Program = Site Investigations
IDEM Document Type = Screening/Assessment
Document Date = 3-22-2012
Security Group = Public (per Mark Jaworski)
Site # = INN000508678
Screening Type = HRS Document Record

If applicable:

Reference #_____ to #_____ Reference document(s) Scanned Separately.

3/22/12

HRS DOCUMENTATION RECORD-REVIEW COVER SHEET

Name of Site:	Martinsville Ground Water Contamination Site
EPA ID No.:	INN000508678
Date Prepared:	March, 2012

Contact Persons

Site Investigation:	Dan Chesterson, Indiana Department of Environmental Management (IDEM), Site Investigation, (317) 234-3505
	Mark Jaworski, Indiana Department of Environmental Management (IDEM), Site Investigation, (317) 233-2407
Documentation Record:	Nuria Muniz, United States Environmental Protection Agency (EPA), Region V, (312) 886-6312
	Dan Chesterson, Indiana Department of Environmental Management (IDEM), Site Investigation, (317) 234-3505
	Mark Jaworski, Indiana Department of Environmental Management (IDEM), Site Investigation, (317) 233-2407

Pathways, Components, or Threats Not Scored

Surface Water Migration Pathway
The Surface Water Migration Pathway was not scored as part of this Hazard Ranking System (HRS) evaluation. This pathway was not included because a release to this media does not significantly affect the overall site score and because the ground water pathway produces an overall site score above the minimum required for the site to qualify for inclusion on the National Priorities List (NPL).

Soil Exposure Pathway
The Soil Exposure Pathway was not scored as part of this Hazard Ranking System (HRS) evaluation. This pathway was not included because a release to this media does not significantly affect the overall site score and because the ground water pathway produces an overall site score above the minimum required for the site to qualify for inclusion on the National Priorities List (NPL).

Air Migration Pathway
The Air Migration Pathway was not scored as part of this Hazard Ranking System (HRS) evaluation. This pathway was not included because a release to this media does not significantly affect the overall site score and because the ground water pathway produces an overall site score above the minimum required for the site to qualify for inclusion on the National Priorities List (NPL).

HRS DOCUMENTATION RECORD

Name of Site:	Master Wear
EPA Identification No.:	INN000508678
EPA Region:	5
Date Prepared:	February 2012
Street Address of Site:	28 ½ North Main Street* (Ref. 22, p. 4; 24, p. 2; 25, p. 2)
County/State/Zip Code:	Morgan County, Indiana, 46151
General Location in the State:	South Central Indiana (Figure 1-1 of this Documentation Record)
Topographic Map:	Martinsville, Indiana Quad (7.5') (Ref. 3)
Latitude:	39° 25' 37.923"N
Longitude:	86° 25' 45.649 "W
Site Reference Point:	Approximate center of the source area
Congressional District:	07

* Note: The address of the site does not reflect the center of the site. The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

SITE SCORING SUMMARY

Pathway Scores:

Air Pathway	Not Scored
Ground Water Pathway	100
Soil Exposure Pathway	Not Scored
Surface Water Pathway	Not Scored
HRS SITE SCORE	50.00

WORKSHEET FOR COMPUTING HRS SITE SCORE

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	100.00	10,000.00
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	NS	
2b.	Ground Water to Surface Water Migration Component	NS	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	NS	
3.	Soil Exposure Pathway Score (S_s)	NS	
4.	Air Migration Pathway Score (S_a)	NS	
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10,000.00
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root		50.00

TABLE 4-1
GROUND WATER MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors		Maximum Value	Value Assigned
Ground Water Migration Pathway			
	Likelihood of Release to an Aquifer		
1.	Observed Release	550	550
2.	Potential to Release		
	2a. Containment	10	NS
	2b. Net Precipitation	10	NS
	2c. Depth to Aquifer	5	NS
	2d. Travel Time	35	NS
	2e. Potential to Release [lines 2a(2b + 2c + 2d)]	500	NS
3.	Likelihood of Release (higher of lines 1 and 2e)	550	550
	Waste Characteristics		
4.	Toxicity/Mobility	a	10,000
5.	Hazardous Waste Quantity	a	100
6.	Waste Characteristics	100	32
	Targets		
7.	Nearest Well	b	50
8.	Population		
	8a. Level I Concentrations	b	54,380
	8b. Level II Concentrations	b	NS
	80c. Potential Contamination	b	323
	8d. Population (lines 8a + 8b + 8c)	b	54,703
9.	Resources	5	0
10.	Wellhead Protection Area	20	20
11.	Targets (lines 7 + 8d + 9 + 10)	b	54,773
Factor Categories and Factors		Maximum Value	Value Assigned
	Ground Water Migration Score for an Aquifer		
12.	Aquifer Score [(Lines 3 x 6 x 11)/82,500] [c]	100	100
	Ground Water Migration Pathway Score		
13.	Pathway Score (Sgw) (highest value from line 12 for all aquifers evaluated) [c]	100	100

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

Site Location Map, Master Wear Site

Martinsville, Morgan Co., Indiana (U.S.EPA ID: INN000508678)

Non Orthophotography Data -
Source: State of Indiana Geographic Information Office Spatial Database Engine. County boundary from INDOT. Site location digitized based on location on Orthophoto.

Orthophotography -
Source: Indiana Map Framework Data, 2005 Orthophoto. (www.indianamap.org)
Map Projection: UTM Zone 16 N Map Datum: NAD83

IDEM

Approximate Center of Site
Interstates
County Boundary (INDOT)

Morgan Co, Indiana

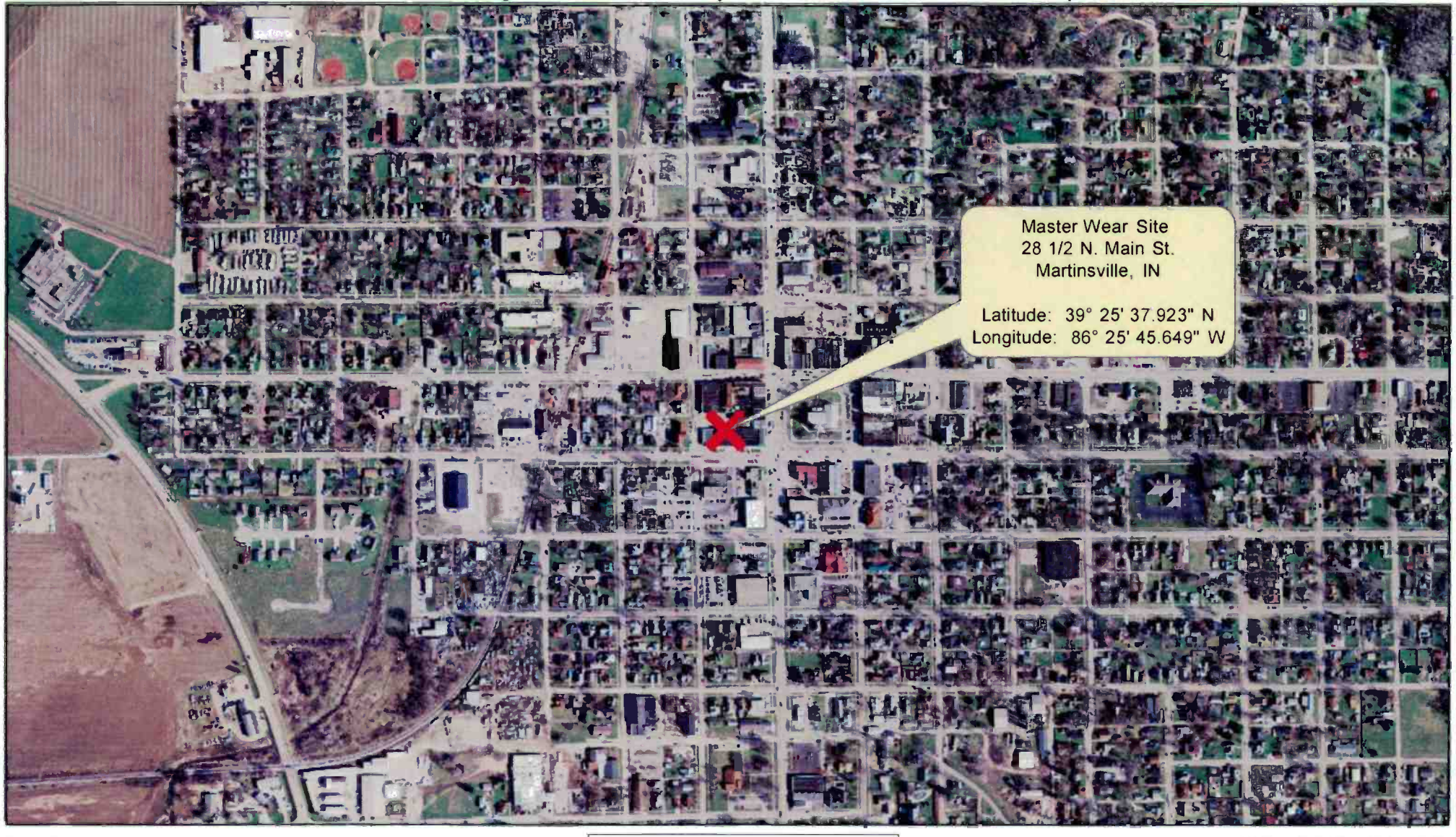
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

Mapped by: Lorraine Wright, ~~IDEM, Office~~ of Land Quality, Science Services Branch, Engineering and GIS Section

Date: November 7, 2011

Expanded Site Location Map, Master Wear Site

Martinsville, Morgan Co., Indiana (U.S.EPA ID: INN000508678)



Non Orthophotography Data -
Source: State of Indiana Geographic Information Office Spatial Database Engine. City boundary from INDOT Cities and Towns layer. Site location and boundary was digitized based on Project Managers decription.

Orthophotography -
Source: Indiana Map Framework Data, 2005 Orthophoto (www.Indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83

IDEM

N W E S

Approximate Center of Site

0 620 Feet

0 210 Meters

Morgan Co, IN

Martinsville, Morgan Co.

