. TRANS-110, a grab sample of residual oily absorbent material, was collected from the footprint of a transformer which was formerly located inside Building No. 10. TRANS-217, a grab sample of oily dirt, was collected from within a contained area on the first floor roof of Building No. 10. The

## GENERAL INFORMATION (Concluded)

transformers were still present at the location of sample TRANS-217. Since START received information from WRT, via Kroll, indicating that all PCB-containing transformers were removed from the property, START personnel assume that the transformers present on the roof of Building No. 10 do not contain PCBs [22].

The samples collected in conjunction with the transformer locations were submitted to Eastern Analytical, Inc. for PCB analysis by EPA Method 8080. The PCB analysis was conducted between 24 December 1996 and 31 December 1996. Aroclor-1260 was detected in sample TRANS-110 at a concentration of 400 ppm. No other PCB compounds were detected in any of the source samples [22].

Two shallow (0 to 2 feet below grade) soil/source samples (ASH-1 and ASH-2) were collected by CEH-JW on 20 December 1996 from the eastern extent of the foundry sand landfill located adjacent to the Covitch Property. The exact locations of the two soil/source samples was not depicted in the information received from the MA DEP-CRO [22].

The foundry sand landfill samples were submitted to Eastern Analytical, Inc. for polynuclear aromatic hydrocarbon (PAH) analysis by Method 8270 and priority pollutant metals analysis. The PAH analysis was conducted on 31 December 1996. No PAH compounds were detected in the shallow soil/source samples. The priority pollutant metals analysis was conducted on 2 January 1997. Chromium, copper, and lead were detected in sample ASH-2 at concentrations three times greater than the concentrations detected in sample ASH-1 (reference sample). START personnel chose sample ASH-1 as the reference sample due to its uncontaminated condition. Detected concentrations ranged from 88 to 1,000 ppm [22].

The following table presents a summary of the maximum concentrations for substances detected in the soil/source samples collected by CEH-JW from the Covitch Property on 20 December 1996.

### Summary of Maximum Concentrations Analytical Results for Soil/Source Samples collected by CEH-Jacques Whitford, Inc. for the Covitch Property/ ATF Davidson Co. (FMR)

Contaminant	Maximum Sample Concentration (ppm)	Sample ID	Reference Concentration (ppm)	Reference ID
Chromium	1,000	ASH-2	8.3	ASH-1
Copper	120	ASH-2	28	ASH-1
Lead	88	ASH-2	8	ASH-1
PCBs (Aroclor-1260)	400	TRANS-110	NA	NA

ppm = Parts per million  
PCBs = Polychlorinated biphenyls  
NA = Not applicable  
[22]

## SOURCE EVALUATION

**Description of each Source:** Identify each source area by name and number, and classify each source into a source type category (see SI Table 1). Describe the dimensions of each source. Identify the hazardous substances associated with each source. Determine the containment characteristics for each source by pathway (see HRS Tables 3-2, 4-2, 6-3 and 6-9).

### Source No. 1: Foundry Sand Landfill (Landfill)

The Arcade property is built on a foundry sand landfill. The 1991 EPA SI report stated that the landfill consists of 40,000 cubic yards of foundry sand (90%), coal ash (5%), and other material consisting of paint, plating sludge, plating rinsewater, bromide salt baths, solvents and cutting oils. The 1991 EPA SI Report also estimated that the surficial extent of the landfill is approximately 730,000 square feet. There is no containment associated with this source. The source is available to all pathways [2].

### Source No. 2: VOC Plume-Arcade Property (Contaminated Soil)

A VOC plume exists/existed within the foundry sand landfill. A risk assessment on the plume was conducted by CEH in 1987. As part of the risk assessment, it was determined by CEH that the plume occupied approximately 13,100 square feet. There is no containment associated with this source. The source is available to all pathways [10].

### Source No. 3: Oil/VOC Plume-Covitch Property (Contaminated Soil)

There is/was an area of contaminated soil and groundwater in the vicinity of the Raceway on the Covitch property. A groundwater remediation system was installed in late 1985/early 1986 to address both petroleum and VOC contamination detected in this area. The specific dimensions for the extent of contamination in this area was not determined; however, NEPCCO theorized that the majority of the petroleum was removed during the excavation and installation of the recovery system. The excavation removed approximately 15,000 cubic feet of petroleum-contaminated soil, which was sent to an asphalt batch plant. There is no containment associated with this source. The source is available to all pathways [2; 6].

### Source No. 4: Former Coal Ash Disposal Area (Landfill)

An area of landfilled material exists, south of Douglas Road, on land owned by WRT. This land corresponds to property formerly owned by Whitin and WCI where coal ash was reportedly disposed. During the START on-site reconnaissance, a surface area of approximately 7,500 square feet of landfilled material was observed. START personnel were unable to locate monitoring wells MC-1 and MC-2, which would have verified that the area in question was the actual location of the former coal ash landfill. There is no containment associated with this source. The source is available to all pathways [2; 3].

### Source No. 5: 55-gallon Drums-Exterior (Drums)

Six metal 55-gallon drums and one plastic 55-gallon drum was observed on the exterior portion of the property during the START on-site reconnaissance. All of the drums appeared to be empty. These drums are considered a source due to their unknown contents. There was no containment associated with this source and the source was available to all pathways [3].

## SOURCE EVALUATION (Continued)

### Source No. 6: 55-gallon Drums-Interior (Drums)

Approximately 70 metal drums were observed throughout the on-site buildings during the START on-site reconnaissance. Many of the drums appeared to contain virgin material and as such would not be considered for this evaluation. However, approximately 50 drums were observed to be labeled as "hazardous waste" and "waste oil". These drums were located in the various metal processing businesses which lease space on the Covitch property. There is no containment associated with the drums and the source is available to all pathways [3].

### Source No. 7: Debris Piles-Arcade Property (Piles)

On the Arcade property several piles of scrap metal were observed on the foundry sand landfill. These piles were associated with the on-going renovation of the property. Several electric motors were strewn in among the debris. The total surficial extent of the debris piles was approximately 30,000 square feet. There is no containment associated with this source. The source is available to all pathways [3].

### Source No. 8: Debris Piles-Covitch Property (Piles)

On the Covitch property several piles of concrete, brick, metal, and wood debris, associated with the on-going renovation of the property were observed south of the Mumford River. The total surficial extent of these piles was approximately 300 square feet. There is no containment associated with this source. The source is available to all pathways [3].

### Source No. 9: ASTs and USTs (Tanks)

Historically, there have been at least six USTs and three ASTs utilized on the property. At the time of this evaluation, one UST and one AST were still in use. All of the tanks have been used to store petroleum products. There is no containment associated with this source. The source is available to all pathways. However due to the Comprehensive Environmental Response, Compensation, and Liability Act's (CERCLAs) Petroleum Exclusion Policy, this source will be listed but not evaluated [11].

### Source No. 10: Industrial Wastewater Discharge (Other)

The 1991 EPA SI report stated that untreated electroplating wastewater had been discharged to the Mumford River from the property between 1930 to 1965. An on-site wastewater treatment plant was installed on the property in 1965 and treated wastewater was discharged to the Mumford River from 1965 until September 1982. Between 1974 and 1982 discharge of treated wastewater was carried out under a NPDES permit. The 1991 EPA SI report indicated that the wastewater treatment plant ceased operations in September 1982. The SI report did not indicate why operations ceased. This source is available to all pathways; however, since START personnel were unable to locate any additional information relevant to the discharge of industrial wastewater this source will be listed but not evaluated [2].

### Source No. 11: Transformers (Non-Drum Containers)

Historically, there have been at least eight transformers known to contain PCB-contaminated oil utilized on the property. These transformers had a total storage capacity of approximately 3,000 gallons. The PCB-containing transformers were removed from the property after the completion of the 1991 EPA SI report. There is no containment associated with these sources. These sources are available to all pathways [11].

## SOURCE EVALUATION (Continued)

### Source No. 12: PCB Release (Other)

According to information received from the MA DEP-CRO, there is an area of PCB contamination located within Building No. 10. START personnel were unable to determine the specific dimensions of the PCB contamination from the information provided by the MA DEP-CRO. The PCB contamination is associated with a transformer formerly located within the building. Due to this fact, Source No. 12 will be considered a component of Source No. 11 Transformers and will not be evaluated separately. There is no containment associated with this source. This source is available to all pathways [22].

Source No.	Source Type	Pathway Availability			
		GW	SW	SE	A
1	Landfill	Y	Y	Y	Y
2	Contaminated Soil	Y	Y	Y	Y
3	Contaminated Soil	Y	Y	Y	Y
4	Landfill	Y	Y	Y	Y
5	Drums	Y	Y	Y	Y
6	Drums	Y	Y	Y	Y
7	Piles	Y	Y	Y	Y
8	Piles	Y	Y	Y	Y
9	Tanks	I	I	I	I
10	Other	Y	Y	Y	Y
11	Non-Drum Containers	Y	Y	Y	Y
12	Other	Y	Y	Y	Y

Legend: Y = available to pathway  
 N = not available to pathway  
 ? = availability unknown  
 I = ineligible waste

## SOURCE EVALUATION (Continued)

**Hazardous Waste Quantity (HWQ) Calculations:** SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

For each source, provide HWQ calculations by tier and provide assumptions. Note: HWQ calculations may be different for the soil exposure pathway.

This is a multiple source site. Due to insufficient data, Tier A (Hazardous Constituent Quality) and B (Hazardous Wastestream Quality) could not be evaluated.

### Source No. 1: Landfill

Tier C: The 1991 EPA SI Report states that the landfill is approximately 40,000 cubic yards.  
 $40,000 \div 2,500 = 16.0$

Tier D: The 1991 EPA SI Report states that the surficial extent of the landfill is approximately 730,000 square feet.

$$730,000 \div 3,400 = 214.71$$

$$\text{WQ} = 214.71$$

### Source No. 2: Contaminated Soil

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: The July 1987 CEH report states that the VOC plume comprises approximately 13,100 square feet.

$$13,100 \div 34,000 = 0.39$$

$$\text{WQ} = 0.39$$

### Source No. 3: Contaminated Soil

Tier C: Approximately 15,000 cubic feet of oil-contaminated soil was removed during the installation of the recovery system.

$$15,000 \div 67,500 = 0.22$$

Tier D: The surface area of the excavation for the recovery system was approximately 1,500 square feet.

$$1,500 \div 34,000 = 0.04$$

$$\text{WQ} = 0.22$$

### Source No. 4: Landfill

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: During the START on-site reconnaissance, an area of approximately 7,500 square feet of landfilled material was observed.

$$7,500 \div 3,400 = 2.21$$

$$\text{WQ} = 2.21$$

### Source No. 5: Drums

Tier C: During the START on-site reconnaissance, seven 55-gallon drums were observed on the exterior portion of the property.

$$7 \div 10 = 0.7$$

Tier D: Insufficient information is available to evaluate the source on this tier.

$$\text{WQ} = 0.7$$

## SOURCE EVALUATION (Concluded)

### Source No. 6: Drums.

Tier C: During the START on-site reconnaissance, approximately 50 55-gallon drums, labeled as containing waste material, were observed on the interior portion of the property.

$$50 \div 10 = 5.0$$

Tier D: Insufficient information is available to evaluate the source on this tier.

$$\text{WQ} = 5$$

### Source No. 7: Piles

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: According to on-site observations made during the START reconnaissance, the total surficial extent of the piles is approximately 30,000 square feet.

$$30,000 \div 13 = 2,307.69$$

$$\text{WQ} = 2,307.69$$

### Source No. 8: Piles

Tier C: Insufficient information is available to evaluate the source on this tier.

Tier D: According to on-site observations made during the START reconnaissance, the total surficial extent of the piles is approximately 300 square feet.

$$300 \div 13 = 23.08$$

$$\text{WQ} = 23.08$$

Source No. 10: Not evaluated.

### Source No. 11: Non-Drum Container

Tier C: The total storage capacity of the eight transformers was approximately 3,000 gallons of PCB-contaminated oil.

$$3,000 \div 500 = 6$$

Tier D: Insufficient information is available to evaluate the source on this tier.

$$\text{WQ} = 6$$

Source No. 12: Other (PCB Release) Not evaluated.

All of the sources evaluated are available to all pathways. The multiple source site Hazardous Waste quantity value is calculated as follows:

$$214.71 + 0.39 + 0.23 + 2.21 + 0.70 + 5 + 2,307.69 + 23.08 + 6 = 2,560$$

$$100 < 2,560 < 10,000$$

$$\text{HWQ} = 100$$

$$\text{GW HWQ} = 100$$

$$\text{SW HWQ} = 100$$

$$\text{SE HWQ} = 100$$

$$\text{AIR HWQ} = 100$$

**TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES**

Tier	Source Type	Single Source Sites (assigned HWQ scores)			Multiple Source Sites
		HWQ = 10	HWQ = 100	HWQ = 1,000,000	
A Hazardous Constituent Quantity	N/A	HWQ = 10 if Hazardous Constituent Quantity data are complete HWQ = 10 if Hazardous Constituent Quantity data are not complete	> 100 to 10,000 lbs > 500,000 to 50 million lbs	> 1 million lbs	lbs ÷ 1
	N/A	≤ 500,000 lbs	> 50 million to 5 billion lbs	> 5 million lbs	lbs ÷ 5,000
B Hazardous Wastestream Quantity	Landfill	≤ 6.75 million ft <sup>3</sup> ≤ 250,000 yd <sup>3</sup>	> 6.75 million to 675 million ft <sup>3</sup> > 250,000 to 25 million yd <sup>3</sup>	> 67.5 billion ft <sup>3</sup> > 2.5 billion yd <sup>3</sup>	ft <sup>3</sup> ÷ 67,500 yd <sup>3</sup> ÷ 2,500
	Surface impoundment	≤ 6,750 ft <sup>3</sup> ≤ 250 yd <sup>3</sup>	> 6,750,000 to 67.5 million ft <sup>3</sup> > 250,000 to 2.5 million yd <sup>3</sup>	> 67.5 million ft <sup>3</sup> > 2.5 million yd <sup>3</sup>	ft <sup>3</sup> ÷ 67.5 yd <sup>3</sup> ÷ 2.5
C Volume	Drums	≤ 1,000 drums	> 100,000 to 100,000 drums	> 10 million drums	drums ÷ 10
	Tanks and non-drum containers	≤ 50,000 gallons	> 50,000 to 5 million gallons	> 500 million gals.	gallons ÷ 500
	Contaminated soil	≤ 6.75 million ft <sup>3</sup> ≤ 250,000 yd <sup>3</sup>	> 675 million to 675 billion ft <sup>3</sup> > 25 million to 2.5 billion yd <sup>3</sup>	> 67.5 billion ft <sup>3</sup> > 2.5 billion yd <sup>3</sup>	ft <sup>3</sup> ÷ 67,500 yd <sup>3</sup> ÷ 2,500
	Pile	≤ 6,750 ft <sup>3</sup> ≤ 250 yd <sup>3</sup>	> 675,000 to 675 million ft <sup>3</sup> > 250,000 to 2.5 million yd <sup>3</sup>	> 67.5 million ft <sup>3</sup> > 2.5 million yd <sup>3</sup>	ft <sup>3</sup> ÷ 67.5 yd <sup>3</sup> ÷ 2.5
Other	≤ 6,750 ft <sup>3</sup> ≤ 250 yd <sup>3</sup>	> 675,000 to 675 million ft <sup>3</sup> > 250,000 to 2.5 million yd <sup>3</sup>	> 67.5 million ft <sup>3</sup> > 2.5 million yd <sup>3</sup>	ft <sup>3</sup> ÷ 67.5 yd <sup>3</sup> ÷ 2.5	