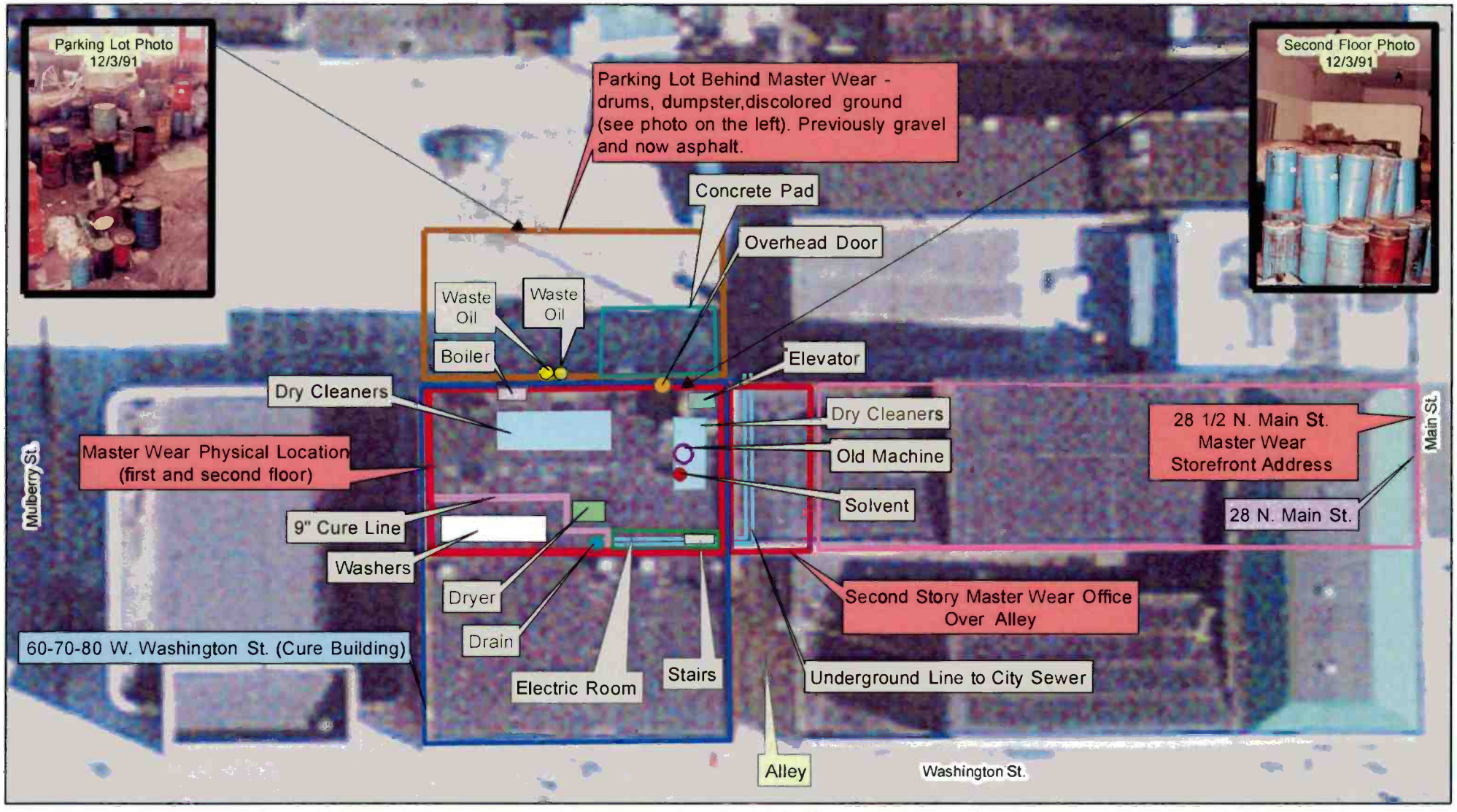
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

Mapped by: Lorraine Wright, IDEM, Office of Land Quality, Science Services Branch, Engineering and GIS Section

Date: November 7, 2011

Site Features Map, Master Wear Site

Martinsville, Morgan Co., Indiana (U.S.EPA ID: INN000508678)



Non Orthophotography Data -
Source: State of Indiana Geographic Information Office Spatial Database Engine. Site location and boundary was digitized based on Project Managers decription. Site features located in the Master Wear physical location were on the first floor and were digitized based on a paper drawing in the Ground floor #1 Exhibit paper drawing.

Orthophotography -
Source: Indiana Map Framework Data, 2005 Orthophoto. (www.Indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83

IDEM

N W E S

0 15 30 Feet

0 5 10 Meters

NOTE: The Master Wear Facility occupied the: Master Wear Physical Location (first and second floors), the Second Story Master Wear Office Over the Alley, and the Parking Lot Behind Master Wear.

Master Wear Physical Location (bounded by the red box on the left): First floor - All items shown on the map within the Master Wear Physical Location (red box) were located on the first floor. Second floor - No information was available indicating where items were located other than pictures showing drums stacked on the second floor (see photo on the right).

All items and boundary lines on the map are approximate.

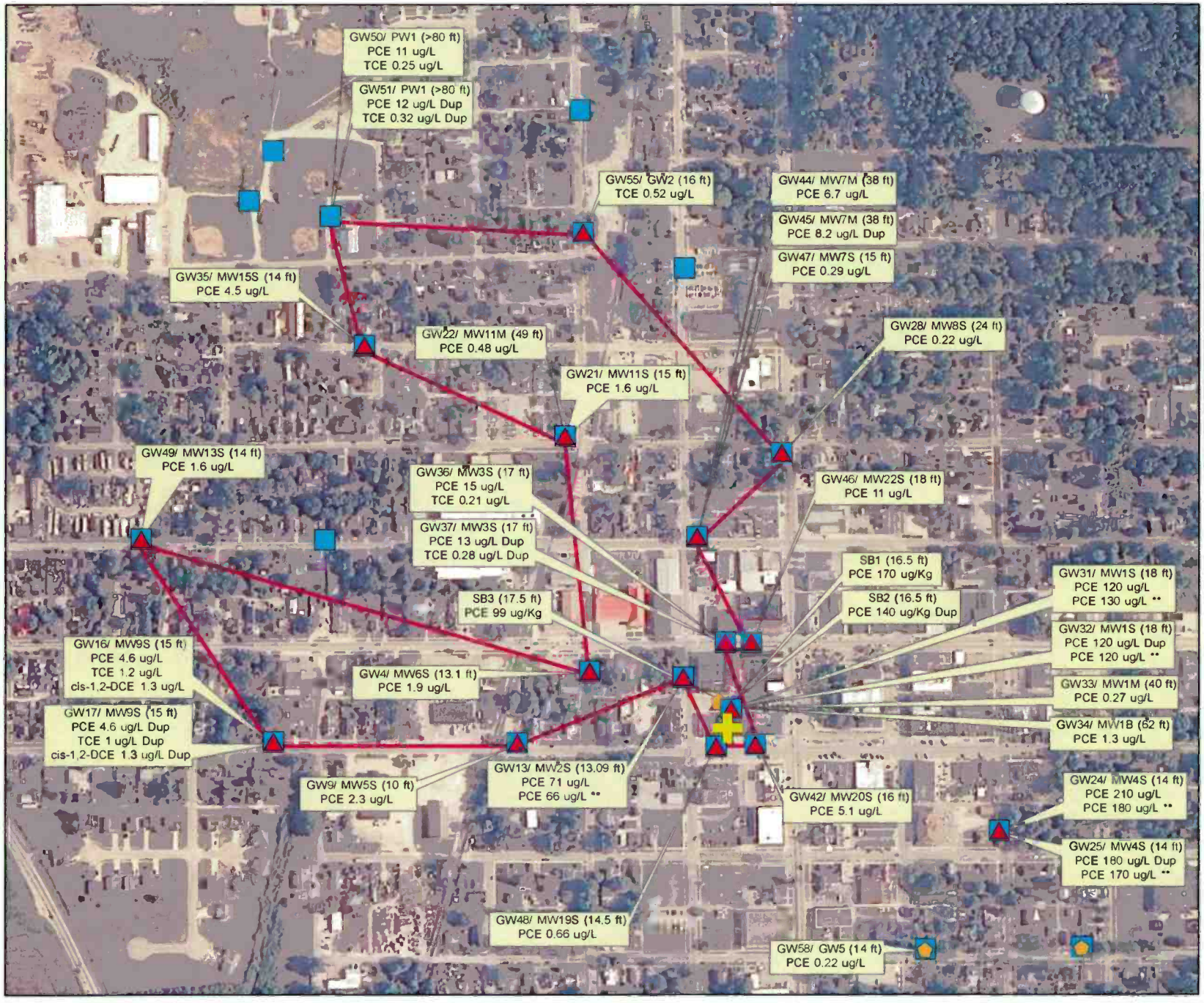
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

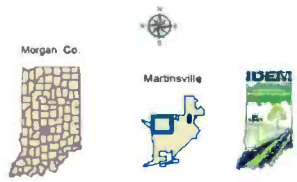
Mapped by: Lorraine Wright, IDEM, Office of Land Quality, Science Services Branch, Engineering and GIS Section

Date: November 14, 2011

Master Wear Groundwater Plume Boundary Map:

Defined by PCE, TCE, and cis-1,2-DCE from the Key Findings List & Preliminary Assessment Groundwater Sampling (July 26-28 and August 3, 2010) Results
Master Wear Site, Martinsville, Morgan Co., Indiana, EPA ID - INN000508678





- Groundwater Plume Boundary *
- Contaminant of Concern
- Master Wear Site
- Soil Sample Location
- Water Sample Location

* The Groundwater Plume Boundary Map, as referenced, was constructed using data from the 2010 Reassessment. The plume boundary line was digitzed by connecting the wells locations that had contaminants of concern (PCE, TCE, cis-1,2-DCE) above contaminant concentration levels of concern. The boundary line represents the perimeter of the area sampled that had PCE, TCE, and cis-1,2-DCE concentration levels of concern.

0 360 Feet

0 90 Meters

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

Mapped by: Lorraine Wright,
Date: November 14, 2011

Non Orthophotography Data - Source: State of Indiana Geographic Information Office Spatial Database Engine. The sample location coordinates were collected using GPS. The Groundwater Plume Boundary was digitized by drawing line segments that connected the well locations that had PCE, TCE and/or cis-1,2-DCE concentration levels of concern.

Orthophotography -
Source: Indiana Map Framework Data. 2010 NAIP Orthophoto.
(www.indianamap.org)
Map Projection: UTM Zone 16 N
Map Datum: NAD83

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The site is a ground water plume consisting of a probable source (Master Wear) and at least one unknown source. The ground water plume consists of chlorinated solvents, specifically tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE), that has impacted one of the City of Martinsville's municipal drinking water wells, Municipal Well #3. Municipal Well #3 was found to contain elevated levels of tetrachoroethene above the U.S. Environmental Protection Agency (U.S. EPA) Maximum Contaminant Level (MCL) of 5 ug/l set by the U.S. EPA (Ref. 63, p. 1; 96, p. 1; 97, p. 1; 98, p. 1; 99, p. 1; Figure 1-4 of this documentation record; Source Soil Sample (Obtained on Master Wear Property) Table, Contaminated Ground Water Monitoring Well Sample Table, Contaminated Ground Water Sample (Municipal Well #3) Table, and Contaminated Ground Water Sample (Direct Push Method) Table of this documentation record). Municipal Well #3 supplies drinking water to approximately 5,438 people (Ref. Section 3.3.2.2 of this documentation record).

Martinsville Municipal Wells

The Martinsville Water Utility operates three (3) municipal drinking water wells in the northwest portion of the Martinsville city limits (Ref. 60, pp. 1, 2; 63, p. 1). Municipal Wells #3, #4, and #5 are approximately 2,000 feet northwest of the former Master Wear facility (Ref. 100, p. 1; Figure 1-4 of this documentation record). The well field supplies drinking water to approximately 15,000 people (Ref. 60, p. 1; 77, pp. 1, 2). Groundwater from the Master Wear facility flows in a northwestern direction toward the wells (Ref. 59, p. 2; 84, p. 8; 85, p. 1; 86, p. 1; 87, p. 1). In February 2002 the city first detected PCE in Well #3 (Ref. 79, p. 1). In November 2002 the levels first exceeded the MCL of five (5) parts per billion (ppb) (Ref. 79, p. 4; 43, p. 17).

In June 2005, the city installed an activated carbon filtration system to remove PCE from the drinking water (Ref. 54, p. 1; 78, p. 1). This system has allowed the city to provide drinking water to its residents that meet MCL requirements (Ref. 78, pp. 1 through 13). However, the continued presence of PCE in the city's well field has necessitated that the city change the carbon filters in its system at an interval and cost greater than expected and is currently causing a financial hardship on the city (Ref. 78, pp. 1, 2). As a result, the city has had to consider relocating the wellfield to ensure an adequate drinking water supply (Ref. 47, p. 3; 53, p. 1). (The site is scored based on releases from the facility that have resulted in Level I environment threat targets, via the ground water pathway (Ref. Section 3.1.1 of this HRS documentation record).

Ground Water Plume History

The IDEM Site Investigation Program was asked to investigate the presence of PCE in the Martinsville municipal well in late 2002 (Ref. 43, p. 20). A Preliminary Assessment/Site Inspection (PA/SI) was conducted in 2003/2004 by IDEM staff in four (4) separate phases (43, pp. 6 through 39).

The first phase in January 2003 involved sampling the municipal wells and nearby residential wells (Ref. 43, pp. 21, 22). This phase confirmed the presence of PCE in Municipal Well #3 (4.2 ppb) as well as in a residential well (87 ppb) (Ref. 43, pp. 21, 22, 23, 106,107, 108, 109, 110, 111, 113 through 139).

Based on discussions with city representatives, a former drycleaner, Master Wear, Inc., located in downtown Martinsville was identified as a possible source (Ref. 43, pp. 4, 18, 20, 21; 32, p. 2; 39, p. 1). After reviewing the information from the city representatives, the second phase of the PA/SI began in February 2003 (Ref. 43, pp. 20, 30). The investigation involved the use of a direct-push drilling rig to collect soil and ground water samples at and near the Master Wear facility (Ref. 43, pp. 20, 30). A total of twelve (12) borings were drilled in various locations in Martinsville, including two at the Master Wear facility (Ref. 43, pp. 22, 24, 25). PCE was detected in subsurface soil at levels as high as 270,000 ppb and in ground water as high as 20,000 ppb at the Master Wear facility indicating that this facility is a probable source of PCE contributing to the ground water plume that is contaminating Municipal Well #3 (Ref. 43, pp. 22, 24, 25, 30, 141 through 167; 72, pp. 1 through 51; 73, pp. 1 through 375). Three (3) background soil and two (2) background water samples were obtained up-gradient to the east and southeast of the Master Wear facility utilizing the direct push instrument (Ref. 43, p. 22; 97, p. 1). The background samples located to the southeast (up-gradient to Master Wear) were non-detect; the background samples located to the east (side-gradient to Master Wear) had levels of PCE detected indicating a possible other source (Ref. 43, pp. 24, 25, 205; 97, p. 1; 98, p. 1).

The third phase was conducted in July 2003 and involved the collection of indoor air samples that confirmed the presence of indoor air contamination at various businesses and residences in the immediate vicinity of the Master Wear facility (Ref. 43, p. 20). Elevated levels of PCE and TCE (above IDEM and ATSDR established chronic and acute action levels) were detected in the living quarters of residential apartments and businesses (Ref. 43, pp. 26, 27, 37, 289, 290, 291; 68, p. 1; 69, pp. 1, 2). Four (4) more rounds of indoor air sampling followed in September 2003, October 2003, December 2003, and February 2004 but were not a part of this PA/SI report (Ref. 43, p. 26, 277 through 331).

In March 2004 the fourth phase of the PA/SI was conducted which involved the advancement of an additional fourteen (14) borings using a direct-push drill rig between Master Wear and the Martinsville well field to collect ground water samples (Ref. 43, pp. 20, 30). No samples were obtained from the Master Wear facility during this phase. PCE was detected in ground water in several borings at levels as high as 890 ppb and confirmed Master Wear as the probable source of the plume (Ref. 43, pp. 20, 26, 28, 30). Background ground water samples were collected up-gradient to the southeast in the same area as they were obtained in the February 2003 sampling event. No detections of any chlorinated compounds were reported in any of the background samples indicating at that time the Master Wear facility is the primary source of ground water contamination in the immediate area (Ref. 43, p. 48; 99, p. 1; Background Ground Water Grab Sample Table found in Section 3.0.2.1 of this Documentation Record.

After the 2003/2004 investigation by IDEM, the owner of the building where the Master Wear facility operated, through a U. S. EPA Unilateral Administrative Order signed in April 2004, his insurers contracted Astbury Environmental Engineering Inc. to conduct remedial activities at the Master Wear facility (Ref. 24, pp. 1 through 21; 32, p. 2; 39, p. 1). As part of the remedial activities, a total of forty-six (46) monitoring wells (consisting of both nested and un-nested wells) were installed in 2004 (Ref. 46, p. 11). A nest of three background monitoring wells was installed 950 feet up-gradient to the southeast of the Master Wear

facility, in the same area as the 2003/2004 IDEM background sample locations (Ref. 46, pp. 12, 21). The nested wells were completed at shallow, medium, and deep depths and were designated as MW4S, MW4M, and MW4B (Ref. 46, p. 21). No detections of any chlorinated solvents were reported from these background monitoring wells for two years, from July 2004 through May 2006 (46, pp. 41, 42). Also, there were three shallow monitoring wells (MW19, MW20, and MW21) immediately up-gradient to the east, south, and southeast, less than one block from the Master Wear facility (Ref. 46, p. 31). No detections of any chlorinated solvents were found within these wells from 2004 to 2008 (Ref. 46, pp. 31, 49). These non-detect results indicate that Master Wear was the primary source of PCE impacting the municipal wells during the time that the PA/SI was conducted.

As part of Astbury's remedial activities, a remedial system was installed in 2005 at the Master Wear facility using a combination air-sparging (AS) and soil vapor extraction (SVE) system which was used to strip/volatilize chlorinated solvents from subsurface soil and ground water (Ref. 40, pp. 1, 2, 3, 4; 41, pp. 1, 2, 3, 6, 7, 8, 9; 42, pp. 1, 2, 3; 46, pp. 7, 27, 28, 29; 54, p. 1). The system was comprised of seventeen (17) AS wells and fifteen (15) SVE wells (Ref. 40, pp. 1, 2, 3, 4; 41, pp. 1, 2, 3, 6, 7, 8, 9; 42, pp. 1, 2, 3; 46, pp. 7, 27, 28, 29). The system operated from January 2005 through March 2008 (with downtime for testing and maintenance), at which time air, soil and water sampling conducted by the responsible party's contractor indicated that the closure criteria had been met at that time (Ref. 46, p. 7). Between 2005 and 2008, this system removed a large percentage of PCE from the soils of the Master Wear facility, but did not completely remediate the ground water plume that already existed down gradient from the Master Wear facility as indicated by continuing contamination detected in monitoring wells MW-1S, MW-2S, MW-3S, MW-15S, MW-17, and MW-22S and the municipal wells (Ref. 46, pp. 11, 12, 39 through 51; 78, pp. 3 through 13). After the system was shut down in 2008, elevated levels of PCE continued to be present in the municipal wells (Ref. 78, pp. 1, 3 through 13). Additionally, air sampling was conducted in various buildings in the area around the Master Wear facility using Summa canisters (Ref. 36, pp. 1-17). Due to the continuing presence of PCE in the well field, the City of Martinsville installed an activated carbon filtration system in June 2005 to remove PCE from its finished water (Ref. 54, p. 1; 78, pp. 1, 2).

It should be noted that in August 2006, elevated levels of PCE began to show up in Astbury's shallow, up-gradient background monitoring well MW4S (Ref. 46, p. 42). Elevated levels of PCE in MW4S continued to be detected throughout Astbury's quarterly monitoring of the well through 2008 when sampling of the well was discontinued (Ref. 46, p. 42). Sampling of this well in IDEM's 2010 Reassessment confirmed the continuing presence of elevated levels of PCE, indicating another nearby possible source up-gradient from the Master Wear facility; see paragraph below (Ref. 46, p. 12, 13, 31, 42).

In July and August 2010, staff from IDEM's Site Investigation Section conducted a Reassessment at the Master Wear facility (Ref. 56, pp. 1 through 37). Drinking water from municipal wells, ground water from monitoring wells, and ground water and subsurface soil samples from a direct-push drill rig were collected (Ref. 56, pp. 12, 13, 14, 15, 16, 199 through 267). Elevated levels of tetrachloroethene were detected in one (1) of the municipal well water samples, in thirteen (13) monitoring well ground water samples, and in two (2) subsurface soil samples at levels greater than three (3) times background (Ref. 56, pp. 29, 30, 35; 55, pp. 10, 14, 144, 147, 149, 145, 261, 269, 267, 271, 273, 392, 196, 197, 198, 199, 200, 201, 53, 54, 55, 56, 57, 58, 59, 66, 67, 68, 69, 70, 71, 91, 92, 93, 94, 95, 96, 187, 188,

189, 217, 218, 219, 208, 209, 210, 211, 212, 213, 223, 224, 225, 300, 301, 302, 303, 304, 305, 318, 319, 320, 321, 322, 323, 330, 331, 345, 346, 347, 357, 358, 359, 429, 430, 431, 432, 433, 434, 458, 459, 461, 462, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508; 57, pp. 1 through 18). Trichloroethene was detected in two monitoring wells and in one ground water sample obtained from a direct-push drill rig (Ref. 55, pp. 9, 115, 116, 117, 267, 345, 346, 347). Cis-1, 2-dichloroethene was detected in one monitoring well (Ref. 55, pp. 267, 345, 346, 347). The trichloroethene and cis-1, 2-dichloroethene may be degradation products from the PCE (Ref. 58, pp. 1, 2, 4). Background ground water samples were obtained up-gradient from the Master Wear facility (Ref. 56, pp. 28, 55, 56, 247, 248; 63, p. 1). These samples were collected from the medium and deep nested wells (MW4M and MW4B) that were installed for the Astbury remedial activities (Ref. 56, pp. 28, 55, 56, 247, 248; 63, p. 1).