**SI TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES**

Tier	Source Type	Single Source Sites (assigned HWQ scores)			Multiple Source Sites
		HWQ = 10	HWQ = 100	HWQ = 1,000,000	
D Area	Landfill	≤ 340,000 ft <sup>2</sup> ≤ 7.8 acres	> 340,000 to 34 million ft <sup>2</sup> > 7.8 to 780 acres	> 34 million to 3.4 bil. ft <sup>2</sup> > 780 to 78,000 acres	> 3.4 billion ft <sup>2</sup> > 78,000 acres
	Surface Impoundment	≤ 1,300 ft <sup>2</sup> ≤ 0.029 acres	> 1,300 to 130,000 ft <sup>2</sup> > 0.029 to 2.9 acres	> 130,000 to 13 million ft <sup>2</sup> > 2.9 to 290 acres	> 13 million ft <sup>2</sup> > 290 acres
	Contaminated Soil	≤ 3.4 million ft <sup>2</sup> ≤ 78 acres	> 3.4 million to 340 million ft <sup>2</sup> > 78 to 7,800 acres	> 340 million to 34 bil. ft <sup>2</sup> > 7,800 to 780,000 acres	> 34 billion ft <sup>2</sup> > 780,000 acres
	Pile	≤ 1,300 ft <sup>2</sup> ≤ 0.029 acres	> 1,300 to 130,000 ft <sup>2</sup> > 0.029 to 2.9 acres	> 130,000 to 13 million ft <sup>2</sup> > 2.9 to 290 acres	> 13 million ft <sup>2</sup> > 290 acres
	Land treatment	≤ 27,000 ft <sup>2</sup> ≤ 0.62 acres	> 27,000 to 2.7 million ft <sup>2</sup> > 0.62 to 62 acres	> 2.7 million to 270 million ft <sup>2</sup> > 62 to 6,200 acres	> 270 million ft <sup>2</sup> > 6,200 acres

1 ton = 2,000 lbs = 1 yd<sup>3</sup> = 4 drums = 200 gallons

**SI TABLE 2: HWQ SCORES FOR MULTIPLE SOURCE SITES**

Site WQ Total	HWQ Score
0	0
1 <sup>a</sup> to 100	1 <sup>b</sup>
> 100 to 10,000	100
> 10,000 to 1,000,000	10,000
> 1,000,000	1,000,000

<sup>a</sup>If the HWQ total is between 0 and 1, round it to 1.

<sup>b</sup>If the hazardous constituent quantity data are not complete, assign the score of 10.

### SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Enter "NA" for substances which are not available to a pathway.  
 Enter "NL" for substances values not listed in SCDM.  
 Enter "—" for values not calculated due to substances values not listed in SCDM.  
 Provide footnote for substances listed in table but not used for scoring purposes  
 (e.g. BTEX substances attributable to a gasoline tank.)

- Sources:
1. Foundry Sand Landfill (Landfill)
  2. VOC Plume-Arcade Property (Contaminated Soil)
  3. Oil/VOC Plume-Covitch Property (Contaminated Soil)

11. Transformers (Non-drum Containers)

Source	Hazardous Substance	GROUNDWATER PATHWAY				SURFACE WATER PATHWAY						
		Tox. x Mobility Value (HRS Table 3-8)	Tox. x Mobility Value (HRS Table 3-9)	Pers. (HRS Tables 4-10 and 4-11)	Tox. x Pers. x Bioacc. Ppt. (HRS Table 4-12)	Tox. x Pers. x Bioacc. Ppt. (HRS Table 4-13)	Ecotox. (HRS Table 4-14)	Ecotox. x Pers. (HRS Table 4-15)	Ecotox. (HRS Table 4-16)	Ecotox. x Pers. (HRS Table 4-17)	Ecotox. x Pers. x Bioacc. Value (HRS Table 4-18)	
3	Arsenic	10,000	100	1	10,000	5	10	50,000	10	10	500	5,000
1,2,3	Barium	10,000	0.01	1	10,000	5	1	500	1	1	0.5	0.5
1,2,3	Benzene	100	1	0.4	40	5,000	40	2E+05	100	40	500	20,000
3	Beryllium	10,000	0.01	1	10,000	50	NL	5E+05	NL	50	50	—
1	Chromium	10,000	0.01	1	10,000	5	100	50,000	100	100	5	500
1	Copper	NL	0.01	1	—	50,000	100	—	100	100	50,000	5E+06
1,2,3	Dichloroethane, 1,1-	10	1	0.4	4	5	20	20	NL	—	5	—
1,2,3	Dichloroethylene, trans-1,2-	100	1	0.4	40	50	2,000	2,000	1	0.4	50	20
1	Lead	10,000	0.01	1	10,000	50	5E+05	5E+05	1,000	1,000	5,000	5E+06
3	Nickel	10,000	0.01	1	10,000	0.5	5,000	5,000	10	10	500	5,000
11	PCBs (Aroclor-1260)	10,000	0.0001	1	10,000	50,000	5E+08	5E+08	10,000	10,000	50,000	5E+08
1,2,3	Tetrachloroethylene	100	1	0.4	40	50	2,000	2,000	100	40	50	2,000
1,2,3	Toluene	10	1	0.4	4	50	200	200	100	40	50	2,000
1,2,3	Trichloroethane, 1,1,1-	1	1	0.4	0.4	5	2	2	10	4	5	20
1,2,3	Trichloroethylene	10	1	0.4	4	50	200	200	100	40	50	2,000
1,2,3	Vinyl chloride	10,000	1	0.0007	7	5	35	35	NL	—	5	—
1,2,3	Xylene, p- (also use for total)	10	1	0.4	4	50	200	200	100	40	50	2,000

**SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET**

Enter "NA" for substances which are not available to a pathway.  
 Enter "NL" for substances values not listed in SCDM.  
 Enter "-", "-" for values not calculated due to substances values not listed in SCDM.  
 Provide footnote for substances listed in table but not used for scoring purposes  
 (e.g. BTEX substances attributable to a gasoline tank.)

- Sources: \*
1. Foundry Sand Landfill (Landfill)
  2. VOC Plume-Acacle Property (Contaminated Soil)

3. Oil/VOC Plume-Covitch Property (Contaminated Soil)
11. Transformers (Non-Drum Containers)

Source	GROUNDWATER PATHWAY				SURFACE WATER PATHWAY				OVERLAND/FLOOD MIGRATION			
	GW Mobility (HRS Table 3-8)	Tox. x Mobility Value (HRS Table 3-9)	Pers. (HRS Tables 4-10 and 4-11)	Tox. x Pers. Value (HRS Table 4-12)	Bioacc. Pot. (HRS Table 4-15)	Tox. x Pers. x Bioacc. Value (HRS Table 4-16)	Ecotox. (HRS Table 4-19)	Ecotox. x Pers. (HRS Table 4-20)	Ecotox. x Pers. x Bioacc. Value (HRS Table 4-21)	Ecotox. (HRS Table 4-19)	Ecotox. x Pers. (HRS Table 4-20)	Ecotox. x Pers. x Bioacc. Value (HRS Table 4-21)
1,2,3	0.01	0.1		10	500	5,000	10	10	500	10	5,000	
Zinc												

Notes:

SCDM Version: JUN96

SI Table 3 assumptions: liquid phase waste disposed of in non-karst terrain, fresh-water river environment values.

\* For this evaluation, potential chemical contamination will be attributed to Sources 1 through 3, and 11 only.

**SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET**  
(Continued)

- Sources:  
 1. Foundry Sand Landfill (Landfill)  
 2. VOC Plume-Arcade Property (Contaminated Soil)

3. Oil/VOC Plume-Covitch Property (Contaminated Soil)  
 11 Transformers (Non-ferrous Containers)

Source	Hazardous Substance	Toxicity	SURFACE WATER PATHWAY			GROUND-WATER TO SURFACE WATER			AIR PATHWAY				
			Tox. x Mob. x Pers. Value (HRS Table 4-26)	Tox. x Mob. x Pers. x Bioacc. Value (HRS Table 4-28)	Ecotox. x Mob. x Pers. Value (HRS Table 4-29)	Tox. x Mob. x Pers. Value (HRS Table 4-26)	Ecotox. x Mob. x Pers. Value (HRS Table 4-28)	Ecotox. x Mob. x Pers. x Bioacc. Value (HRS Table 4-29)	Gaseous/Particulate (HRS Table 6-13) (indicate G or P)	Mobility (HRS Table 6-11,6-12)	Tox. x Mob. Value (HRS Table 6-13)		
3	Arsenic	10,000	100	500	0.1	50	50						
1,2,3	Barium	10,000	100	50	0.01	0.005	0.005						
1,2,3	Benzene	100	40	2E+05	40	20,000	20,000						100
3	Beryllium	10,000	100	5,000	--	--	--						
1	Chromium	10,000	100	500	1	5	5						
1	Copper	NL	--	--	1	50,000	50,000						
1,2,3	Dichloroethane, 1,1-	10	4	20	--	--	--						10
1,2,3	Dichloroethylene, trans-1,2-	100	40	2,000	0.4	20	20						100
1	Lead	10,000	100	5,000	10	50,000	50,000						
3	Nickel	10,000	100	50	0.1	50	50						
11	PCBs (Aroclor-1260)	10,000	1	50,000	1	50,000	50,000						200
1,2,3	Tetrachloroethylene	100	40	2,000	40	2,000	2,000						100
1,2,3	Toluene	10	4	200	40	2,000	2,000						10
1,2,3	Trichloroethane, 1,1,1-	1	0.4	2	4	20	20						1
1,2,3	Trichloroethylene	10	4	200	40	2,000	2,000						10
1,2,3	Vinyl chloride	10,000	7	35	--	--	--						10,000
1,2,3	Xylene, p- (also use for total)	10	4	200	40	2,000	2,000						10

**SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET**  
(Continued)

- Sources:  
 1. Foundry Sand Landfill (Landfill)  
 2. VOC Plume-Arcade Property (Contaminated Soil)

3. Oil/VOC Plume-Covitch Property (Contaminated Soil)  
 11 Transformers (Non-drum Containers)

Source	Hazardous Substance	SURFACE WATER PATHWAY			AIR PATHWAY		
		TOX. x MOB. x PERS. VALUE (HRS Table 4-86)	TOX. x MOB. x PERS. x BIOACC. VALUE (HRS Table 4-28)	ECOTOX. x MOB. x PERS. x ECOBIOACC. VALUE (HRS Table 4-29)	Gaseous/Particulate (HRS Table 6-13) (indicate G or P)	Mobility (HRS Table 6-11, 6-12)	Tox. x Mob. Value (HRS Table 6-13)
1,2,3	Zinc	0.1	56	50	P	8E-05	0.0008

## GROUNDWATER PATHWAY

**Pathway Description and Scoring Notes:** Describe the Groundwater Migration Pathway. Include the names and brief descriptions of the aquifers underlying the site, the depth to groundwater, the locations of the nearest private and public drinking water supplies and the aquifers from which they draw, and the population relying upon groundwater drawn from within four miles of the site for their drinking water supplies.

Briefly discuss any sampling events relative to the Groundwater Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Groundwater Pathway for this site, or any key factors which influence your scoring rationale.

The Covitch property is almost entirely developed with a large industrial mill complex which dates back to the 1800s. Due to this overburden encountered on this portion of the property is considered borrow fill. CEH described this material in the 1985 monitoring well installation report for the Covitch property investigation as consisting of brown (grayish below the water table) silty fine to medium sand with occasional coarse gravel, cobbles, and small boulders. CEH further reported that this material closely resembled the native till of the region. Groundwater depths on the Covitch property ranged from 5 to 8 feet below grade. CEH determined that groundwater in this area generally flows south towards the Mumford River. CEH calculated that the groundwater seepage velocity below the Covitch property varied from a minimum of approximately 3.5 feet per year (eastern extent) to a maximum of approximately 52 feet per year (western extent) [5].

Two of the monitoring wells installed as part of the 1985 Covitch property investigation were located in the former coal ash disposal area south of Douglas Road. CEH reported that the overburden encountered during the installation of these monitoring wells was similar to that encountered on the Covitch property. Groundwater was encountered on the former coal ash disposal area property approximately 5 feet below grade. CEH estimated that groundwater below the former coal ash disposal area was flowing north towards the Mumford River. CEH calculated that the groundwater seepage velocity below the former coal ash disposal area was approximately 3.5 feet per year [5].

To the west of the mill buildings on the Covitch property the overburden is comprised of foundry fill. CEH described the foundry fill in the 1985 monitoring well installation report for the Arcade property investigation as consisting of fine to coarse sand and gravel with some pumice like material, foundry bed glass, and ash. The fill material is a result of the large foundry which operated on the Covitch property. The spent foundry sand was graded into the river creating a large land mass (on the Arcade property) which stretches approximately 3,200 feet west of the former foundry building (Building No. 12). The filled area contains approximately 40,000 cubic yards of material in an area approximately 730,000 square feet. CEH reported that groundwater was encountered on the Arcade property at depths varying between 3 and 7 feet below grade. CEH determined that groundwater below this portion of the property was flowing south towards the Mumford River. CEH calculated that the groundwater seepage velocity below the Arcade property was approximately 23 feet per year [2; 7].