To confirm that the original shallow background well (MW4S) was still contaminated with elevated levels of PCE as documented by Astbury during their quarterly monitoring of the well from 2006 through 2008, IDEM collected a sample from MW4S (Ref. 56, pp. 28, 53, 54, 252, 253). Analytical results showed that this well continued to be impacted by another nearby source (Ref. 55, p. 147; 56, p. 32; 63, p. 1). Research conducted by IDEM revealed that monitoring well MW4S was installed immediately down gradient of a former dry cleaning facility, Central Dry Cleaners (CDC), that operated from approximately1954 to 1976 (Ref. 91, p. 1; 101, p. 1).

Since MW4S was originally found to be free of any chlorinated compounds but later became contaminated with PCE, two additional shallow background ground water samples were collected by direct push method up-gradient from MW4S (63, p. 1; 56, pp. 32, 90, 91, 285, 286). These two direct push samples, along with the background ground water samples collected from MW4M and MW4B, were found to be non-detect (Ref. 55, pp. 145, 196, 197, 198, 199, 200, 201, 392, 429, 430, 431, 432, 433, 434). Because ground water flow is from southeast to northwest, and no detections of PCE were found up-gradient to CDC, the contamination in MW4S located down-gradient to CDC indicates that CDC may be another potential source (Ref. 55, pp. 392, 429, 430, 431, 432, 433, 434; 59, pp. 2, 3; 63, p. 1). Since ground water flow from CDC is to the northwest toward the Master Wear facility, the plume associated with this CDC facility may have become comingled with the plume at the Master Wear facility (Ref. Figure 1-4 of this documentation record).

Research of city directories revealed the presence of several other current and former dry cleaning facilities in Martinsville in addition to the previously discussed Central Dry Cleaners (Ref. 101, p. 1). To further determine the extent of the ground water plume, additional monitoring wells were sampled (Ref. 55, pp. 10, 14, 56, 57, 58, 59, 94, 95, 96, 261, 268, 269, 300, 301, 302, 303, 304, 305, 357, 358, 359; 56, pp. 46, 50, 64, 85, 241, 265, 272, 274, 363, 368, 386, 398; 63, p. 1; 93, pp. 1 through 20). These monitoring wells are located down gradient from several dry cleaning facilities including Manitorium Cleaners (MW2S, MW2M, and MW2B) which operated from 1954 to 1962, Kent Cleaners/Richard Deering (MW22S, MW3S, MW3M, and MW3B) which operated from 1962 to 1978, Artesian City Cleaners (MW7S, MW7M, MW7B, MW8S, and MW8M) which operated from 1954 to 1999 (Ref. 63, p. 1; 91, p. 1; 101, p. 1). Two other dry cleaners, Martinsville Cleaners which operated in 1989 and O'Neal's Clothes Depot which operated from 1983 to present were located further to the east (Ref. 91, p. 1; 101, p. 1). No monitoring wells are located downgradient from these cleaners (Ref. 63, p. 1;

91, p. 1). Two of the former dry cleaners, Manitorium Cleaners and Kent Cleaners/Richard Deering, were located in the general vicinity of the Master Wear facility (Ref. 91, p. 1). Samples obtained from monitoring wells located immediately down-gradient from these facilities (MW2S, MW3S, and MW22S) indicate elevated levels of PCE (Ref. 55, pp. 14, 94, 95, 96, 261, 267, 269, 300, 301, 302, 303, 304, 305, 354, 355, 356, 357, 358, 359; 63, p. 1). Another facility, Artesian City Cleaners, was located two blocks east northeast of the Master Wear facility (Ref. 91, p. 1). Ground water samples obtained from two monitoring wells located down-gradient from this facility (MW7M and MW8S) also showed detections of PCE (Ref. 55, pp. 10, 57, 58, 59, 60, 61, 62, 151, 235, 236, 237; 63, p. 1).

Research for the Reassessment also showed other possible sources of chlorinated solvents exist to the west of the Master Wear facility (Ref. 63, p. 1; 67, pp. 5, 8; 91, p. 1; 96, p. 1; 97, p. 1; 98, p. 1). As a result, ground water samples were collected for the Reassessment at two other monitoring well nested locations, MW5S, MW5M, MW5B, MW9S, MW9M, and MW9B (Ref. 56, pp. 57, 58, 59, 69, 70, 71, 72, 236, 237, 238, 239, 240, 244, 245; 63, p. 1). Sample results indicate elevated levels of PCE in the shallow ground water monitoring wells (MW5S and MW9S) obtained down-gradient from these three facilities, Black Lumber Company, a junk yard, and a semi-truck repair facility (Ref. 55, pp. 149, 217, 218, 219, 266, 267, 345, 346, 347, 348, 349, 350; 63, p. 1; 67, p. 5, 8; 91, p. 1; 96, p. 1; 97, p. 1; 98, p. 1). The presence of PCE in these wells indicates that these facilities may be other sources that could be contributing to the ground water plume in Martinsville (Ref. 59, pp. 2, 3; Figure 1-4 of this documentation report).

2.2 SOURCE CHARACTERIZATION

A probable source used to score the Martinsville Ground Water Contamination site is the Master Wear facility. Figures 1-1, 1-2, 1-3, and 1-4 of this documentation record depict facility location, source area locations and site features, and the ground water plume boundary of the Martinsville Ground Water Contamination. It is currently improbable to identify and reasonably attribute with confidence the ground water contamination of some of the other possible sources due to their close proximity to the Master Wear facility. (i.e., Manatorium Cleaners and Kent Cleaners/Richard Deering) (Ref. 91, p. 1). Other possible sources that may have comingled with the contaminated ground water at the Master Wear facility include Central Dry Cleaners, Artesian City Cleaner, Black Lumber Company, and the junkyard and the semi-truck repair facility near Black Lumber (Ref. 91, p. 1).

Master Wear (Probable Source) History

The Master Wear facility (CERCLIS ID No. INN000508678; Resource Conservation and Recovery Act (RCRA) ID No. IND981798622) is a former commercial/industrial laundering and drycleaning facility that operated in Martinsville, Morgan County, Indiana, from January 1986 to November 1991and released chlorinated solvents (tetrachloroethylene, a.k.a. perchloroethylene, perc, PCE) to the ground water that was documented by IDEM RCRA inspections and subsequent subsurface investigations (Ref. 11, p. 3; 21, pp. 1, 2; 22, pp. 8, 9, 10; 23, pp. 3, 4, 6, 9; 24, pp. 3, 4, 5, 6; 25, pp. 3, 4; 26, pp. 5, 6; 28, p. 4; 29, pp. 3, 4; 30, pp. 6, 7, 17, 19, 21, 24; 31, pp. 5, 14, 15, 16, 18; 32, pp. 1, 2; 35, p. 2; 38, p. 2; 39, pp. 1, 2; 43, pp. 4, 18, 19, 24, 25, 28, 30, 31, 32, 33, 34, 36, 37; 44, pp. 1, 2; 45, p. 1; 47, p. 3; 48, p. 1; 49, p. 1; 50, p. 1; 51, p. 1; 52, p. 1; 54, p. 1; 55, pp. 10, 14, 144, 147, 149, 145, 261, 269, 267, 271, 273, 392, 196, 197, 198, 199, 200, 201, 53, 54, 55, 56, 57, 58, 59, 66, 67, 68, 69, 70, 71, 91, 92, 93, 94, 95, 96, 187, 188, 189, 217, 218, 219, 208, 209, 210, 211, 212, 213, 223, 224, 225, 300, 301, 302, 303, 304, 305, 318, 319, 320, 321, 322, 323, 330, 331, 345, 346, 347, 357, 358, 359, 429, 430, 431, 432, 433, 434, 458, 459, 461, 462, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508; 56, pp. 29, 30, 35; 73, pp. 10, 11, 12, 13, 14, 15, 46 through 75, 82, 83, 84, 114, 118, 119, 120, 121, 126, 127, 129, 157, 158, 159, 163, 164, 165, 169, 170, 171, 175, 176, 177, 211, 212, 213, 230, 231, 232, 259, 260, 261, 262, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329; 75, pp. 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 84, 85, 86, 96, 97, 98, 99, 100, 101, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 120, 121, 122, 123, 124, 125, 129, 130, 131, 135, 136, 137, 138, 139, 140, 144, 145, 146, 171, 172, 184, 185, 186, 187, 188, 189, 192, 193, 214, 215, 216, 217, 218, 219, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 238, 239, 240, 241, 242, 243, 247, 248, 249, 256, 257, 258, 268, 269, 270; 88, pp. 102, 119, 221, 222, 223, 224). Tetrachloroethene is a hazardous substance and may reasonably be anticipated to be a human carcinogen (Ref. 23, p. 4; 61, pp. 1, 2; 70, p. 18). The groundwater pathway is the primary pathway of concern.

The Master Wear facility generated and improperly stored and disposed of hazardous waste (Ref. 66, pp. 1, 2, 3, 4, 5; 11, pp. 1, 2, 3; 15, pp. 1, 2, 3, 4, 5, 6, 7, 11; 4, p. 1; 5, p. 1; 6, p. 1; 7, p. 1; 8, pp. 1, 2; 12, p. 1). Master Wear was also referred to in some documents as American Laundry and American Glove Co. (Ref. 23, p. 1). The owner of Master Wear, Mr. James Alan Reed and his wife Mrs. Linda Lou Mull Davis Reed, also owned and operated multiple other drycleaning facilities in Indianapolis (Marion Co.) and Mooresville (Morgan Co.), under various names (including American Dry Cleaning and

Laundry, Inc., American Glove Co., and U.S. Towel, Inc., American Leasing, American, Inc., and LMR Holding Corp.) (Ref. 23, pp. 1, 2; 24, p. 5; 26, pp. 2, 3; 28, p. 1; 29, pp. 1, 2, 3). The Master Wear facility discharged industrial wastewater into the Martinsville city sewers without an industrial discharge permit. Although Master Wear obtained an EPA facility identification number, they did not obtain a permit allowing them to store hazardous waste on-site as required (Ref. 65, pp. 1, 2; 76, p. 1; 68, p. 1).

In January 1986, Mr. Reed began operations of the Master Wear drycleaning facility in Martinsville, Indiana (Ref. 11, p. 1; 22, p. 5; 25, p. 3; 29, p. 2). The property was leased from Mr. William Cure who owned the Cure Building located at 60-70-80 W. Washington Street (Ref. 21, p. 2; 22, p. 5; 29, pp. 2, 3; 64, p. 1). The Master Wear facility utilized the first and second floors of the northern portion of the Cure Building for its cleaning operations, as well as an overhead walkway that extended over an alley to a building located at 28 N. Main Street as its offices (Ref. 43, p. 14; 31, p. 5; 32, p. 1; 15, pp. 4, 5, 6, 7 8, 9, 10; 11, p. 2). The Master Wear facility applied for and received a hazardous waste ID number (IND981798622) from the U.S. EPA (Ref. 65, p. 1).

From 1987 through 1991, the Martinsville Fire Department conducted inspections at the facility that revealed improper storage of hazardous materials, poor housekeeping , and lack of any containment (Ref. 24, pp. 3, 4). The fire department responded to a fire at the facility which resulted from a leak from the chemical processing equipment (Ref. 24, pp. 3). In 1991, a spill occurred when dry cleaning waste was being pumped into a 1,000-gallon tank causing the dry cleaning chemicals to overflow into the alley and street (Ref. 24, p. 4). This spill also was reported to the IDEM Emergency Response Branch (Ref. 8, pp. 1, 2).

From 1989 through 1991, several anonymous complaints regarding improper handling and disposal of hazardous wastes, operating without a license, and leaking drums being stored outside the building were filed with IDEM against the Master Wear facility (Ref. 4, p. 1; 5, p. 1; 6, pp. 1, 2; 7, p. 1). In addition, in 1991 two incidents/complaints were filed with IDEM by the certified operator of the Martinsville waste water treatment plant. The report alleged that the facility is generating more waste product that they are reporting (16 gallons/month) based on dramatic increases in water use at the facility and that the operator was discharging oil and dark rinse water into the sewer system (Ref. 9, pp. 1, 2; 10, pp. 1, 2).

Mr. Reed ceased operation at the Martinsville facility in December 1991 leaving behind equipment and chemicals (Ref. 11, p. 1; 23, p. 3). The IDEM RCRA Section conducted a Complaint Investigation (COI) on December 3, 1991 (approximately one month after the facility closed) (Ref. 11, pp. 1, 2, 3; 15, pp. 1 through 11). The Trip Report for that investigation documents that there were approximately forty (40) to forty-two (42) drums located behind the building (Ref. 11, pp. 2, 3). Seven (7) of these drums were labeled "perchloroethylene" (Ref. 11, p. 2). The ground in the area behind the building was described as being discolored with contamination (Ref. 11, p. 3). The back of the facility was unsecured and another seventeen (17) drums, containing either contaminated oil or unlabelled, were found inside the back door (Ref. 11, p. 2, 3; 13, pp. 1, 2; 14, pp. 1, 2). On the second floor of the building were approximately fifty (50) 20-gallon PCE drums that appeared to have been filled with other substances, and an additional nineteen (19) 55-gallon PCE drums that were either empty of partially full of unknown substances (Ref. 11, p. 3; 12, p. 2; 15, p. 1, 4, 5, 8, 9).

Detrex Corporation removed 275 gallons of perchloroethylene on July 22, 1992, and 30 drums of "waste perc." on August 10, 1992 (Ref. 13, p. 1, 2; 14, p. 1, 2; 19, p. 1, 2). In early 1993, additional waste was removed from the facility (Ref. 20, pp. 1, 2). As of September, 1993, waste was still present on the facility (Ref. 18, p. 1).

On February 8, 1998, the RCRA Section conducted a follow-up inspection at the request of the Indiana Attorney General's Office. At that time the property was primarily vacant (Ref. 16, pp. 1, 2). A construction company had rented the facility for a short time in 1997 but was currently vacated (Ref. 16, p. 1). Two (2) drums were found inside the building ("Mineral Seal Oil" and "Boiler Feed Water Treatment" (Ref. 16, pp. 1, 2). Mr. Cure was advised to remove these drums, which he later did (Ref. 17, p. 1).

Other Possible Sources

Research conducted by IDEM revealed that monitoring well MW4S was installed immediately down gradient of a former dry cleaning facility, Central Dry Cleaners (CDC), that operated from approximately1954 to 1976 (Ref. 91, p. 1; 101, p. 1). To confirm that the original shallow background well (MW4S) was still contaminated with elevated levels of PCE as documented by Astbury during their quarterly monitoring of the well from 2006 through 2008, IDEM collected a sample from MW4S (Ref. 56, pp. 28, 53, 54, 252, 253). Analytical results showed that this well continued to be impacted by another nearby source (Ref. 55, p. 147; 56, p. 32; 63, p. 1).

Since MW4S was originally found to be free of any chlorinated compounds but later became contaminated with PCE, two additional shallow background ground water samples were collected by direct push method up-gradient from MW4S (63, p. 1; 56, pp. 32, 90, 91, 285, 286). Two direct push shallow background ground water samples, along with a medium and deep background ground water samples, collected from monitoring wells MW4M and MW4B respectively, were found to be non-detect (Ref. 55, pp. 145, 196, 197, 198, 199, 200, 201, 392, 429, 430, 431, 432, 433, 434). Because ground water flow is from southeast to northwest, and no detections of PCE were found up-gradient to CDC, the contamination in MW4S located down-gradient to CDC indicates that CDC may be another potential source (Ref. 55, pp. 392, 429, 430, 431, 432, 433, 434; 59, pp. 2, 3; 63, p. 1). Since ground water flow from CDC is to the northwest toward the Master Wear facility, the plume associated with this CDC facility may have become comingled with the plume at the Master Wear facility (Ref. Figure 1-4 of this documentation record).

Research of city directories revealed the presence of several other current and former dry cleaning facilities in Martinsville in addition to the previously discussed Central Dry Cleaners (Ref. 101, p. 1). To further determine the extent of the ground water plume, additional monitoring wells were sampled (Ref. 55, pp. 10, 14, 56, 57, 58, 59, 94, 95, 96, 261, 268, 269, 300, 301, 302, 303, 304, 305, 357, 358, 359; 56, pp. 46, 50, 64, 85, 241, 265, 272, 274, 363, 368, 386, 398; 63, p. 1; 93, pp. 1 through 20). These monitoring wells are located down gradient from several dry cleaning facilities including Manitorium Cleaners (MW2S, MW2M, and MW2B) which operated from 1954 to 1962, Kent Cleaners/Richard Deering (MW22S, MW3S, MW3M, and MW3B) which operated from 1962 to 1978, Artesian City Cleaners (MW7S, MW7M, MW7B, MW8S, and MW8M) which operated from 1954 to 1999 (Ref. 63, p. 1; 91, p. 1; 101, p. 1). Two other dry cleaners, Martinsville Cleaners which operated in 1989 and O'Neal's Clothes Depot

which operated from 1983 to present were located further to the east (Ref. 91, p. 1; 101, p. 1). No monitoring wells are located downgradient from these cleaners (Ref. 63, p. 1; 91, p. 1). Two of the former dry cleaners, Manitorium Cleaners and Kent Cleaners/Richard Deering, were located in the general vicinity of the Master Wear facility (Ref. 91, p. 1). Samples obtained from monitoring wells located immediately down-gradient from these facilities (MW2S, MW3S, and MW22S) indicate elevated levels of PCE (Ref. 55, pp. 14, 94, 95, 96, 261, 267, 269, 300, 301, 302, 303, 304, 305, 354, 355, 356, 357, 358, 359; 63, p. 1). Another facility, Artesian City Cleaners, was located two blocks east northeast of the Master Wear facility (Ref. 91, p. 1). Ground water samples obtained from two monitoring wells located down-gradient from this facility (MW7M and MW8S) also showed detections of PCE (Ref. 55, pp. 10, 57, 58, 59, 60, 61, 62, 151, 235, 236, 237; 63, p. 1).

Research for the Reassessment also showed other possible sources of chlorinated solvents exist to the west of the Master Wear facility (Ref. 63, p. 1; 67, pp. 5, 8; 91, p. 1; 96, p. 1; 97, p. 1; 98, p. 1). As a result, ground water samples were collected for the Reassessment at two other monitoring well nested locations, MW5S, MW5M, MW5B, MW9S, MW9M, and MW9B (Ref. 56, pp. 57, 58, 59, 69, 70, 71, 72, 236, 237, 238, 239, 240, 244, 245; 63, p. 1). Sample results indicate elevated levels of PCE in the shallow ground water monitoring wells (MW5S and MW9S) obtained down-gradient from these three facilities, Black Lumber Company, a junk yard, and a semi-truck repair facility (Ref. 55, pp. 149, 217, 218, 219, 266, 267, 345, 346, 347, 348, 349, 350; 63, p. 1; 67, p. 5, 8; 91, p. 1; 96, p. 1; 97, p. 1; 98, p. 1). The presence of PCE in these wells indicates that these facilities may be other sources that could be contributing to the ground water plume in Martinsville (Ref. 59, pp. 2, 3; Figure 1-4 of this documentation report).

Level of Effort:

In late 2002, IDEM was contacted by Martinsville city officials who reported levels of PCE in one of the wells at levels approaching the EPA MCL. IDEM proceeded to conduct a phased PA/SI, which centered around the former Master Wear drycleaning facility that had a history of spills and violations.

The first phase in January 2003 involved sampling the municipal wells and nearby residential wells (Ref. 43, pp. 21, 22). This phase confirmed the presence of PCE in Municipal Well #3 (4.2 ppb) as well as in a residential well (87 ppb) (Ref. 43, pp. 21, 22, 23, 106,107, 108, 109, 110, 111, 113 through 139). Six (6) ground water samples were collected for this investigation (Ref. 96, p. 1).

Based on discussions with city representatives, a former drycleaner, Master Wear, Inc., located in downtown Martinsville was identified as a possible source (Ref. 43, pp. 4, 18, 20, 21; 32, p. 2; 39, p. 1). After reviewing the information from the city representatives, the second phase of the PA/SI began in February 2003 (Ref. 43, pp. 20, 30). The investigation involved the use of a direct-push drilling rig to collect soil and ground water samples at and near the Master Wear facility (Ref. 43, pp. 20, 30). A total of twelve (12) borings were drilled in various locations in Martinsville, including two at the Master Wear facility (Ref. 43, pp. 22, 24, 25). PCE was detected in subsurface soil at levels as high as 270,000 ppb and in ground water as high as 20,000 ppb at the Master

Wear facility indicating that this facility is a probable source of PCE contributing to the ground water plume that is contaminating Municipal Well #3 (Ref. 43, pp. 22, 24, 25, 30, 141 through 167; 72, pp. 1 through 51; 73, pp. 1 through 375). Three (3) background soil and two (2) background water samples were obtained up-gradient to the east and southeast of the Master Wear facility utilizing the direct push instrument (Ref. 43, p. 22; 97, p. 1). The background samples located to the southeast (up-gradient to Master Wear) were non-detect; the background samples located to the east (side-gradient to Master Wear) had levels of PCE detected indicating a possible other source (Ref. 43, pp. 24, 25, 205; 97, p. 1; 98, p. 1). A total of thirty four (34) soil samples and eighteen (18) ground water samples were collected for this investigation.