During the hydrogeological investigation of the Covitch property five of the monitoring well locations met refusal above the water table, preventing the installation of these wells. As a result, only 10 monitoring wells were completed. CEH theorized that refusal was a result of

## GROUNDWATER PATHWAY (Continued)

a bedrock surface or a boulder layer above the bedrock. According to CEH this theory was reinforced by the presence of a dam and large smoke stack adjacent to the attempted monitoring well locations, both of which require a shallow bedrock foundation [5].

One of the monitoring wells that CEH installed on the Arcade property was required by MA DEQE to be advanced until refusal was encountered. CEH chose monitoring well M-1 located on the former island for this purpose. Split-spoon and auger refusal was encountered 18 feet below grade. CEH theorized that this corresponded to the bedrock surface in this area. According to CEH this decision was supported by a visible bedrock outcrop approximately 200 feet south of the area of interest [7].

No bedrock formations mapped within a 4-mile radius of the property exhibit karst characteristics [12].

The mean annual rate of precipitation for Northbridge, Massachusetts is 45.59 inches [15].

There are approximately 19,466 people relying upon municipal drinking water wells located within 4-radial miles of the property. These wells are located in the towns of Douglas, Grafton, Northbridge, Sutton, and Uxbridge. The nearest municipal well is the Whitinsville Station located in Northbridge, Massachusetts. This well is located approximately 0.9 miles northwest of the property. The well is operated by the Whitinsville Water Company and serves approximately 2,814 people in the Town of Northbridge [14; 16].

The population served by each municipal well was estimated by multiplying the average number of persons per household in each household by the approximate number of year-round water department accounts in each respective town. The average number of persons per household was obtained from 1990 U.S. Census data, and the approximate number of year-round water department accounts were obtained in telephone conversations with the respective town water departments [15].

Private groundwater supplies within 4-radial miles of the property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private water wells for "Block Groups" which lie within or partially within individual radial distance rings of the property. According to the CENTRACTS report there are approximately 4,879 people relying upon private groundwater wells for drinking water purposes within 4-radial miles of the property. The Northbridge Board of Health and the Whitinsville Water Company were unable to provide information regarding the exact location of the nearest private well. The CENTRACTS report indicates that there are 16 people utilizing private wells within 0.25-radial miles of the property [14].

The following tables summarize public and private groundwater usage within 4-radial miles of the property.

**GROUNDWATER PATHWAY (Continued)**

**Public Groundwater Supply Sources Within 4-Radial Miles of the  
Covitch Property/ATF Davidson Co. (FMR)**

Distance/Direction from Site	Source Name	Location of Source <sup>a</sup>	Estimated Population Served	Source Type <sup>b</sup>
0.9 miles Northwest	Whitinsville Station	Northbridge, MA	2,814	Unknown
1.9 miles Northwest	Sutton Station	Sutton, MA	6,056	Unknown
3.3 miles Southeast	S. Main Street Wells (3)	Uxbridge, MA	5,372*	Unknown
3.4 miles Southwest	West Street Well No. 2	Douglas, MA	1,162	Unknown
3.5 miles Southwest	West Street Well No. 1	Douglas, MA	1,338	Unknown
3.7 miles North	Providence Road Well	Grafton, MA	918	Unknown
3.8 miles South-Southwest	Putnam Hill Road Wells (3)	Sutton, MA	496*	Unknown
3.9 miles Southeast	Blackstone Street Wells (3)	Uxbridge, MA	1,310*	Unknown

<sup>a</sup> Indicates Town in which well is located.

<sup>b</sup> Overburden, Bedrock, or Unknown.

\*: Combined total population served by the three wells.

[16]

**Estimated Drinking Water Populations Served by Groundwater Sources  
Within 4-Radial Miles of the Covitch Property/ATF Davidson Co. (FMR)**

Radial Distance From Covitch Property/ATF Davidson Co. (FMR) property	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 < 0.25	16	0	16
0.25 < 0.50	36	0	36
0.50 < 1.00	179	2,814	2,993
1.00 < 2.00	857	6,056	6,913
2.00 < 3.00	1,434	0	1,434
3.00 < 4.00	2,357	10,596	12,953
<b>Totals</b>	<b>4,879</b>	<b>19,466</b>	<b>24,345</b>

[14; 16]

## GROUNDWATER PATHWAY (Continued)

On 24 April 1985, an oil sheen was observed by an unknown party on the surface water contained within the Raceway. As a result of this observation an investigation was initiated to determine the cause of the oil sheen. CEH completed an auger probe investigation in the area of concern in May 1985. This investigation indicated that a layer of oil and grease was present both above and below the water table in the vicinity of the Raceway. As a result of the presence of the oil and grease layer the hydrogeological investigation of the Covitch property was initiated [5]. Additional information concerning the auger probe investigation is presented in the Waste/Source Sampling section of this report

As previously mentioned, the Covitch property investigation included the proposed installation of 15 groundwater monitoring wells, 10 of which were actually completed. CEH collected groundwater samples from these wells on 30 July 1985. The samples were analyzed by RAI for VOCs (EPA Method 624), priority pollutant metals, barium, and total cyanide. Two well samples (MC-7 and MC-14) were also analyzed for oil and grease, and phenols. The September 1985 CEH report for the investigation indicated that no significant levels of VOCs, priority pollutant metals, cyanide, barium, or phenol were detected in the groundwater samples. However, CEH further stated that monitoring well MC-14 contained 24 mg/L of oil and grease. This well is located northwest and upgradient of the Raceway [5].

According to the September 1985 CEH report, there have been documented oil releases on both sides of the Raceway, one in the basement of the powerhouse (Building No. 19) and one in an area between Building No. 9 and the Raceway where oil-soaked metal turnings were temporarily stored outdoors prior to off-site disposal. CEH stated in the report that the source on the powerhouse side of the Raceway was strongly suspected of causing the oil and grease contamination [5].

On 9 December 1985, NEPCCO was contracted by WCI to install a cut-off trench/well system with a double pump recovery unit, in order to remediate the groundwater contamination problem in the vicinity of Building No. 9, the Raceway, and the Mumford River. The system was installed between 23 December 1985 and 20 June 1986 [6].

Three overburden observation wells (OW-1 through OW-3) were also installed as part of the remediation system. The only analytical data that START personnel were able to locate relative to the collection of groundwater samples from the observation wells is contained within the Project Summary Report prepared by NEPCCO. A data table contained within the report indicated that groundwater samples were collected from the wells on 17 February 1987 and analyzed by an unknown laboratory for VOCs by EPA Methods 601 and 602. START personnel chose the groundwater sample collected from observation well OW-2 as the background location due to its minimal contamination. According to the data table, seven VOCs were detected in one or more of the observation wells at concentrations greater than reference values. The following compounds were detected above reference values benzene, 1,1-dichloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, trichloroethene, and xylenes. Detected concentrations ranged from 3 to 57 ppb [6].

## GROUNDWATER PATHWAY (Continued)

The NEPCCO project report indicated that the recovery system was operational from 13 June 1986 until approximately 11 February 1987. According to the 1991 EPA SI report, the recovery and treatment system was shut down in the spring of 1987 at the request of NEPCCO due to decreased levels of VOCs detected in the influent groundwater samples collected from the recovery system. START personnel were unable to locate any additional information concerning the treatment system [2; 6]

The hydrogeological investigation of the Arcade property was conducted by CEH during summer 1985. On 18 July 1985, CEH collected groundwater samples from the eight groundwater monitoring wells (M-1 through M-8) installed on the Arcade property. These samples were analyzed by RAI for VOCs (EPA Method 624), priority pollutant metals, barium, and total cyanide. START personnel chose the groundwater sample collected from monitoring well M-1 as the background location due to its crossgradient location and its uncontaminated condition. The October 1985 CEH report indicated that the groundwater below the Arcade property contained detectable levels of four VOCs. Vinyl chloride, trans-1,2-dichloroethene, trichloroethene, and tetrachloroethene were detected in one or more of the monitoring well samples at concentrations greater than reference values. Detected concentrations ranged from 10 ppb for trichloroethene (M-3) to 950 ppb for tetrachloroethene (M-6). Barium was also detected in several groundwater samples at concentrations three times greater than the barium concentration of the reference sample (M-1). Barium was present at the highest concentration (2,900 ppb) in the sample from monitoring well M-5 [7].

As a result of the detection of VOCs in the groundwater below the Arcade property, an additional round of groundwater samples were collected by CEH on 13 November 1985 and sent to RAI for VOC analysis by EPA Method 624. The groundwater samples were also analyzed by RAI for arsenic, barium, and zinc. The January 1986 CEH report indicated that some of the VOCs previously detected in several of the monitoring wells were not detected in the 13 November 1985 samples collected from the same wells. However, the January 1986 CEH report further indicated that the concentrations of vinyl chloride and trans-1,2-dichloroethene detected in monitoring well M-8 had increased. The concentrations detected in the 13 November 1985 groundwater samples collected from monitoring well M-8 ranged from 380 ppb for vinyl chloride to 1,100 ppb for trans-1,2-dichloroethene. START personnel chose the groundwater sample collected from monitoring well M-1 as the background location due to its crossgradient location and its uncontaminated condition. No VOCs were detected in the background sample (M-1) collected with the November 1985 groundwater samples. Barium and zinc were also detected at concentrations three times greater than reference sample (M-1) concentrations. Barium was present at the highest concentration (3,100 ppb) in the monitoring well M-5 sample. Zinc was also present at the highest concentration (11 ppb) in the M-5 sample [8].

A third round of groundwater samples were collected by CEH from the Arcade property on 24 January 1987, as part of an additional investigation of the area around monitoring well M-8. This investigation included the installation and sampling of three additional monitoring wells (M-9 through M-11). The new wells are located radially in the vicinity of monitoring well M-8. The groundwater samples collected on 24 January 1987 were submitted to RAI for VOC analysis by EPA Method 624 [9].

## GROUNDWATER PATHWAY (Continued)

The March 1987 CEH report stated that only one of the newly installed wells (M-9) contained VOC contamination. Tetrachloroethene was detected in monitoring well M-9 at a concentration greater than the reference value. START personnel chose the groundwater sample collected from monitoring well M-10 as the reference location for this sampling round due to its uncontaminated condition. Tetrachloroethene was detected in M-9 at a concentration of 48 ppb. This compound had previously only been detected in monitoring well M-6 [9].

The March 1987 report also stated that the concentrations of vinyl chloride (280 ppb) and trans-1,2-dichloroethene (640 ppb) detected in monitoring well M-8 had decreased. In addition, trichloroethene was detected at 17 ppb in the sample from monitoring well M-8 [9].

In July 1987, CEH submitted a risk assessment report concerning the area around monitoring well M-8. This report stated that the VOC-contaminated plume covered approximately 13,100 square feet. CEH also theorized in the report that the plume consisted predominantly of a parent compound (trichloroethene) and two "weathered" species (vinyl chloride and trans-1,2-dichloroethene). The report further stated that the mass balance of chemical compounds present in monitoring well M-8 had shifted towards the "weathered" species. CEH attributed this to a long period of emplacement or an accelerated weathering process. The CEH report further stated that the chemicals were migrating towards the Mumfords River where the contamination would ultimately be diluted, diminishing its impact on human health and the environment [10].

The following table presents a summary of the maximum concentrations for substances detected in groundwater samples collected by CEH from the Covitch Property/ATF Davidson Co. (FMR) property.

**Summary of Maximum Concentrations  
Analytical Results for Groundwater Samples collected at the  
Covitch Property/ATF Davidson Co. (FMR)**

Date	Contaminant	Maximum Concentration (ppb)	Sample Location	Reference Concentration (ppb)	Background Location
11/85	Vinyl Chloride	380	M-8	DL (10)	M-1
7/85	Tetrachloroethene	950	M-6	DL (5)	M-1
11/85	Trans-1,2-dichloroethene	1,100	M-8	DL (5)	M-1
7/85	Trichloroethene	30	M-6	DL (5)	M-1
2/87	1,1-Dichloroethane	17	OW-1	5	OW-2
2/87	1,1,1-Trichloroethane	12	OW-1	2	OW-2
2/87	Benzene	12	OW-1	DL (1)	OW-2
2/87	Toluene	57	OW-1	DL (1)	OW-2

## GROUNDWATER PATHWAY (Concluded)

### Summary of Maximum Concentrations Analytical Results for Groundwater Samples collected at the Covitch Property/ATF Davidson Co. (FMR) (Concluded)

Date	Contaminant	Maximum Concentration (ppb)	Sample Location	Reference Concentration (ppb)	Background Location
2/87	Xylenes (Total)	40	OW-1	DL (1)	OW-2
11/85	Zinc	11	M-5	<10	M-1
11/85	Barium	3,100*	M-5	<10	M-1
7/85	Oil and Grease	24,000	MC-14	None	None

ppb = Parts per billion  
DL = Detection Limit

Notes: 1985 groundwater samples were collected by Caswell, Eichler, & Hill, Inc.  
1987 groundwater samples were collected by New England Pollution Control Corporation.

\* Value exceeds the Maximum Contaminant Level (MCL) of 2,000 ppb.

[6; 7; 8]



## GROUNDWATER PATHWAY WORKSHEET

### LIKELIHOOD OF RELEASE

	Score	Data Type	Refs
1. <b>OBSERVED RELEASE:</b> If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.	550	+	6;7;8;9
2. <b>POTENTIAL TO RELEASE:</b> Depth to aquifer: <u>5 to 8</u> feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.1.2.			