The third phase was conducted in July 2003 and involved the collection of indoor air samples that confirmed the presence of indoor air contamination at various businesses and residences in the immediate vicinity of the Master Wear facility (Ref. 43, p. 20). Elevated levels of PCE and TCE (above IDEM and ATSDR established chronic and acute action levels) were detected in the living quarters of residential apartments and businesses (Ref. 43, pp. 26, 27, 37, 289, 290, 291; 68, p. 1; 69, pp. 1, 2). Four (4) more rounds of indoor air sampling followed in September 2003, October 2003, December 2003, and February 2004 but were not a part of this PA/SI report (Ref. 43, p. 26, 277 through 331).

In March 2004 the fourth phase of the PA/SI was conducted which involved the advancement of an additional fourteen (14) borings using a direct-push drill rig between Master Wear and the Martinsville well field to collect ground water samples (Ref. 43, pp. 20, 30). No samples were obtained from the Master Wear facility during this phase. PCE was detected in ground water in several borings at levels as high as 890 ppb and confirmed Master Wear as the probable source of the plume (Ref. 43, pp. 20, 26, 28, 30). Background ground water samples were collected up-gradient to the southeast in the same area as they were obtained in the February 2003 sampling event. No detections of any chlorinated compounds were reported in any of the background samples indicating at that time the Master Wear facility is the primary source of ground water contamination in the immediate area (Ref. 43, p. 48; 99, p. 1; Background Ground Water Grab Sample Table found in Section 3.0.2.1 of this Documentation Record. A total of forty (40) ground water samples were obtained for this investigation (Ref. 93, pp. 2, 3, 4, 5, 6, 7).

After the 2003/2004 investigation by IDEM, the owner of the building where the Master Wear facility operated, through a U. S. EPA Unilateral Administrative Order signed in April 2004, his insurers contracted Astbury Environmental Engineering Inc. to conduct remedial activities at the Master Wear facility (Ref. 24, pp. 1 through 21; 32, p. 2; 39, p. 1). As part of the remedial activities, a total of forty-six (46) monitoring wells (consisting of both nested and un-nested wells) were installed in 2004 (Ref. 46, p. 11; 93, pp. 8, 9, 10, 11).

As part of Astbury's remedial activities, which were overseen by U. S. EPA, a remedial system was installed in 2005 at the Master Wear facility using a combination air-sparging (AS) and soil vapor extraction (SVE) system which was used to strip/volatilize chlorinated solvents from subsurface soil and ground water (Ref. 40, pp. 1, 2, 3, 4; 41, pp. 1, 2, 3, 6, 7, 8, 9; 42, pp. 1, 2, 3; 46, pp. 7, 27, 28, 29; 54, p. 1). The system was comprised of seventeen (17) AS wells and fifteen (15) SVE wells (Ref. 40, pp. 1, 2, 3, 4; 41, pp. 1, 2, 3, 6, 7, 8, 9; 42, pp. 1, 2, 3; 46, pp. 7, 27, 28, 29). Due to the continuing presence of PCE in the well field, the City of Martinsville installed an activated carbon filtration system in June 2005 to remove PCE

from its finished water (Ref. 54, p. 1; 78, pp. 1, 2).

In July and August 2010, staff from IDEM's Site Investigation Section conducted a Reassessment at the Master Wear facility (Ref. 56, pp. 1 through 37). Drinking water from municipal wells, ground water from monitoring wells, and ground water and subsurface soil samples from a direct-push drill rig were collected (Ref. 56, pp. 12, 13, 14, 15, 16, 199 through 267). Background ground water samples were obtained up-gradient from the Master Wear facility (Ref. 56, pp. 28, 55, 56, 247, 248; 63, p. 1). These samples were collected from the medium and deep nested wells (MW4M and MW4B) that were installed for the Astbury remedial activities (Ref. 56, pp. 28, 55, 56, 247, 248; 63, p. 1). A total of five (5) soil samples and sixty four (64) ground water samples were collected for this investigation (Ref. 93, pp. 12 through 20).

Research of city directories for the 2010 IDEM Reassessment revealed the presence of several other current and former dry cleaning facilities in Martinsville (Ref. 101, p. 1). Additional research showed that other possible sources of chlorinated solvents exist to the west of the Master Wear facility (Ref. 63, p. 1; 67, pp. 5, 8; 91, p. 1; 96, p. 1; 97, p. 1; 98, p. 1). As a result of the research, ground water samples were collected down gradient from the possible sources identified during the research.

2.2.1 SOURCE IDENTIFICATION

Source Number: 1

HRS Source Type: Other (Ground water plume with no identified source)

Description and Location of Source (with reference to a map of the site):

The Martinsville Ground Water Contamination site consists of a ground water plume (aerial representation of the ground water plume can be seen in Figure 1-4 of this documentation record). Even though numerous soil and ground water samples (thirty nine (39) soil samples and 128 ground water samples) were obtained during several sampling events (January 2003, February 2003, March 2004, and July/August 2010) to identify possible sources of chlorinated solvents (tetrachloroethene, trichloroethene, and cis-1,2-dichloroethene) (Ref. 93, pp. 1 through 20). While sampling was able to identify and reasonably attribute one probable source (Master Wear), there are several other known possible sources that may be contributing to the current boundaries of the ground water plume. Per the HRS, the plume itself will be considered the source (Ref. 1, Sec 1.1, p. 61). The extent of this plume has not been completely delineated at this time but has been characterized by data from monitoring wells and samples obtained using direct push instruments (See Sections 2.2.2 and 3.1.1, 3.3.2.2 and 3.3.2.3 of this HRS documentation record).

In February 2003 and March 2004, IDEM's Site Investigation Section began PA/SI activities that focused on the Master Wear facility (Ref. 43, p. 13). IDEM conducted this sampling utilizing the EPA Contract Laboratory Program (CLP) for sample analysis (Ref. 43, pp. 22, 26). Ground water sample results obtained from the CLP showed that the concentrations of PCE were above the EPA MCL of 5.0 ug/L for PCE in twenty five (25) wells in a range of 5.0 ug/L to 2200 ug/L (See Sections 2.2.2, 3.1.1, 3.3.2.2 of this HRS documentation record). In July & August 2010, IDEM's Site Investigation Section began Reassessment activities that focused on the Master Wear facility but also looked at other possible sources that may be contributing to the ground water plume (Ref. 56, pp. 10, 11). IDEM conducted this sampling utilizing the EPA Contract Laboratory Program (CLP) for sample analysis (Ref. 56, p. 17).

The outer boundaries of the contaminated ground water plume have tentatively been established from west to east from Jackson Street to the south, Sycamore Street to the east, just north of Cunningham Street to the north, and Shirley Street to the west (Ref. Figure 1-4 of this documentation record). Unimpacted, "background" wells were identified up-gradient of the plume (see Section 2.2.2 of this HRS documentation record). The plume was drawn by connecting a line to the perimeter of all contaminated water sample locations on the farthest edges of the sample area (Ref. Figure 1-4 of this documentation record). Monitoring wells, municipal wells, and samples obtained using direct push instruments were found to be contaminated with chlorinated VOCs (See Sections 2.2.2, 3.1.1, 3.3.2.2, and 3.3.2.3 of this HRS documentation record). These forty six (46) wells are within a one mile radius of the center of the plume (Ref. 63, p. 1).

2.2.1 SOURCE IDENTIFICATION

Number of the source: 2

Name: Master Wear (Probable Source)

HRS Source Type: Drycleaner

Description and Location of the Source:
The former Master Wear facility was located at 28½ N. Main Street, Martinsville, Morgan County, Indiana. The Master Wear facility can be found on the U.S.G.S. Martinsville, Ind. Quadrangle Topographic map (Ref. 3, p. 1). The Master Wear facility lies in an urban downtown setting and can be found on the south central edge of Section 33 in Township 12 North, Range 1 East (Ref. 3, p. 1). The facility was located in the northern half of the Cure Building which is at 60-70-80 W. Washington Street. The office portion of Master Wear was located in a 2nd floor walkway that connected the Cure Building above an alley to another office building located at 28 N. Main Street (Ref. the Site Features Map, Figure 1-3 of this Documentation Record). It was the location of the office that gave the facility its Main Street address.

The former facility is bordered to the immediate north by a parking area where wastes were stored by Master Wear (Ref. the Site Features Map, Figure 1-3 of this Documentation Record; 43, pp. 14, 16). This parking area is currently asphalt and concrete but at the time Master Wear was in operation it was gravel (Ref. 43, p. 14; 15, pp. 1, 2, 3, 10, 11; 18, p. 1; 21, p. 2). The parking lot is followed by an alley to the north and other businesses which are located on West Morgan Street. Immediately to the west is a bank which is located on the corner of West Washington Street (to the south) and North Mulberry Street (on the west) (Ref. the Site Features Map, Figure 1-3 of this Documented Record). The former facility is bordered to the east by various business located on North Main Street and to the south by various business located in the Cure Building on West Washington Street (Ref. the Site Location Map, Figure 1-3 of this Documentation Record).

The soil contamination at the Master Wear facility is the probable source of the ground water contamination (Ref. 24, p. 6; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 59, p. 3). Site inspections noted violations for improper storage of hazardous substances as well as other violations including improper storage and spilling of chlorinated solvents (mostly tetrachloroethene) from the facility onto on-site soils (Ref. 11, pp. 1, 2, 3; 15, pp. 1 through 11; 24, pp. 2, 3, 4, 5, 6; 25, p. 3). The improper storage and spilling of the solvents occurred outside the north side of the building in a graveled parking area (Ref. 11, pp. 2, 3; 15, pp. 1, 2, 3, 10, 11; 21, p. 2; Figure 1-3 of this documentation record). The parking area is currently paved in asphalt but was not at the time the release of chlorinated solvents occurred (Ref. 43, p. 14; 15, pp. 1, 2, 3, 10, 11; 21, p. 2).