LR = 550

### TARGETS

	Score	Data Type	Refs
Are any wells part of a blended system? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, attach a page to show apportionment calculations.			
3. <b>ACTUAL CONTAMINATION TARGETS:</b> If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5).  Level I: $\frac{0}{9} \text{ people} \times 10 = 0$ Level II: $\frac{0}{9} \text{ people} \times 1 = 0$ <span style="float: right;">Total =</span>	0	-	16
4. <b>POTENTIAL CONTAMINATION TARGETS:</b> Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	303	+	14; 16
5. <b>NEAREST WELL:</b> Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well Score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	20	+	14
6. <b>WELLHEAD PROTECTION AREA (WHPA):</b> If any source lies within or above a WHPA for the aquifer, or if a groundwater observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles; otherwise assign 0.	5	+	16
7. <b>RESOURCES:</b> Assign a score of 5 if one or more groundwater resource applies; assign 0 if none applies. <ul style="list-style-type: none"> <li>• Irrigation (5 acre minimum) of commercial food crops or commercial forage crops</li> <li>• Watering of commercial livestock</li> <li>• Ingredient in commercial food preparation</li> <li>• Supply for commercial aquaculture</li> <li>• Supply for a major or designated water recreation area, excluding drinking water use</li> </ul>	5	-	1; 16
<b>Sum of Targets T =</b>	333		

**SI TABLE 6 (FROM HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUNDWATER TARGET POPULATIONS**

**SI Table 6a: Other Than Karst Aquifers**

Distance From Site	Nearest Well (choose highest)	Pop.	POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORY										Pop. Value	Ref.
			1 to 10	101 to 100	301 to 1000	1001 to 10,000	10,001 to 50,000	50,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000			
0 to 1/4 mile	20	16	11	3	101	300	10,001	30,801	100,001	300,001	1,000,000	17	14; 16	
> 1/4 to 1/2 mile	18	36	30	100	300	10,000	50,000	100,000	300,000	1,000,000	3,000,000	33	14; 16	
> 1/2 to 1 mile	9	2,993	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	523	14; 16
> 1 to 2 miles	5	6,913	3	10	30	94	294	939	2,930	9,385	29,384	93,845	939	14; 16
> 2 to 3 miles	3	1,434	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212	14; 16
> 3 to 4 miles	2	12,953	1	4	13	42	131	417	1,306	4,171	13,060	41,709	1,306	14; 16
Nearest Well =	20												Sum =	3,030

Notes: The exact location of the nearest well was unable to be determined. However, the CENTRACTS Report prepared by Frost Associates for the property indicates that 16 people utilize private wells within a one-quarter mile radius of the property.

**SI TABLE 6 (FROM HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUNDWATER TARGET POPULATIONS (Continued)**

**SI Table 6b: Karst Aquifers**

Distance From Site	Nearest Well (choose highest)	POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORY										1,000,000 to 3,000,000	Pop. Value	Ref.	
		1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000				
0 to 1/4 mile	20	4	17	53	164	572	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	0	12
>1/4 to 1/2 mile	20	2	11	33	102	324	1,043	3,233	10,122	32,325	101,213	323,243	1,012,122	0	12
>1/2 to 1 mile	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	12
>1 to 2 miles	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	12
>2 to 3 miles	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	12
>3 to 4 miles	20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227	0	12
<b>Nearest Well =</b>	<b>0</b>												<b>Sum =</b>	<b>0</b>	

## GROUNDWATER PATHWAY WORKSHEET (Concluded)

### WASTE CHARACTERISTICS

	Score	Data Type	Does Not Apply																																	
8. If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to groundwater.	100	+																																		
-9. Assign the highest groundwater toxicity/mobility value from SI Table 3 or 4.  Substance(s): <u>Vinyl Chloride</u> <u>Barium</u> <u>Tetrachloroethene</u> Value: <u>10,000</u> <u>10,000</u> <u>100</u> From Table: <u>4</u> <u>4</u> <u>4</u>	10,000	+																																		
10. Multiply the groundwater toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7)																																				
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Product</th> <th>WC Score</th> <th>*</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td></td></tr> <tr><td>&gt;0 to &lt;10</td><td>1</td><td></td></tr> <tr><td>≥10 to &lt;100</td><td>2</td><td></td></tr> <tr><td>≥100 to &lt;1,000</td><td>3</td><td></td></tr> <tr><td>≥1,000 to &lt;10,000</td><td>6</td><td></td></tr> <tr><td>≥10,000 to &lt;1E+05</td><td>10</td><td></td></tr> <tr><td>≥1E+05 to &lt;1E+06</td><td>18</td><td></td></tr> <tr><td>≥1E+06 to &lt;1E+07</td><td>32</td><td style="text-align: center;">✓</td></tr> <tr><td>≥1E+07 to &lt;1E+08</td><td>56</td><td></td></tr> <tr><td>≥1E+08 or greater</td><td>100</td><td></td></tr> </tbody> </table>	Product	WC Score	*	0	0		>0 to <10	1		≥10 to <100	2		≥100 to <1,000	3		≥1,000 to <10,000	6		≥10,000 to <1E+05	10		≥1E+05 to <1E+06	18		≥1E+06 to <1E+07	32	✓	≥1E+07 to <1E+08	56		≥1E+08 or greater	100				
Product	WC Score	*																																		
0	0																																			
>0 to <10	1																																			
≥10 to <100	2																																			
≥100 to <1,000	3																																			
≥1,000 to <10,000	6																																			
≥10,000 to <1E+05	10																																			
≥1E+05 to <1E+06	18																																			
≥1E+06 to <1E+07	32	✓																																		
≥1E+07 to <1E+08	56																																			
≥1E+08 or greater	100																																			
*check (✓) the WC score calculated for the pathway	WC =																																			
	32																																			

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the groundwater pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

### GROUNDWATER PATHWAY CALCULATION:

$$\frac{LR \times T \times WC}{82,500}$$

$$= \boxed{71.04}$$

(Maximum of 100)

Notes:

Calculation:  $(550 \times 333 \times 32) \div 82,500 = 71.04$

## SURFACE WATER PATHWAY

**Pathway Description and Scoring Notes:** Describe the Surface Water Migration Pathway. Identify the nearest source area with non-zero containment for the Surface Water Pathway and the location of the PPE. Include the length of the overland segment. Describe the in-water segment up to the target distance limit noting the stream flow characteristics of each reach and the locations of drinking water intakes, fisheries and sensitive environments along the 15-mile pathway.

Briefly discuss any sampling events relative to the Surface Water Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Surface Water Pathway for this site, or any factors which influenced your scoring rationale.

Note: If a site has more than one watershed or has both overland/flood and groundwater to surface water migration potential, document each scenario and use the higher scoring watershed/migration route to calculate the surface water migration pathway score. Provide a summary of the scores for all other watershed/migration routes.

The property is primarily located along the northern shore of the Mumford River, bordering the river for approximately 1.1 miles. There is also a land parcel located along the southern shore of the river which is associated with the property. The land parcel bordering the southern shore of the Mumford River contains a paved employee parking area (eastern extent) and an unpaved area used to store piles of renovation debris (western extent) are located on the land parcel which borders the southern shore of the Mumford River. The dam, owned by WRT, is located between the Covitch property on the northern shore and the employee parking lot on the southern shore. The impoundment reservoir created by this dam is referred to as Meadow Pond. The property is located in portions of both the 100-year and 500-year floodplain [3; 17].

The length of the Mumford River frontage passing through the property contains numerous Probable Point of Entry (PPE) areas. There are various discharge pipes, and drainage swales located along the northern shore of the Mumford River. Due to the large number of storm drains and discharge pipes observed during the on-site reconnaissance, START personnel assume that surface water runoff from the developed portion of the property drains directly to the Mumford River. For this evaluation, the most-upstream PPE area is the western extent of the filled area containing spent foundry sand and other materials located on the Arcade property [3].

The downstream pathway includes flow along the Mumford River for approximately 4.5 miles until its convergence with the Blackstone River and flow for approximately 10.5 miles along the Blackstone River, until the 15-mile terminus is reached in Woonsocket, Rhode Island. The Mumford River flows through several ponds including Meadow Pond, Linwood Pond, Whitin Pond, Caprons Pond, and several unnamed ponds prior to converging with the Blackstone River. The mean annual flowrate of the Mumford River is approximately 45 cubic feet per second (cfs) and the mean annual flowrate of the Blackstone River is 433 cfs. The mean annual flow rate for the Mumford River was based on historical information from the former East Douglas gaging station formerly located approximately 3 miles upstream of the property. The Blackstone River mean annual flow rate was determined from the partial record station located in Northbridge, Massachusetts [1; 10; 19].

## SURFACE WATER PATHWAY (Continued)

The following table contains a summary of waterbodies found along the 15-mile downstream pathway for the Covitch Property/ATF Davidson Co. (FMR) property.

**Water Bodies Along the 15-Mile Downstream Pathway for  
Covitch Property/ATF Davidson Co. (FMR)**

Surface Water Body	Descriptor <sup>a</sup>	Length of Reach (miles)	Flow Characteristics (cfs) <sup>b</sup>	Length of Wetlands (miles)
Mumford River <sup>c</sup> (Meadow Pond)	Small to moderate stream	4.5	45	2.86
Blackstone River <sup>d</sup>	Moderate to large stream	10.5	433	5.44

<sup>a</sup> Minimal stream < 10 cfs. Small to moderate stream 10-100 cfs. Moderate to large stream > 100-1,000 cfs. Large stream to river > 1,000-10,000 cfs. Large river > 10,000-100,000 cfs. Very large river > 100,000 cfs. Coastal tidal waters (flow not applicable). Shallow ocean zone or Great Lake (flow not applicable). Moderate depth ocean zone or Great Lake (flow not applicable). Deep ocean zone or Great Lake (flow not applicable). Three-mile mixing zone in quiet flowing river 10 cfs or greater.

<sup>b</sup> Cubic feet per second.

<sup>c</sup> Includes Meadow Pond, Linwood Pond, Whitin Pond, Caprons Pond, and several unnamed ponds.

<sup>d</sup> Includes Rice City Pond.

[1; 10; 18; 19]

There are no known municipal drinking water intakes located along the downstream pathway. However, a surface water intake, used for irrigation of commercial food crops at the Sherman-Baker Farm, is located along the Mumford River in North Uxbridge, Massachusetts. The surface water intake is located along the downstream pathway approximately 2 miles downstream of the large dam on the Covitch property [20].

There are no sensitive environments located along the approximately 1.1 miles of Mumford River frontage which bisects the property. The nearest sensitive environment is an approximate 6-acre *Palustrine* forested wetland located approximately 0.8 miles downstream of the property. There are approximately 2.86 miles of wetland frontage along the Mumford River portion of the downstream pathway and approximately 5.44 miles of wetland frontage along the Blackstone River portion of the downstream pathway. There are two occurrences of Commonwealth of Massachusetts-listed species of concern along the Mumford River portion of the downstream pathway. Along the Blackstone River portion of the downstream pathway, there are two occurrences of Commonwealth of Massachusetts-listed threatened/endangered species and six occurrences of Commonwealth of Massachusetts-listed species of concern [18; 21].

### SURFACE WATER PATHWAY (Continued)

The following table contains a summary of the sensitive environments found along the 15-mile downstream pathway for the Covitch Property/ATF Davidson Co. (FMR) property.

#### Sensitive Environments Along the 15-Mile Downstream Pathway for Covitch Property/ATF Davidson Co. (FMR)

Sensitive Environment Name	Sensitive Environment Type	Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs) <sup>a</sup>
CWA Waterbody	CWA Waterbody	Mumford River	<0.1	45
Wetlands	Wetlands	Mumford River	0.8 <sup>b</sup>	45
State-Concerned Species	State-Concerned Species	Mumford River	2.8 <sup>c</sup>	45
Wetlands	Wetlands	Blackstone River	4.5 <sup>d</sup>	433
State-Concerned Species	State-Concerned Species	Blackstone River	5.4 <sup>e</sup>	433
State-Endangered/ Threatened Species	State-Endangered Species	Blackstone River	10.8 <sup>f</sup>	433

<sup>a</sup> Cubic feet per second

<sup>b</sup> There are approximately 2.86 miles of wetlands frontage located along the Mumford River. The nearest is approximately 0.8 miles downstream of the PPE area.

<sup>c</sup> There are two occurrences of Commonwealth of Massachusetts-Concerned Species located along the Mumford River. The nearest is approximately 2.8 miles downstream of the PPE area.

<sup>d</sup> There are approximately 5.44 miles of wetlands frontage located along the Blackstone River. The nearest is approximately 4.5 miles downstream of the PPE area.

<sup>e</sup> There are six occurrences of Commonwealth of Massachusetts-Concerned Species located along the Blackstone River. The nearest is approximately 5.4 miles downstream of the PPE area.

<sup>f</sup> There are two occurrences of Commonwealth of Massachusetts-Endangered/Threatened Species located along the Blackstone River. The nearest is approximately 10.8 miles downstream of the PPE area.

CWA = Clean Water Act

PPE = Probable Point of Entry

[18; 21]

Visual evidence observed during the START on-site reconnaissance indicates that the Mumford River is a recreational fishery. The evidence consisted of a handwritten sign on the property pointing out a good fishing location and a number of fishing poles which were utilized by WRT personnel. Also, the representative of WRT indicated that employees of the businesses located on the property often fish from the northern shore of the Mumford River during their lunch periods. START personnel assume for this evaluation that the Blackstone River is a recreational fishery, as well [3].

## SURFACE WATER PATHWAY (Continued)

The Covitch property has operated as a large industrial mill complex since the 1800s. Several of the manufacturing processes carried out within the mill complex have potentially impacted the Mumford River. A large foundry operated on the Covitch property through approximately the mid-1970s. Foundry wastes were mixed with spent foundry sand and disposed of by landfilling the material on the Arcade property and grading the material into the river. As a result of this disposal practice, a channel within the river was filled; connecting a small island to the northern shore of the river adjacent to the Arcade property. The 1991 EPA SI report for the property details the landfilled material as consisting of 90% spent foundry sand, 5% coal ash, and 5% paint, plating sludge, plating rinsewater, bromide salt baths, solvents and cutting oils. According to the 1985 CEH report, approximately 3,200 feet of river frontage on the property consisted of filled material. Additionally, the 1991 EPA SI report indicated that the filled area contained approximately 40,000 cubic yards of material in an area of approximately 730,000 square feet [2].

The 1991 EPA SI report for the property stated that untreated electroplating wastewater had been discharged to the Mumford River from the property between 1930 to 1965. According to the EPA SI report, an on-site wastewater treatment plant was installed on the property in 1965 and treated wastewater was discharged to the Mumford River from 1965 until September 1982. Between 1974 and 1982 discharge of treated wastewater was carried out under a NPDES permit (No. MA0001252). The SI report did not indicate why wastewater treatment operations ceased in September 1982. The present owners of the property were unable to provide any additional information concerning the discharge of industrial wastewater to the Mumford River. START personnel were unable to find any additional information concerning the discharge of treated or untreated wastewater to the Mumford River [2].

An additional area associated with the on-site mill complex, which has potentially impacted the Mumford River/Meadow Pond is the Raceway located on the Covitch property. The Raceway was used for on-site power generation for manufacturing operations during the 1800s. Water from the impoundment reservoir, created by the on-site dam, was diverted inland under several of the on-site buildings via the Raceway. This water was used to directly power manufacturing equipment. The water was then discharged back to the Mumford River below the dam. The Raceway was later used to generate electricity in an on-site power plant [2].

In April 1985, an oil sheen was observed by an unknown party on the surface of the water in the Raceway. This discovery led to the CEH hydrogeological investigation of the Covitch property. In the September 1985 CEH report it was determined that the sheen observed in the Raceway was the result of draining metal turnings outside between Building No. 9 and the Raceway [5]. Additional information concerning the oil sheen can be found in the General Information section of this evaluation.

In spring 1985, MA DEQE requested that a hydrogeological investigation be completed for the Arcade property. WCI retained CEH to collect five benthic core/sediment samples from the Mumford River/Meadow Pond. The sediment samples (B-1 through B-5) were collected from the Mumford River on 18 July 1985 by representatives of CEH. Sediment sample locations are depicted on Figures 3 and 4. These samples were analyzed for priority pollutant metals and barium by RAI between 23 July 1985 and 12 August 1985.

## SURFACE WATER PATHWAY (Continued)

Results of the analyses indicated that there were high levels of six metals in the sediments of the Mumford River. Cadmium, chromium, copper, lead, nickel, and zinc were all detected in one or more of the sediment samples at concentrations greater than three times the reference concentration of the upstream reference sample (B-5). Cadmium, however, has never been detected above reference concentrations on the property and therefore will not be discussed further in this report. The concentrations of the metals in the sediment samples, which have also been historically detected on the property ranged from 12 ppm for nickel to 920 ppm for zinc [7]. The following table presents a summary of the maximum concentrations of the metals detected in the sediment samples collected from the Mumford River on 18 July 1985. A metal is listed if it was detected at three times or greater than the upstream reference sample concentration.

**Summary of Maximum Concentrations  
Analytical Results for Sediment Samples collected by  
Caswell, Eichler, & Hill, Inc. for the Covitch Property/ATF Davidson Co. (FMR)**

Contaminant	Maximum Sample Concentration (ppm)	Sample ID	Reference Concentration (ppm)	Reference ID
Chromium	410	B-1	65	B-5
Copper	110	B-1	10	B-5
Lead	350	B-4	14	B-5
Nickel	17	B-1	3.8	B-5
Zinc	920	B-3	150	B-5

ppm = Parts per million

[7]

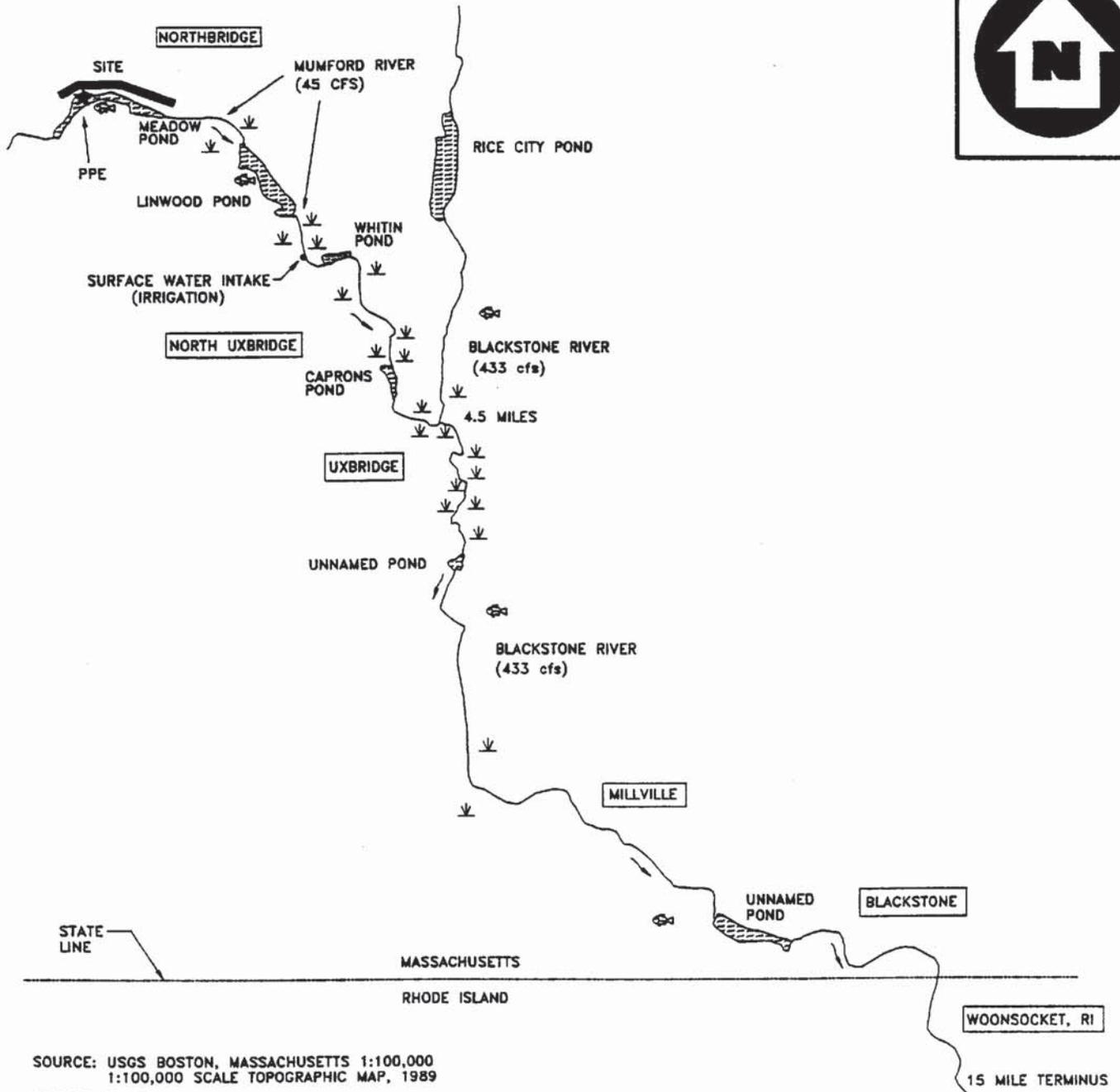
Additional sediment samples were collected from the Mumford River on 13 November 1985 by representatives of CEH. Eleven sediment samples were collected and sent to RAI for analysis during this sampling round. The samples were analyzed for chromium via EPA Method 3050. The samples were also subjected to an EP Toxicity test for chromium. The sediment samples collected on 13 November 1985 are not depicted in Figures 3 and 4 because the majority of the samples were collected upstream of the property. However, it should be noted that the locations of sediment samples B-1 through B-5 collected on 13 November 1985 correspond to the locations of the sediment samples collected on 18 July 1985 [7; 8].

Results of the EPA Method 3050 analyses indicated that chromium concentrations ranged from 200 to 870 ppm. Start personnel chose the chromium concentration of sediment sample B-6 as the reference concentration because it was the most upstream sample collected. Chromium was detected at concentrations greater than three times the reference value in six of the 11 samples collected [8].

### SURFACE WATER PATHWAY (Concluded)

It should be noted that all of the sediment samples collected, to date, were located within the same basin of the Mumford River. The samples were collected from the impoundment reservoir, Meadow Pond, created by the on-site dam. CEH theorized in the October 1985 CEH report that the dam on the property created a settling basin, resulting in the elevated metals concentrations [1; 7]. The impoundment reservoir created is contained between the dam on the property and Lackey Dam located approximately 1.2 miles upstream of the western extent of the property. A true upstream reference sample would need to be located above Lackey Dam.

CEH reported that the EP Toxicity results indicated that a retardation agent was affecting the mobility of the chromium present in the river bottom sediments. CEH based this on the fact that even though chromium was detected via EPA Method 3050 procedures, virtually none of the chromium was extractable [8].



**LEGEND**

- FISHERY
- WETLAND
- SURFACE WATER
- FLOW DIRECTION
- PROBABLE POINT OF ENTRY (PPE)

**SURFACE WATER PATHWAY**  
**COVITCH PROPERTY /**  
**ATF DAVIDSON CO. (FMR)**  
**MAIN STREET**  
**NORTHBRIDGE, MASSACHUSETTS**



**REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM**

TDD # 95-07-0065	DRAWN BY: T. CAMPBELL	DATE 6/19/96
---------------------	--------------------------	-----------------

FILE NAME:  
S:\95070065\FIG3.DWG

**FIGURE 5**



**SURFACE WATER PATHWAY  
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET**

**LIKELIHOOD OF RELEASE -  
OVERLAND/FLOOD MIGRATION**

		Score	Data Type	Refs												
1.	<b>OBSERVED RELEASE:</b> If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.	550	+	5; 7; 8												
2.	<p><b>POTENTIAL TO RELEASE:</b> Distance to surface water: <u>      </u> (feet)</p> <p>If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on distance to surface water and flood frequency.</p> <table border="1" style="margin-left: 40px;"> <tr> <td>Distance to surface water &lt; 2500 feet</td> <td align="center">500</td> </tr> <tr> <td>Distance to surface water &gt; 2500 feet, and:</td> <td></td> </tr> <tr> <td>    Site in annual or 10-yr floodplain</td> <td align="center">500</td> </tr> <tr> <td>    Site in 100-yr floodplain</td> <td align="center">400</td> </tr> <tr> <td>    Site in 500-yr floodplain</td> <td align="center">300</td> </tr> <tr> <td>    Site outside 500-yr floodplain</td> <td align="center">100</td> </tr> </table> <p>Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2</p>	Distance to surface water < 2500 feet	500	Distance to surface water > 2500 feet, and:		Site in annual or 10-yr floodplain	500	Site in 100-yr floodplain	400	Site in 500-yr floodplain	300	Site outside 500-yr floodplain	100			
Distance to surface water < 2500 feet	500															
Distance to surface water > 2500 feet, and:																
Site in annual or 10-yr floodplain	500															
Site in 100-yr floodplain	400															
Site in 500-yr floodplain	300															
Site outside 500-yr floodplain	100															
	<b>LR =</b>	550														

**LIKELIHOOD OF RELEASE -  
GROUNDWATER TO SURFACE WATER MIGRATION**

		Score	Data Type	Refs
1.	<b>OBSERVED RELEASE:</b> If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.	550	+	5; 7; 8
	<p><b>NOTE:</b> Evaluate groundwater to surface water migration only for a surface water body that meets all of the following conditions:</p> <p>1) A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0.</p> <p>2) No aquifer discontinuity is established between the source and the above portion of the surface water body.</p> <p>3) The top of the uppermost aquifer is at or above the bottom of the surface water.</p> <p>Elevation of top of uppermost aquifer: _____</p> <p>Elevation of bottom of surface water body: _____</p>			
2.	<b>POTENTIAL TO RELEASE:</b> Depth to aquifer: _____ feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less assign a score of 500; otherwise assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.1.2.			
	<b>LR =</b>	550		

Notes: Both the Overland/Flood Migration and the Groundwater to Surface Water Migration Pathways yield a likelihood of release score of 550. The Overland/Flood will be used as this is the more likely pathway due to the close proximity of the Mumford River.

**SURFACE WATER PATHWAY  
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET  
(Continued)**

**DRINKING WATER THREAT TARGETS**

				Score	Data Type	Refs																
<p>Record the water body type, flow, and number of people served by each drinking water intake within the distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign 0 to factors 3, 4, and 5.</p> <table border="1"> <thead> <tr> <th>Intake Name</th> <th>Water Body Type</th> <th>Flow</th> <th>People Served</th> </tr> </thead> <tbody> <tr> <td>N/A</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Are any intakes part of a blended system? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, attach a page to show appointment calculations.</p> <p>3. <b>ACTUAL CONTAMINATION TARGETS:</b> If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8).</p> <p>Level I: <math>0 \text{ people} \times 10 = 0</math> Level II: <math>0 \text{ people} \times 1 = 0</math> <span style="float:right">Total =</span></p>				Intake Name	Water Body Type	Flow	People Served	N/A												0	+	20
Intake Name	Water Body Type	Flow	People Served																			
N/A																						
<p>4. <b>POTENTIAL CONTAMINATION TARGETS:</b> Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.</p>				0	-	20																
<p>5. <b>NEAREST INTAKE:</b> Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign 0.</p>				0	-	20																
<p>6. <b>RESOURCES:</b> Assign a score of 5 if one or more surface water resource applies, assign 0 if none applies.</p> <ul style="list-style-type: none"> <li>• Irrigation (5 acre minimum) of commercial food crops or commercial forage crops</li> <li>• Watering of commercial livestock</li> <li>• Ingredient in commercial food preparation</li> <li>• Major or designated water recreation area, excluding drinking water use.</li> </ul>				5	-	20																
<b>Sum of Targets T =</b>				5																		

Notes: The Sherman-Baker Farm located in North Uxbridge, Massachusetts utilizes water drawn from the Mumford River to irrigate food crops.