As part of the PA/SI, the February 2003 subsurface investigation phase conducted by IDEM found high levels of PCE in on-site soil (270,000 ppb) and ground water (20,000 ppb) in the parking lot on the north side of the facility (Ref. 43, pp. 24, 30, 32; 25, p. 3, 4; 73, pp. 10, 11, 12, 13, 14, 15, 46 through 75, 82, 83, 84, 114, 118, 119, 120, 121, 126, 127, 129, 157, 158, 159, 163, 164, 165, 169, 170, 171, 175, 176, 177, 211, 212, 213, 230, 231, 232, 259, 260, 261, 262, 318 through 329). The March 2004 phase of the PA/SI confirmed the

presence of a PCE plume emanating from the Master Wear facility and was able to reasonably attribute with confidence that the source of the ground water contamination in the municipal well field is the Master Wear facility (Ref. 43, pp. 30, 493; 25, pp. 3, 4; 21, p. 2; 24, pp. 4, 5, 6; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 75, pp. 32 through 43, 69 through 80, 84, 85, 86, 96, 97, 98, 99, 100, 101, 105 through 116, 120, 121, 122, 123, 124, 125, 129, 130, 131, 135, 136, 137, 138, 139, 140, 144, 145, 146, 171, 172, 184, 185, 186, 187, 188, 189, 192, 193, 214, 215, 216, 217, 218, 219, 223 through 234, 238, 239, 240, 241, 242, 243, 247, 248, 249, 256, 257, 258, 268, 269, 270).

In the 2010 IDEM Reassessment, numerous samples collected at the Master Wear facility confirmed that elevated levels of PCE (as high as 140 ppb) were still present in the on-site soils and ground water (Ref. 55, pp. 269, 318, 323, 459, 497, 498, 499, 500, 501, 502; 56, pp. 28, 30, 35, 41, 95, 96, 97, 230, 264, 265; 63, p. 1). Additionally, ground water samples confirmed the continuing presence of the PCE plume emanating from the Master Wear facility and was again able to reasonably attribute with confidence that the source of the ground water contamination in the municipal well field is the Master Wear facility (Ref. 56, pp. 29, 30, 35; 55, pp. 10, 14, 144, 147, 149, 145, 261, 267, 271, 273, 392, 196, 197, 198, 199, 200, 201, 53, 54, 55, 56, 57, 58, 59, 66, 67, 68, 69, 70, 71, 91, 92, 93, 94, 95, 96, 187, 188, 189, 217, 218, 219, 208, 209, 210, 211, 212, 213, 223, 224, 225, 300, 301, 302, 303, 304, 305, 319, 320, 321, 322, 330, 331, 345, 346, 347, 357, 358, 359, 429, 430, 431, 432, 433, 434, 458, 461, 462, 503, 504, 505, 506, 507, 508; 59, p. 3).

Based on the data obtained from the samples collected from the parking lot located on the north side of the Master Wear facility during the PA/SI and the Reassessment, the geologic assessment verifies that the Master Wear facility is the source of the ground water contamination in Municipal Well #3 (Ref. 21, p. 2; 24, p. 6; 25, p. 3, 4; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 59, pp. 2, 3; 43, p. 30; Figure 1-4 of this documentation record).

Containment:

Hazardous wastes were stored in drums outside of the Master Wear facility in an unpaved area (Ref. 11, p. 2, 3; 15, pp. 1, 2, 3, 10, 11; 24, pp. 3, 4; 43, p. 14). Releases at the facility have lead to the presence of various hazardous substances in surface soils (Ref. 29, p. 3). No natural barriers are present (sand and gravel is present from surface to bedrock with no impermeable strata) to prevent these drums from leaking and overflowing to the ground where it was able to penetrate the ground and contaminate the ground water (Ref. 59, p. 2; 71, pp. 4, 5, 6, 7; 56, pp. 372, 373). Observation of boring log descriptions obtained during the PA/SI and Reassessment sampling events did not indicate any engineered liner on-site (Ref. 71, pp. 4, 5, 6, 7; 56, pp. 372, 373). No surface liners were observed during the PA/SI or IDEM RCRA inspections (Ref. 43, pp. 14, 143, 145, 148; 15, pp. 1, 2, 3, 10, 11; 21, p. 2; 71, pp. 4, 5, 6, 7). IDEM inspection reports indicate that soil outside the building was discolored with contamination (Ref. 11, p. 3). Since there were no hazardous waste containment, and the geology of the surrounding area presented a permeable path for the migration of hazardous materials, hazardous materials in the subsurface were able to migrate from the Master Wear facility to the municipal well field less than ½ mile downgradient of the facility (Ref. 21, p. 2; 24, pp. 4, 5, 6; 25, pp. 3, 4; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 56, p. 35; 59, pp. 2, 3; 43, p. 30; 80, pp. 1, 2, 3; Figure 1-4

of this documentation record; Source Sample Tables in Section 2.2; Monitoring Wells Ground Water Sample Data Table and Level I Samples (Municipal Well #3) Table found in Section 3.1.1 of this documentation record).

Evidence of hazardous substance migration from the source area (i.e., source area includes source and any associated containment structures) without a liner gives a Containment Factor Value for the Ground Water Migration Pathway of 10 (Ref. 1, p. 70).

2.2.1 SOURCE IDENTIFICATION

Number of the source: 3

Name: Artesian Cleaners (Possible Source)

HRS Source Type: Drycleaner

Description and Location of the Source:

The former Artesian Cleaners facility was located at 165 N. Morgan Street, Martinsville, Morgan County, Indiana. The Artesian Cleaner facility can be found on the U.S.G.S. Martinsville, Ind. Quadrangle Topographic map (Ref. 3, p. 1). The Artesian Cleaner facility lies in an urban downtown setting and can be found on the south central edge of Section 33 in Township 12 North, Range 1 East (Ref. 3, p. 1).

The former facility is bordered to the immediate north by Morgan Street, to the east by a parking lot followed by Sycamore Street, to the south by a parking lot and a commercial bank, and to the west by an alley and other commercial buildings located on N. Jefferson Street (Ref. 91, p. 1).

During the February 2003 PA/SI subsurface investigation phase conducted by IDEM, high levels of PCE were found in on-site soil (sample E1LP1, 18 ppb) and ground water (sample E1LL5, 8 ppb) samples obtained from the parking lot immediately to the east of this facility (Ref. 43, pp. 24, 25, 159, 160; 72, pp. 2, 21; 73, pp. 125, 205, 206, 207, 259, 315, 316, 317). These samples were initially taken as background samples during the Master Wear investigation, but due to the presence of PCE in both the soil and ground water, and due to the close proximity to the former dry cleaning facility, these samples indicate that another possible source of PCE may be located at or near this facility.

Ground water samples obtained from a down-gradient monitoring well (MW7M) during the 2010 IDEM Reassessment indicate elevated levels of PCE that may be attributable to this facility (Ref. 55, pp. 10, 56, 57, 58, 59, 60, 61, 62 ; 56, pp. 64, 65, 272, 273, 398; 63, p. 1; 91, p. 1)

Containment:

No natural barriers are present (sand and gravel is present from surface to bedrock with no impermeable strata) to prevent these drums from leaking and overflowing to the ground

where it was able to penetrate the ground and contaminate the ground water (Ref. 59, p. 2; 71, p. 2). Observation of boring log descriptions obtained during the PA/SI sampling event did not indicate any engineered liner on-site (Ref. 71, p. 2). No surface liners were reported during the PA/SI inspections (Ref. 71, p. 2). Since there were no hazardous waste containment, and the geology of the surrounding area presents a permeable path for the migration of hazardous materials, it is possible that hazardous materials in the subsurface are able to migrate from the Artesian Cleaners facility to the municipal well field (Ref. 59, pp. 2, 3; Figure 1-4 of this documentation record; Source Sample Tables in Section 2.2; Level I Samples (Municipal Well #3) Table found in Section 3.1.1 of this documentation record).

Evidence of hazardous substance migration from the source area (i.e., source area includes source and any associated containment structures) without a liner gives a Containment Factor Value for the Ground Water Migration Pathway of 10 (Ref. 1, p. 70).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

Source Samples: Source 2 and Source 3

The soil contamination at the Master Wear facility is a probable source of the ground water contamination at the municipal well field, and the soil contamination at the Artesian Cleaners facility is a possible source that may contribute contamination to the ground water plume (Ref. 24, p. 6; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 59, p. 3; 43, pp. 24, 30, 160; 73, pp. 259, 260, 315, 316, 317; Figure 1-4 of this Documentation Record).

The site is being scored on the ground water pathway as a ground water plume (Ref. 1, Sec 1.1, p. 61). Soil samples were collected from the parking area at the former Master Wear facility during the 2003 IDEM PA/SI inspection with detections as high as 270,000 ppb at a depth of 19 feet, and the 2010 Reassessment with detections as high as 140 ppb at a depth of 16.5 feet, and are considered source samples (Ref. 43, pp. 24, 32, 144, 145, 146, 147, 161, 162, 163; 55, pp. 372, 459, 497, 498, 499; 56, pp. 30, 95, 96, 97, 264, 265; 72, pp. 24 through 37; 73, pp. 10, 11, 12, 13, 14, 15, 46 through 75, 259, 260, 261, 262, 263, 264, 318 through 332). A soil samples were collected from the former Artesian Cleaner facility parking area during the 2003 IDEM PA/SI inspection (Ref. 43, pp. 24, 160; 73, pp. 259, 260, 315, 316, 317).

The following tables list the soil samples that were obtained offsite of the Master Wear and Artesian Cleaners facilities that are considered background soil samples, and soil samples that were obtained from the Master Wear facility and the Artesian Cleaners that are considered source samples. These soil samples were obtained during the PA/SI and Reassessment sampling events. All necessary quality assurance/quality control reviews were conducted for both of these samples (Ref. 43, 169, 170, 171, 172, 173, 174, 187 through 193; 56, pp. 169 through 174; Section 2.2.2 of this HRS documentation record). The corresponding chlorinated compounds that were detected in each sample along with other corresponding information are listed in these tables. The soil samples were collected by IDEM Site Investigation staff for the PA/SI and Reassessment sampling events (Ref. Section 3.1.1 for a list of ground water samples that were found to be contaminated).