**SI TABLE 9 (FROM HRS TABLE 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY<sup>(a)</sup>**

Type of Surface Water Body <sup>(b)</sup>	Pop.	Nearest Intake	NUMBER OF PEOPLE								Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (< 10 cfs)	0	20	4	17	53	164	522	1,633	5,214	16,325	0
Small to moderate stream (10 to 100 cfs)	0	2	0.4	2	5	16	52	163	521	1,633	0
Moderate to large stream (> 100 to 1,000 cfs)	0	0	0.04	0.2	0.5	2	5	16	52	163	0
Large Stream to river (> 1,000 to 10,000 cfs)	0	0	0.004	0.02	0.05	0.2	0.5	2	5	16	0
Large River (> 10,000 to 100,000 cfs)	0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	0
Very Large River (> 100,000 cfs)	0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	0
Shallow ocean zone or Great Lake (depth < 20 feet)	0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	0
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)	0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	0
Deep ocean zone or Great Lake (depth > 200 feet)	0	0	0	0	0	0.001	0.003	0.008	0.03	0.08	0
3-mile mixing zone in quiet flowing river (> 10 cfs)	0	10	2	9	26	82	261	817	2,667	8,163	0

**SI TABLE 9 (FROM HRS TABLE 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY<sup>(a)</sup> (Continued)**

Type of Surface Water Body	Pop. Value	NUMBER OF PEOPLE					Pop. Value
		30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000	3,000,001 to 10,000,000	
Minimal Stream (< 10 cfs)	0	52,137	163,246	521,360	1,632,455	5,213,590	0
Small to moderate stream (10 to 100 cfs)	0	5,214	16,325	52,136	163,245	521,359	0
Moderate to large stream (> 100 to 1,000 cfs)	0	521	1,633	5,214	16,325	52,136	0
Large Stream to river (> 1,000 to 10,000 cfs)	0	52	163	521	1,632	5,214	0
Large River (> 10,000 to 100,000 cfs)	0	5	16	52	163	521	0
Very Large River (> 100,000 cfs)	0	0.5	2	5	16	52	0
Shallow ocean zone or Great Lake (depth < 20 feet)	0	5	16	52	163	521	0
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)	0	0.5	2	5	16	52	0
Deep ocean zone or Great Lake (depth > 200 feet)	0	0.3	1	3	8	26	0
3-mile mixing zone in quiet flowing river ( $\geq$ 10 cfs)	0	26,068	81,623	260,680	816,227	2,606,795	0
						Sum =	0

<sup>a</sup>Round the number of people to nearest integer. Do not round the assigned dilution-weighted population value to nearest integer.

<sup>b</sup>Treat each lake as a separate type of water body and assign it a dilution-weighted population value using the surface water body type with the same dilution weight from HRS Table 4-13 as the lake. If drinking water is withdrawn from coastal tidal water or the ocean, assign a dilution-weighted population value to it using the surface water body type with the same dilution weight from HRS Table 4-13 as the coastal tidal water or the ocean zone.

**SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED**

Notes: Convert all results and SCDM values to  $\mu\text{g}/\text{kg}$  or ppb. If sum of percents calculated for I or J index is  $\geq 100\%$ , consider the fishery a Level I target; if sum of I or J index is  $< 100\%$  consider the fishery a Level II target. List only those substances that meet the observed release criteria in a fishery within the target distance limit and have a BCF of  $\geq 500$ ; BCF values are found on SI Table 7.

Fishery ID: Murriford River		Sample Type: Sediment	Level I: No	Level II: Yes	References: 7			
Sample ID	Hazardous Substance	Conc. ( $\mu\text{g}/\text{kg}$ )	Benchmark Conc. (FDA/AL)	% of Benchmark	RFD (J index)	% of RFD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
B-1 (7/85)	Copper	110,000	NL	--	NL	--	NL	--
B-3 (7/85)	Zinc	920,000	NL	--	27,000	> 100	NL	--
				Highest Percent	Sum of Percents	> 100	Sum of Percents	--

Notes: NL = not listed.  
-- = unable to calculate due to lack of SCDM data

**SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED**

Notes: Convert all results and SCDM values to  $\mu\text{g}/\text{L}$  or ppb. If the highest % of benchmark calculated is  $\geq 100\%$ , consider the sensitive env. a Level I target; if the highest % of benchmark calculated is  $< 100\%$  consider the sensitive env. a Level II target.

Sample ID	Hazardous Substance	Sample Type: Sediment	Level I: No		Level II: Yes		References
			Conc. ( $\mu\text{g}/\text{L}$ )	Benchmark Conc. (AWQC or AALAC)	% of Benchmark	Environment Value: 5	
B-1 (11/85)	Chromium		870,000	1	> 100%	8	
B-1 (7/85)	Copper		110,000	22	> 100%	7	
B-4 (7/85)	Lead		350,000	3.2	> 100%	7	
B-1 (7/85)	Nickel		17,000	160	> 100%	7	
B-3 (7/85)	Zinc		920,000	110	> 100%	7	
			Highest Percent		> 100%		

SCDM Version: JUN96  
Notes:

**SURFACE WATER PATHWAY (Continued)  
HUMAN FOOD CHAIN THREAT WORKSHEET**

**HUMAN FOOD CHAIN THREAT TARGETS**

Score

Data Type

Refs

Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.			
Fishery Name: Mumford River Species: Unknown Species:	Water Body: Small to moderate stream Production: Unknown lbs/yr Production: lbs/yr	Flow: 45 cfs	10; 19
Fishery Name: Blackstone Riv. Species: Unknown Species:	Water Body: Moderate to large stream Production: Unknown lbs/yr Production: lbs/yr	Flow: 433 cfs	
<b>FOOD CHAIN INDIVIDUAL (Select highest value)</b>			
7.	<b>ACTUAL CONTAMINATION FISHERIES:</b>  Assign 50 points for a Level I fishery only if tissue samples document an observed release of a substance with a BCF $\geq 500$ to a fishery within the target distance limit (SI Table 10). List substance(s):  Assign 45 points for a Level II fishery if surface water/sediment samples document an observed release of a substance with a BCF $\geq 500$ to a fishery within the target distance limit (SI Table 10). List substance(s): <u>Copper, Zinc</u> .		45
8.	<b>POTENTIAL CONTAMINATION FISHERIES:</b>  Assign 20 points for a potential fishery if there is an observed release of a substance with a BCF $\geq 500$ (SI Table 7) to a watershed containing fisheries within the target distance limit, but no Level I or Level II fisheries are scored because there is no fishery documented between the PRE and the most downstream observed release sample point.  If there is no observed release of a substance with a BCF $\geq 500$ to a watershed, assign a value for potential contamination fisheries from the table below using the lowest flow of all fisheries within the target distance limit.		7; 8
	Lowest Flow	FCI Value	
	< 10 cfs	20	
	10 to 100 cfs	2	
	> 100 cfs, coastal tidal waters, oceans, or Great Lakes	0	
	3-mile mixing zone in quiet flowing river	10	
	<b>FCI Value =</b>		45

Notes:

**Targets T =**

45

**SURFACE WATER PATHWAY (Continued)  
ENVIRONMENTAL THREAT WORKSHEET**

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value for each type.

**ENVIRONMENTAL THREAT TARGETS**

					Score	Data Type	Refs
Record the water body and flow for each surface water sensitive environment within the target distance limit (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page.							
Environment Type (SI Table 13)		Water Body Name		Flow			
Wetlands (2.86 miles)		Mumford River		45 cfs			
CWA Waterbody		Mumford River		45 cfs			
Two State Conc. Species		Mumford River		45 cfs			
Wetlands (5.44 miles)		Blackstone River		433 cfs			
Six State Conc. Species		Blackstone River		433 cfs			
Two State Threat/Endg. Species		Blackstone River		433 cfs			
<p>9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14).</p> <p>Substance(s): <u>Chromium</u>    <u>Copper</u>    <u>Lead</u></p> <p>From Table: <u>11</u>    <u>11</u>    <u>11</u></p>							
Environment Type (SI Table 13)	Environment Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)		Product			
CWA Waterbody	5	× 1 =		5			
		× =					
		× =					
		× =					
<b>Sum =</b>					5	+	5; 7; 8
10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:							
Flow	Dilution weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.	Product			
45 cfs	0.1 ×	2.86 mi. of wetlands: 75 ×	0.1 =	0.75			
45 cfs	0.1 ×	2 occurrences of (A): 2(25) ×	0.1 =	0.50			
433 cfs	0.01 ×	5.44 mi. of wetlands: 150 ×	0.1 =	0.15			
433 cfs	0.01 ×	6 occurrences of (A): 6(25) ×	0.1 =	0.15			
433 cfs	0.01 ×	2 occurrences of (B): 2(50) ×	0.1 =	0.10			
<b>Sum =</b>					1.65	+	18; 21
<b>Sum of Targets T =</b>					6.65		

Notes: (A): Particular areas, small in size, important to the maintenance of unique biotic communities (State concerned species); Value= 25/ occurrence.  
(B): State-listed Endangered Species; Value= 50/occurrence.  
CWA = Clean Water Act.

SI TABLE 12 (HRS TABLE 4-13):  
SURFACE WATER DILUTION WEIGHTS

* TYPE OF SURFACE WATER BODY		Assigned Dilution Weight
Descriptor	Flow Characteristics	
Minimal stream	< 10 cfs	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	> 100 to 1,000 cfs	0.01
Large stream to river	> 1,000 to 10,000 cfs	0.001
Large river	> 10,000 to 100,000 cfs	0.0001
Very large river	> 100,000 cfs	0.00001
Coastal tidal waters	Flow not applicable; depth not applicable	0.0001
Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.0001
Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.00001
Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

\* Check all (✓) appropriate dilution weights.

**SI TABLE 13 (HRS TABLE 4-23):  
SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS VALUES**

*	Sensitive Environment	Assigned Value
	Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
	Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
✓	Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
	State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area ✓ Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
✓	State designated areas for the protection and maintenance of aquatic life under the Clean Water Act	5
✓	Wetlands See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

\*Check (✓) all environments impacted or potentially impacted by the site.

**SI TABLE 14 (HRS TABLE 4-24): SURFACE WATER WETLANDS FRONTAGE VALUES**

*	TOTAL LENGTH OF WETLANDS	ASSIGNED VALUE
	Less than 0.1 mile	0
	0.1 to 1 mile	25
	Greater than 1 to 2 miles	50
	Greater than 2 to 3 miles	75
	Greater than 3 to 4 miles	100
	Greater than 4 to 8 miles	150
	Greater than 8 to 12 miles	250
	Greater than 12 to 16 miles	350
	Greater than 16 to 20 miles	450
	Greater than 20 miles	500

\* Check (✓) highest value for each applicable flow characteristic.

Notes:

**SURFACE WATER PATHWAY (Concluded)**  
**WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY**

**WASTE CHARACTERISTICS**

11.	If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater. If no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to surface water.	Score 100
12.	Assign the highest value from SI Table 3 or SI Table 7 for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.	

	DWT	HFCT	ET
Substance(s):	Lead	PCBs	PCBs
Value:	10,000	5.0E+08	5.0E+08
From Table:	7		3

\*Footnote all substances which cannot fit on Table

13.	Multiply the toxicity and hazardous waste quantity scores. Assign the waste characteristics score for each threat from the table below.	
-----	---	--

Product	WC Score	DWT	HFCT	ET
0	0			
>0 to <10	1			
≥10 to <100	2			
≥100 to <1,000	3			
≥1,000 to <10,000	6			
≥10,000 to <1E+05	10			
≥1E+05 to <1E+06	18			
≥1E+06 to <1E+07	32			
≥1E+07 to <1E+08	56			
≥1E+08 to <1E+09	100			
≥1E+09 to <1E+10	180			
≥1E+10 to <1E+11	320		✓	✓
≥1E+11 to <1E+12	560			
≥1E+12 or greater	1000			

\*check (✓) the WC score calculated for each threat

	Substance Value	HWQ	Product	WC Score (from Table)	
Drinking Water Threat Toxicity/Persistence	10,000 ×	100 =	1.0E+06	32	(Maximum of 100)
Food Chain Threat Toxicity/Persistence Bioaccumulation	5.0E+08 ×	100 =	5.0E+10	320	(Maximum of 1000)
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	5.0E+08 ×	100 =	5.0E+10	320	(Maximum of 1000)

**SURFACE WATER PATHWAY THREAT SCORES**

Threat (T)	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics(WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$	
Drinking Water (DW)	550	5	32	1.07	(Maximum of 100)
Human Food Chain (HFC)	550	45	320	96	(Maximum of 100)
Environmental (E)	550	6.65	320	14.19	(Maximum of 60)

Multiply LR by T and by WC. Divide the product by 82,500 for each threat (T). Sum the threat scores to obtain the surface water pathway score for each watershed/migration route. Select the highest watershed/migration route score. If the pathway score is greater than 100, assign 100.

**SURFACE WATER PATHWAY CALCULATION:**

$(DWT + HFCT + ET) =$

100

(Maximum of 100)

**Notes:**

**Calculations;**

DWT:  $[550 \times 5 \times 32] \div 82,500 = 1.07$

HFCT:  $[550 \times 45 \times 320] \div 82,500 = 96$

ET:  $[550 \times 6.65 \times 320] \div 82,500 = 14.19$

$DWT + HFCT + ET = 1.07 + 96 + 14.19 = > 100$

## SOIL EXPOSURE PATHWAY

**Pathway Description and Scoring Notes:** Identify all areas of observed contamination. Indicate whether a resident population is associated with the site and characterize the area surrounding the site. Identify the nearby population and any terrestrial sensitive environments located within the target distance limit.

Briefly discuss any sampling events relative to the Soil Exposure Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Soil Exposure Pathway for this site, or any key factors which influenced your scoring rationale.

The nearest residence is located within the mill complex on the Covitch property. Four people reside in this residence: an employee of WRT, his wife, and their two children. The residence is located in Building No. 4. Based on both historical records and past environmental reports these residents do not appear to be living on a source, or within 200 feet of a source. Approximately 1,200 people work for businesses located on the property. However, the only on-site employees which START personnel will consider targets for soil exposure for this report are the approximately eight people working for WRT on the landscape/grounds maintenance crew. Alternatives Unlimited Day Habitation Program is a school located in one of the on-site buildings. The school is used to train special need students. The students and faculty of the school are not likely targets for soil exposure due to the fact that activities are limited to within the on-site building and the building is not believed to be located on a source. There are no terrestrial sensitive environments located on the property [3].

The property is located in a mixed residential, commercial, and industrial section of Northbridge. Both vehicular and pedestrian access to the portion of the property on the north side of the Mumford River (Covitch and Arcade properties) is restricted. Three sides of the property are enclosed by a 6-foot high chain-link fence. There is also a combination of on-site employees and a 24-hour security service patrolling the property. However, pedestrian access to the property can be gained via the Mumford River. Additionally, there is unrestricted pedestrian and vehicular access to the former coal ash disposal area which is located along Douglas Road south of the Mumford River [3].

According to the CENTRACTS report, prepared by Frost Associates, Inc. for the property, there are approximately 5,327 people residing within 1-radial mile of the property. To date, no known soil samples have been collected on residential properties in the vicinity of the subject property. Based on available information and on-site observations, nearby residential properties are not likely targets from the soil exposure pathway [3; 14].

Two surficial soil/source samples (collected from less than 24 inches below grade) were collected from the eastern extent of the foundry sand landfill on the property by CEH-JW December 1997. Chromium, copper, and lead were detected at concentrations ranging from 88 to 1,000 ppm. Additional information concerning the December 1997 soil/source sampling event is presented in the General Information section of this report [22].



## SOIL EXPOSURE PATHWAY WORKSHEET RESIDENT POPULATION THREAT

### LIKELIHOOD OF EXPOSURE

	Score	Data Type	Refs
1. <b>OBSERVED CONTAMINATION:</b> If evidence indicates presence of observed contamination (depth of 2 feet or less), assign a score of 550; otherwise, assign a 0. Note that a likelihood of exposure score of 0 results in a soil exposure pathway score of 0.	550	+	22

LE =

550

### TARGETS

2. <b>RESIDENT POPULATION:</b> Determine the number of people occupying residences or attending school or day care on contaminated property and within 200 feet of areas of observed contamination (HRS section 5.1.3).  Level I: <u>0</u> people × 10 = <u>0</u> Level II: <u>0</u> people × 1 = <u>0</u>			
Sum =	0		
3. <b>RESIDENT INDIVIDUAL:</b> Assign a score of 50 if any Level I resident population exists. Assign a score of 40 if there are Level II targets but no Level I targets. If no resident population exists (i.e., no Level I or Level II targets), assign 0 (HRS Section 5.1.3).	0		
4. <b>WORKERS:</b> Assign a score from the table below for the total number of workers at the site and nearby facilities and within areas of observed contamination associated with the site.			
<b>Number of Workers</b>	<b>Score</b>		
0	0		
1 to 100	5	5	+
101 to 1,000	10		3; 11
> 1,000	15		
5. <b>TERRESTRIAL SENSITIVE ENVIRONMENTS:</b> Assign a value for each terrestrial sensitive environment (SI Table 16) in an area of observed contamination.			
<b>Terrestrial Sensitive Environment Type</b>	<b>Value</b>		
Sum =	0		
6. <b>RESOURCES:</b> Assign a score of 5 if any one or more of the following resources is present on area of observed contamination at the site, assign 0 if none applies. <ul style="list-style-type: none"> <li>• Commercial agriculture</li> <li>• Commercial silviculture</li> <li>• Commercial livestock production or commercial livestock grazing</li> </ul>	0		
<b>Sum of Targets T =</b>	5		

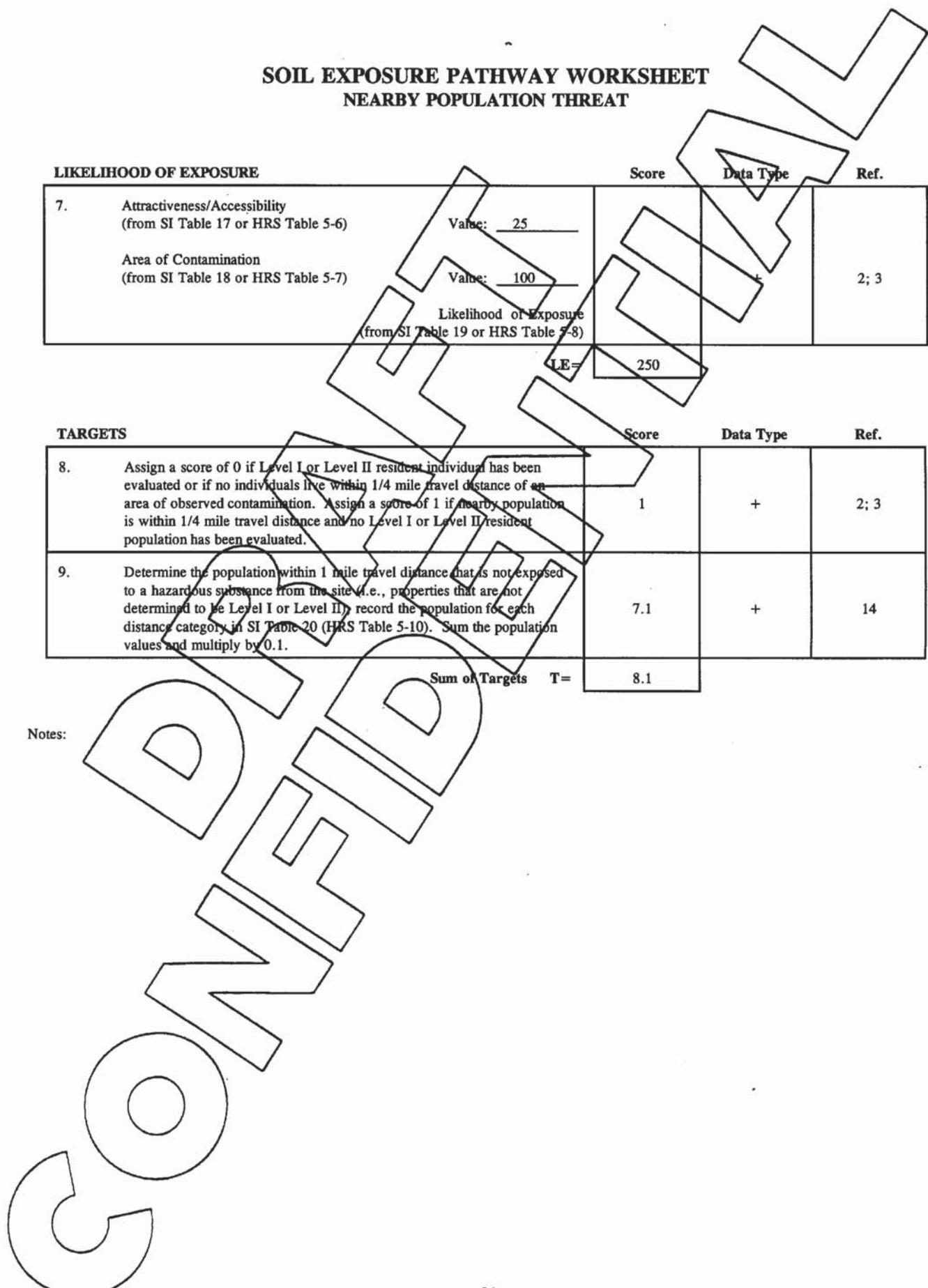
Notes: Approximately 1,200 people work for businesses located on the property. However, the only on-site employees which START personnel will consider targets for soil exposure for this evaluation are the eight people working for WRT on the landscape/grounds maintenance crew.

## SOIL EXPOSURE PATHWAY WORKSHEET NEARBY POPULATION THREAT

LIKELIHOOD OF EXPOSURE		Score	Data Type	Ref.
7.	Attractiveness/Accessibility (from SI Table 17 or HRS Table 5-6)  Area of Contamination (from SI Table 18 or HRS Table 5-7)	Value: <u>25</u>  Value: <u>100</u>  Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)  LE = <u>250</u>	+	2; 3

TARGETS		Score	Data Type	Ref.
8.	Assign a score of 0 if Level I or Level II resident individual has been evaluated or if no individuals live within 1/4 mile travel distance of an area of observed contamination. Assign a score of 1 if nearby population is within 1/4 mile travel distance and no Level I or Level II resident population has been evaluated.	1	+	2; 3
9.	Determine the population within 1 mile travel distance that is not exposed to a hazardous substance from the site (i.e., properties that are not determined to be Level I or Level II); record the population for each distance category in SI Table 20 (HRS Table 5-10). Sum the population values and multiply by 0.1.	7.1	+	14
Sum of Targets T=		8.1		

Notes:



**SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY  
TERRESTRIAL SENSITIVE ENVIRONMENT VALUES**

*	TERRESTRIAL SENSITIVE ENVIRONMENT	ASSIGNED VALUE
	Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
	Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
	Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
	State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

\* - Check (✓) all environments impacted or potentially impacted by the site.

CONFIDENTIAL

**SI TABLE 17 (HRS TABLE 5-6);  
ATTRACTIVENESS/ACCESSIBILITY VALUES**

*	AREA OF OBSERVED CONTAMINATION	ASSIGNED VALUE
	Designated recreational area	100
	Regularly used for public recreation (for example, vacant lots in urban area)	75
	Accessible and unique recreational area (for example, vacant lots in urban area)	75
	Moderately accessible (may have some access improvements-for example, gravel road) with some public recreation use	50
✓	Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
	Accessible with no public recreation use	10
	Surrounded by maintained fence or combination of maintained fence and natural barriers	5
	Physically inaccessible to public, with no evidence of public recreation use	0

\* Check (✓) highest value.

**SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR  
VALUES**

*	TOTAL AREA OF THE AREAS OF OBSERVED CONTAMINATION (SQURE FEET)	ASSIGNED VALUE
	≤ to 5,000	5
	> 5,000 to 125,000	20
	> 125,000 to 250,000	40
	> 250,000 to 375,000	60
	> 375,000 to 500,000	80
✓	> 500,000	100

\* Check (✓) highest value.

Notes:

**SI TABLE 19 (HRS TABLE 5-8): NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES**

Area of Contamination Factor Value	Attractiveness/Accessibility Factor Value					
	100	75	50	25	10	5
100	500	500	575	250	125	50
80	500	375	250	125	50	25
60	375	250	125	50	25	5
40	250	175	50	25	5	5
20	125	50	25	5	5	5
5	50	25	5	5	5	5

**SI TABLE 20 (HRS TABLE 5-10): DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT**

Travel Distance Category (miles)	NUMBER OF PEOPLE WITHIN THE TRAVEL DISTANCE CATEGORY										Pop. Value		
	0 to 1	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000		100,001 to 300,000	300,001 to 1,000,000
Greater than 0 to 1/4	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,084	13,034	41
Greater than 1/4 to 1/2	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	20
Greater than 1/2 to 1	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258	10
													Sum = 71

References: 3; 14

Notes: Including the 1,200 people that work for businesses on the property in the Greater than 0 to 0.25 mile Travel Distance Category does not change the Population Value.

## SOIL EXPOSURE PATHWAY WORKSHEET (Concluded)

### WASTE CHARACTERISTICS

	Score																						
10. Assign the hazardous waste quantity score calculated for soil exposure	100																						
11. Assign the highest toxicity value from SI Table 15a. Substance(s): <u>Chromium</u> <u>Lead</u> _____ Value: <u>10,000</u> <u>10,000</u> _____ From Table: <u>15a</u> <u>15a</u> _____	10,000																						
12. Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	1.0E+06																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Product</th> <th style="width: 30%;">WC Score</th> </tr> </thead> <tbody> <tr><td>0</td><td style="text-align: center;">0</td></tr> <tr><td>&gt;0 to &lt;10</td><td style="text-align: center;">1</td></tr> <tr><td>≥10 to &lt;100</td><td style="text-align: center;">2</td></tr> <tr><td>≥100 to &lt;1,000</td><td style="text-align: center;">3</td></tr> <tr><td>≥1,000 to &lt;10,000</td><td style="text-align: center;">6</td></tr> <tr><td>≥10,000 to &lt;1E+05</td><td style="text-align: center;">10</td></tr> <tr><td>≥1E+05 to &lt;1E+06</td><td style="text-align: center;">18</td></tr> <tr><td>≥1E+06 to &lt;1E+07</td><td style="text-align: center;">32</td></tr> <tr><td>≥1E+07 to &lt;1E+08</td><td style="text-align: center;">56</td></tr> <tr><td>≥1E+08 or greater</td><td style="text-align: center;">100</td></tr> </tbody> </table>	Product	WC Score	0	0	>0 to <10	1	≥10 to <100	2	≥100 to <1,000	3	≥1,000 to <10,000	6	≥10,000 to <1E+05	10	≥1E+05 to <1E+06	18	≥1E+06 to <1E+07	32	≥1E+07 to <1E+08	56	≥1E+08 or greater	100	
Product	WC Score																						
0	0																						
>0 to <10	1																						
≥10 to <100	2																						
≥100 to <1,000	3																						
≥1,000 to <10,000	6																						
≥10,000 to <1E+05	10																						
≥1E+05 to <1E+06	18																						
≥1E+06 to <1E+07	32																						
≥1E+07 to <1E+08	56																						
≥1E+08 or greater	100																						
Check (✓) the WC score calculated for the pathway																							
WC =	32																						

#### RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1;  
Targets = Sum of Questions 2, 3, 4, 5, 6)

$$\frac{LE \times T \times WC}{82,500} = 1.067$$

#### NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7;  
Targets = Sum of Questions 8,9)

$$\frac{LE \times T \times WC}{82,500} = 0.785$$

#### SOIL EXPOSURE PATHWAY CALCULATION:

Resident Population Threat + Nearby Population Threat =

1.852

(Maximum of 100)

Notes:

Calculations:

Resident Population:  $[550 \times 5 \times 32] \div 82,500 = 1.067$   
 Nearby Population:  $[250 \times 8.1 \times 32] \div 82,500 = 0.785$   
 Resident Population + Nearby Population =  $1.067 + 0.785 = 1.852$

## AIR MIGRATION PATHWAY

**Pathway Description and Scoring Notes:** Describe the Air Migration Pathway. Identify the nearest potential receptors of airborne contaminants and the population residing within four miles of the site. Identify any sensitive environments located within the target distance limit.

Briefly discuss any sampling events relative to the Air Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Air Pathway for this site, or any key factors which influenced your scoring rationale.

To date no known air samples have been collected on the property. Four people reside on the subject property; an employee of WRT, his wife, and their two children. There are approximately 1,200 people employed with and working for the businesses located on the property. Based on both historical records and past environmental reports these residents and employees do not appear to be living/working on a source or within 200 feet of a source, with the possible exception being the eight employees of WRT working on the landscape/grounds maintenance crew. According to the CENTRACTS report prepared by Frost Associates, Inc. for the property, an estimated 27,419 people live within 4-radial miles of the property. The estimated population distribution is summarized below [3; 11; 14].

### Estimated Population Within 4-Radial Miles of the Covitch Property/ATF Davidson Co. (FMR) Property

Radial Distance From Covitch Property/ATF Davidson Co. (FMR) (miles)	Estimated Population
0.00 < 0.25	1,328
0.25 < 0.50	1,350
0.50 < 1.00	2,649
1.00 < 2.00	5,320
2.00 < 3.00	8,140
3.00 < 4.00	8,632
<b>TOTAL</b>	<b>27,419</b>

[14]

There are no Federal Proposed, -Threatened, or -Endangered Species within a 4-radial miles of the property. However, there is one occurrence of State-Threatened/Endangered Species and seven occurrences of State-listed Species of Concern located within 4-radial miles of the property [21]. There are approximately 1,448 acres of wetlands within 4-radial miles of the property [18].



# AIR PATHWAY WORKSHEET

## LIKELIHOOD OF RELEASE

	Score	Data Type	Refs
1. <b>OBSERVED RELEASE:</b> If sampling data or direct observation support a release to air, assign a score of 550. Record observed release substances on SI Table 21.			
2. <b>POTENTIAL TO RELEASE:</b> If sampling data do not support a release to the air, assign a score of 500. Optionally, evaluate air migration gaseous and particulate potential to release (HRS Section 6.1.2)	500	-	3
LR = 500			

## TARGETS

	Score	Data Type	Refs								
3. <b>ACTUAL CONTAMINATION POPULATION:</b> Determine the number of people within the target distance limit subject to exposure from a release of a hazardous substance to the air.  Level I: $\frac{0}{\quad}$ people $\times 10 = \frac{0}{\quad}$ Level II: $\frac{0}{\quad}$ people $\times 1 = \frac{0}{\quad}$ Total = 0	0	-									
4. <b>POTENTIAL TARGET POPULATION:</b> Determine the number of people within the target distance limit not subject to exposure from a release of a hazardous substance to the air using SI Table 22. Sum the values and multiply by 0.1.	57.2	+	11; 14								
5. <b>NEAREST INDIVIDUAL:</b> Assign a score of 50 if there are any Level I targets. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Population exists, assign the Nearest Individual score from SI Table 22.	20	+	11; 14								
6. <b>ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS:</b> Sum the sensitive environment values (SI Table 13) and wetland acreage values (SI Table 23) for environments subject to exposure from the release of a hazardous substance to the air. <table border="1" style="margin: 10px auto; border-collapse: collapse; width: 80%;"> <thead> <tr> <th style="width: 60%;">Sensitive Environment Type</th> <th style="width: 40%;">Value</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">N/A</td> <td></td> </tr> <tr> <td style="text-align: center;">Wetland Acreage</td> <td></td> </tr> <tr> <td style="text-align: center;">N/A</td> <td></td> </tr> </tbody> </table>	Sensitive Environment Type	Value	N/A		Wetland Acreage		N/A		0		
Sensitive Environment Type	Value										
N/A											
Wetland Acreage											
N/A											
7. <b>POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:</b> Use SI Table 24 to evaluate sensitive environments not subject to exposure from a release.	0.6595	+	18; 21								
8. <b>RESOURCES:</b> Assign a score of 5 if one or more air resources applies within 1/2 mile of a source; assign a 0 if none applies <ul style="list-style-type: none"> <li>• Commercial agriculture</li> <li>• Commercial silviculture</li> <li>• Major or designated recreation area</li> </ul>	5	+	1								
<b>Sum of Targets T =</b>	82.8595										

Notes:

## AIR PATHWAY WORKSHEET (Concluded)

### WASTE CHARACTERISTICS

9. If any Actual Contamination Targets exist for the air pathway, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if there are no Actual Contamination Targets for the air pathway, assign the calculated HWQ score for sources available for air migration.	Score <div style="border: 1px solid black; padding: 5px; width: 50px; margin: auto;">100</div>																						
10. Assign the highest air toxicity/mobility value from SI Table 21a or SI Table 3.  Substance(s): <u>Vinyl Chloride</u>  Value: <u>10,000</u>  From Table: <u>3</u>	<div style="border: 1px solid black; padding: 5px; width: 50px; margin: auto;">10,000</div>																						
11. Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:																							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Product</th> <th style="padding: 5px;">WC Score</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">0</td><td style="padding: 5px;">0</td></tr> <tr><td style="padding: 5px;">&gt;0 to &lt;10</td><td style="padding: 5px;">1</td></tr> <tr><td style="padding: 5px;">≥ 10 to &lt;100</td><td style="padding: 5px;">2</td></tr> <tr><td style="padding: 5px;">≥ 100 to &lt;1,000</td><td style="padding: 5px;">3</td></tr> <tr><td style="padding: 5px;">≥ 1,000 to &lt;10,000</td><td style="padding: 5px;">6</td></tr> <tr><td style="padding: 5px;">≥ 10,000 to &lt;1E+05</td><td style="padding: 5px;">10</td></tr> <tr><td style="padding: 5px;">≥ 1E+05 to &lt;1E+06</td><td style="padding: 5px;">18</td></tr> <tr><td style="padding: 5px;">≥ 1E+06 to &lt;1E+07</td><td style="padding: 5px;">32</td></tr> <tr><td style="padding: 5px;">≥ 1E+07 to &lt;1E+08</td><td style="padding: 5px;">56</td></tr> <tr><td style="padding: 5px;">≥ 1E+08 or greater</td><td style="padding: 5px;">100</td></tr> </tbody> </table> <p style="font-size: small; margin-top: 5px;">*check (✓) the WC score calculated for the pathway</p>	Product	WC Score	0	0	>0 to <10	1	≥ 10 to <100	2	≥ 100 to <1,000	3	≥ 1,000 to <10,000	6	≥ 10,000 to <1E+05	10	≥ 1E+05 to <1E+06	18	≥ 1E+06 to <1E+07	32	≥ 1E+07 to <1E+08	56	≥ 1E+08 or greater	100	
Product	WC Score																						
0	0																						
>0 to <10	1																						
≥ 10 to <100	2																						
≥ 100 to <1,000	3																						
≥ 1,000 to <10,000	6																						
≥ 10,000 to <1E+05	10																						
≥ 1E+05 to <1E+06	18																						
≥ 1E+06 to <1E+07	32																						
≥ 1E+07 to <1E+08	56																						
≥ 1E+08 or greater	100																						
WC =	<div style="border: 1px solid black; padding: 5px; width: 50px; margin: auto;">32</div>																						

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the air migration pathway score. If the pathway score is greater than 100, assign 100.

#### AIR MIGRATION PATHWAY CALCULATION:

$$\frac{LE \times T \times WC}{82,500} = \boxed{16.07}$$

(Maximum of 100)

Notes:

Calculations:  $(500 \times 82.8595 \times 32) \div 82,500 = 16.07$

**SI TABLE 22 (FROM HRS TABLE 6-17): VALUES FOR POTENTIAL CONTAMINATION AIR TARGET POPULATIONS**

Distance From Site	Nearest Individual (choose highest)	NUMBER OF PEOPLE WITHIN THE DISTANCE CATEGORY										Pop. Value		
		1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000		300,001 to 1,000,000	1,000,000 to 3,000,000
On a source	8	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	4
0 to 1/4 mile	1,328	*	4	13	41	131	408	1,304	4,081	13,034	40,812	130,340	408,114	408
> 1/4 to 1/2 mile	1,350	2	0.2	0.9	3	9	28	88	282	882	2,815	8,815	28,153	88
> 1/2 to 1 mile	2,649	1	0.06	0.3	0.9	3	8	28	83	281	834	2,612	8,342	26
> 1 to 2 miles	5,320	0	0.02	0.09	0.3	0.8	3	8	27	83	266	833	2,659	27
> 2 to 3 miles	8,140	0	0.009	0.04	0.1	0.4	1	4	12	38	120	375	1,199	12
> 3 to 4 miles	8,632	0	0.005	0.02	0.07	0.2	0.7	2	7	28	73	229	730	7
Nearest Individual =											20	Sum =		572

\*Score = 20 if the Nearest Individual is within 0.125 miles of a source; score = 7 if the Nearest Individual is between 0.125 and 0.25 miles of a source.

References: 3; 14

Notes: Approximately 1,200 people work for businesses located on the property. However, the only on-site employees which STAKT personnel will consider potential air contamination targets for this evaluation are the eight people working for WRT on the landscape/grounds maintenance crew.

SI TABLE 23 (HRS TABLE 6-18): AIR PATHWAY VALUES FOR WETLAND AREA

WETLAND AREA	ASSIGNED VALUE
< 1 acre	0
✓ 1 to 50 acres	25
> 50 to 100 acres	75
> 100 to 150 acres	125
> 150 to 200 acres	175
✓ > 200 to 300 acres	250
> 300 to 400 acres	350
> 400 to 500 acres	450
✓ > 500 acres	500

\* Check (✓) highest value.

SI TABLE 24: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS

DISTANCE	DISTANCE WEIGHT	SENSITIVE ENVIRONMENT TYPE AND VALUE (FROM SI TABLES 13 AND 23)	PRODUCT
On a Source	0.10	X	
0 to 1/4 mile	0.025	X Clean Water Act waterbody: 5	0.125
1/4 to 1/2 mile	0.0054	X	
1/2 to 1 mile	0.0016	X 1 acre of wetlands: 25	0.135
		X 10 acres of wetlands: 250	
		X 247 acres of wetlands: 250	0.125
		X 1 occurrence of (A): 25	0.0125
		X 523 acres of wetlands: 500	0.115
		X 2 occurrences of (A): 2(25)	0.0115
		X 1 occurrence of (B): 50	0.0115
		X 667 acres of wetlands: 500	0.07
		X 4 occurrences of (A): 4(25)	0.014
> 4 miles	0	X	
Total Environments Score =			6.6595

Notes: (A) Particular areas, small in size, important to the maintenance of unique biotic communities. (State-Concerned Species). Value = 25/occurrence  
 (B) State Endangered Species: Value = 50/occurrence

SITE SCORE CALCULATION	S	S <sup>2</sup>
GROUNDWATER PATHWAY SCORE (S <sub>GW</sub> )	71.04	5,046.68
SURFACE WATER PATHWAY SCORE (S <sub>SW</sub> )	100	10,000
SOIL EXPOSURE PATHWAY SCORE (S <sub>SE</sub> )	1.85	3.42
AIR PATHWAY SCORE (S <sub>A</sub> )	16.07	258.25
SITE SCORE		61.86

$$\sqrt{\frac{S_{GW}^2 + S_{SW}^2 + S_{SE}^2 + S_A^2}{4}} =$$

COMMENTS:

Notes:

DRAFT

**WARNING!!**

EPA has determined that the HRS score of any site that is progressing towards listing on the NPL is confidential. Deliberations regarding scoring or listing issues, the site specific status, and HRS scores cannot be released or discussed with non-Agency persons. For additional guidance see the April 30, 1993 OSWER Directive 9320.1-11.

**COVITCH PROPERTY/ATF DAVIDSON CO. (FMR)  
REFERENCES**

- [1] U.S. Geological Survey (USGS). 1982. Webster, Massachusetts, 1:25000 scale topographic map. 7.5 × 15 Minute Quadrangle.
- [2] Massachusetts Department of Environmental Protection (MA DEP). 1991. MSCA Site Inspection Report for the Covitch Property/Former ATF Davidson Co. Prepared by MA DEP for the U.S. Environmental Protection Agency. 19 June.
- [3] START. 1996. Field Logbook for Covitch Property/Former ATF Davidson Co. 2 May. TDD No. 95-07-0065.
- [4] Massachusetts Department of Environmental Quality Engineering (MA DEQE). 1985. Written Notice of Responsibility, RE: Oil/Hazardous Material/Threat of Release at Main Street Northbridge, Massachusetts 01588. 30 April.
- [5] Caswell, Eichler & Hill, Inc. (CEH). 1985. Monitoring Well Installation and Soil and Ground Water Quality Analysis - Sydney Covitch Properties, Whitinsville, Massachusetts. September.
- [6] New England Pollution Control Corporation (NEPCCO). Undated. Project Summary Report Prepared by NEPCCO for White Consolidated Industries.
- [7] Caswell, Eichler & Hill, Inc. (CEH). 1985. Monitoring Well Installation and Ground Water and River Bottom Sediment Quality Analyses - ATF/Davidson Co. Arcade Facility, Whitinsville, Massachusetts. October.
- [8] Caswell, Eichler & Hill, Inc. (CEH). 1986. Additional Investigations, ATF/Davidson Arcade Facility - Covitch Properties - Mumford River. January.
- [9] Caswell, Eichler & Hill, Inc. (CEH). 1987. Additional M-8 Investigations ATF/Davidson Arcade Facility Whitinsville, Massachusetts. March.
- [10] Caswell, Eichler & Hill, Inc. (CEH). 1987. Risk Assessment of Area Surrounding M-8 at the ATF/Davidson Arcade Facility Whitinsville, Massachusetts. July.
- [11] Kroll Environmental Enterprises, Inc. (Kroll). 1996. RE: Request for Information - Covitch Property/Former ATF Davidson Co. Prepared by Kroll for START. 24 September.
- [12] Zen, E-an. 1983. Bedrock Geological Map of Massachusetts. U.S. Geological Survey.
- [13] U.S. Department of Commerce. Climatography of the United States No. 81. Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1961-1990.

**COVITCH PROPERTY/ATF DAVIDSON CO. (FMR)  
REFERENCES (Concluded)**

- [14] Frost Associates. 1995. Project Note, Covitch Property/Former ATF Davidson Co., RE: Population and Private Well Users. 15 December. TDD No. 95-07-0065.
- [15] U.S. Bureau of Census. 1991. 1990 Census of Population and Housing, Summary Population and Housing Characteristics, Massachusetts. Economics and Statistics Administration, Report 1990 CPH-1-23. August.
- [16] Jennings, M. (START). 1996. Project Note, Covitch Property/Former ATF Davidson Co., RE: Public Well Population Within 4-Radial Miles of Landfill. March. TDD No. 95-07-0065.
- [17] Federal Emergency Management Agency. Flood Insurance Rate Map for Northbridge, Massachusetts (Community Panel No. 3, dated 15 June 1983).
- [18] Jennings, M. 1995. Project Note, Covitch Property/Former ATF Davidson Co., RE: Wetland Acreage Determination. November. TDD No. 95-07-0065.
- [19] U.S. Geological Survey (USGS). 1993. Water Resource Data Massachusetts and Rhode Island Water Year 1993. June.
- [20] Jennings M. (START). 1996. Telephone Conversation Record with Charles Smith of the Uxbridge Conservation Commission, RE: Surface Water Intake on Mumford River. 17 July. TDD No. 95-07-0065.
- [21] EPA. 1995. Project Note, Covitch Property/Former ATF Davidson Co., RE: Rare and Endangered Species Report. 27 December. TDD No. 95-07-0065.
- [22] Root, Greg (MA/DEP). Letter Report to START (w/attachments). Received 5 June 1997.
- [23] Jennings, M. (START). 1997 Project Note, Covitch Property/ATF Davidson Co. (FMR), RE: CERCLIS Name Change.