Background Soil Sample (Obtained Off-Site) Table

EPA CLP #	IDEM #	Sample Date	Location	Hazardous Substance	Sample Concentration (Adjusted value)	Sample Quantitation Limit (SQL)	Depth (Feet)	Percent Solids	Reference
E1LM0*	B1-7	2/17/2003	City water/sewer building; south parking lot	Tetrachloroethene Trichloroethene cis-1,2-Dichloroethene	15 Non-detect Non-detect	15 µg/kg 15 µg/kg 15 µg/kg	7	82	Ref. 43, pp. 24, 141; 73, pp. 3, 8-9, 37-39; 93, p. 2
E1LM1*	B1-19	2/17/2003	City water/sewer building; south parking lot	Tetrachloroethene Trichloroethene cis-1,2-Dichloroethene	18 Non-detect Non-detect	18 µg/kg 18 µg/kg 18 µg/kg	19	83	Ref. 43, pp. 24, 142; 73, pp. 3, 8-9, 40-42; 93, p.
E2RA5	SB4	8/4/2010	North side of East Columbus Street, 72 feet west of south Wayne street	Tetrachloroethene Trichloroethene cis-1,2-Dichloroethene	Non-detect Non-detect Non-detect	5.7 µg/kg 5.7 µg/kg 5.7 µg/kg	12-13	91%	Ref. 56, pp. 28, 30, 98, 266; 93, p. 2

E2RA7	SB5	8/4/2010	Northeast corner of Jefferson and Columbus on grass right of way, 40 feet east of Jefferson	Tetrachloroethene Trichloroethene cis-1,2-Dichloroethene	Non-detect Non-detect Non-detect	7.7 µg/kg 7.7 µg/kg 7.7 µg/kg	14	96%	Ref. 56, pp. 28, 30, 99, 100, 267; 93, p. 2

*E1LM0 and E1LM1 Tetrachloroethene Result Biased High and adjusted using the procedure described in EPA 540-F-94-028, *Using Qualified Data to Document an Observed Release and Observed Contamination*, November 1996. According to the EPA Electronic Review of Data, samples E1LM0 and E1LM1 have analyte concentrations reported below the CRQL and less than or equal to five times the associated method blank concentration. Reported sample concentrations have been elevated to the CRQL (Ref. 73, p.3).

Source Soil Sample (Obtained On Master Wear Property) Table

EPA CLP #	IDEM #	Sample Date	Location	Hazardous Substance	Sample Concentration (Adjusted Value)	Sample Quantitation Limit (SQL)	Depth	Percent Solids	Reference
E1LM2	B4-2	2/17/03	Master Wear on-site by loading dock	Tetrachloroethene	1,100 µg/kg	110 µg/kg	2 ft.	88%	Ref. 73, pp. 9-11, 46-48; 43, p. 143; 93, p. 2
E1LM3	B4-6	2/17/03	Master Wear on-site by loading dock	Tetrachloroethene	3,700 µg/kg	1,000 µg/kg	6 ft.	86%	Ref. 73, pp. 10-11, 49-51; 43, p. 144; 93, p. 2
E1LM4	B4-12	2/17/03	Master Wear on-site by loading dock	Tetrachloroethene	100,000 µg/kg	1,000 µg/kg	12 ft.	96%	Ref. 73, pp. 10-11, 52-54; 43, p. 144; 93, p. 2
E1LM5	B4-18	2/17/03	Master Wear on-site by loading dock	Tetrachloroethene	78,000 µg/kg	1,000 µg/kg	18 ft.	96%	Ref. 73, pp. 10-11, 55-57; 43, p. 145; 93, p. 2
E1LM6	B4-18	2/17/03	Master Wear on-site by loading dock **(Duplicate of E1LM5)**	Tetrachloroethene	110,000 µg/kg	1,000 µg/kg	18 ft.	95%	Ref. 73, pp. 10-11, 58-60; 93, p. 2
E1LM7	B5-7	2/17/03	Utility access behind Master Wear (NW Corner)	Tetrachloroethene	2,200 µg/kg	100 µg/kg	7 ft.	83%	Ref. 73, pp. 12-13, 61-63; 43, p. 146; 93, p. 3
E1LM8	B5-10	2/17/03	Master Wear on-site by loading dock	Tetrachloroethene	1,300,000 µg/kg	1,000 µg/kg	10 ft.	95%	Ref. 73, pp. 12-13, 64-66; 43, p. 146; 93, p. 3
E1LM9	B5-17	2/17/03	Master Wear on-site at utility access	Tetrachloroethene	37,000 µg/kg	1,000 µg/kg	17 ft.	92%	Ref. 73, pp. 12-13, 67-69; 93, p. 3
E1LN0	B5-24	2/17/03	Master Wear on-site at utility access	Tetrachloroethene	22,000 µg/kg	1,000 µg/kg	24 ft.	93%	Ref. 73, pp. 14-15, 70-72; 93, p. 3
E1LP2	B6-1	2/18/03	Master Wear on-site near Southwest corner of lot	Tetrachloroethene	10,000 µg/kg	1,300 µg/kg	1 ft.	91%	Ref. 73, pp. 259-260, 318-320; 43, p. 147; 93, p. 4
E1LP3	B6-10	2/18/03	Master Wear on site near southwest corner of lot	Tetrachloroethene	92,000 µg/kg	12,000 µg/kg	10 ft.	96%	Ref. 73, pp. 259-260, 321-323; 43, p. 162; 93, p. 4
E1LP4	B6-19	2/18/03	Master Wear on site near southwest corner of lot	Tetrachloroethene	270,000 µg/kg	26,000 µg/kg	19 ft.	91%	Ref. 73, pp. 261-262, 324-326; 43, p. 162; 93, p. 4
E1LP5	B6-23	2/18/03	Master Wear on site near southwest corner of lot	Tetrachloroethene	8,000 µg/kg	1,300 µg/kg	23 ft.	85%	Ref. 73, pp. 261-262, 327-329; 43, p. 162; 93, p. 4

E1LP6	B6-23	2/18/03	Master Wear on site near southwest corner of lot (Duplicate of E1LP5)	Tetrachloroethene	13,000 µg/kg	1,300 µg/kg	23 ft.	87%	Ref. 73, pp. 263-264, 330-332; 43, p. 163; 93, p. 4
E2RA2	SB1	8/3/10	Boring #1, Master Wear site, in parking area north of building and south of alley	Tetrachloroethene	170 µg/kg	5.5 µg/kg	16.5 ft.	92%	Ref. 55, pp. 458, 490-492; 93, p. 12
E2RA3	SB2	8/3/10	Boring #1, Master Wear site, in parking area north of building and south of alley (Duplicate of E2RA2)	Tetrachloroethene	140 µg/kg	5.1 µg/kg	16.5 ft.	93%	Ref. 55, pp. 459, 497-499; 93, p. 12
E2RA4	SB3	8/3/10	Boring #1, Master Wear site, in parking area north of building and south of alley	Tetrachloroethene	99 µg/kg	7.4 µg/kg	12-13 ft.	89%	Ref. 55, pp. 459, 500-502; 93, p. 12

*E1LM2 and E1LM7 SQL increased due to 10x dilution factor.
*E1LM4 and E1LM5 and E1LM8 through E1LN0 SQL increased due to 100x dilution factor.
*E1LP2 and E1LP5 SQL increased due to 100x dilution factor.
*E1LP3 SQL increased due to 1000x dilution factor.
*E1LP4 SQL increased due to 2000x dilution factor.

Source Soil Sample (Obtained On Artesian Cleaners Property) Table

EPA CLP #	IDEM #	Sample Date	Location	Hazardous Substance	Sample Concentration (Adjusted Value)	Sample Quantitation Limit (SQL)	Depth	Percent Solids	Reference
E1LP1	B2-19	2/18/2003	Southwest corner of Sycamore and Morgan	Tetrachloroethene Trichloroethene cis-1,2-Dichloroethene	28 Non-detect Non-detect	12 µg/kg 12 µg/kg 12 µg/kg	19	78	Ref. 43, pp. 24, 160; 73, pp. 259-260, 315-317; 93, p. 4

Refer to Section 3.1.1 for a list of ground water samples that were found to be contaminated.

List of Hazardous Substances Associated with Source

The following hazardous substance is associated with the source:
- Tetrachloroethene (PERC)
- Trichloroethene (TCE) (Degradation Product) (Ref. 58, pp. 1, 4)
- Cis-1, 2- Dichloroethene (Cis-1, 2-DCE) (Degradation Product) (Ref, 58, pp. 1, 4)

Hazardous Substance Table

Waste Type	Associated Hazardous Substances	Quantity	References
Dry Cleaning Fluid	Tetrachloroethylene (PCE) Trichloroethene (TCE) Cis-1, 2- Dichloroethene	Unknown* Unknown*(Degredation product of PCE) Unknown *(Degredation product of PCE)	Ref. 8, pp. 2, 3; 11, pp. 1, 2, 3; 58, pp. 1, 2, 3, 4; 13, p. 2; 14. p. 2; 15, pp. 4, 5, 7; 19, pp. 1, 2, 3, 4, 5, 6, 7; 20, pp. 1, 2; 66, pp. 1, 2, 3, 4, 5; 58, pp. 1, 2, 3, 4

*Reports have indicated spills and leaking containers on the ground outside the building but did not specify the quantities that were released (Ref. 11, pp. 1, 2, 3).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	References
Gas release to air:	Not Scored	
Particulate release to air:	Not Scored	
Release to ground water: Because there is an observed release of a hazardous substance to ground water a containment value of 10 has been assigned (See Sections 2.2.2 and 3.1.1 of this HRS documentation record showing elevated levels of volatile organic compounds that were detected in the subsurface soil and groundwater at the Master Wear site, an observed release of hazardous substances by chemical analysis).	10	Ref. 1, Table 3-2, p. 70
Release via overland migration and/or flood:	Not scored	

Notes: The Containment Factor Value for the ground water migration pathway was evaluated for "All Sources" for evidence of hazardous substance migration from source area (i.e. source area includes source and any associated containment structures). The applicable containment factor value was determined based on existing analytical evidence of hazardous substance in soil and ground water samples from grab samples obtained from direct push probes and monitoring wells (Ref. Sections 2.2.2 and 3.1.1 of this HRS documentation record). Based on an observed release of a hazardous substance to ground water a containment value of 10 has been assigned (Ref. 1, Table 3-2, p. 70; Sections 2.2.2 and 3.1.1 of this HRS documentation record).

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity (Tier A)

Description

The information available is not sufficient to evaluate Tier A source hazardous waste quantity; therefore, hazardous constituent quantity is not scored (NS). As a result, the evaluation of hazardous waste quantity proceeds to the evaluation of Tier B, hazardous wastestream quantity (Ref. 1, Section 2.4.2.1.1, pp. 64, 65).

Hazardous Constituent Quantity Assigned Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity (Tier B)

Description

The information available is not sufficient to evaluate Tier B source hazardous wastestream quantity; therefore, hazardous wastestream quantity is not scored (NS). As a result, the evaluation of Hazardous Waste Quantity proceeds to the evaluation of Tier C, Volume (Ref. 1, Section 2.4.2.1.2, p. 65).

2.4.2.1.3 Volume (Tier C)

Description
Hazardous Wastestream Quantity Assigned Value:

During the PA/SI, three borings were advanced at the Master Wear Facility verify the source of contamination (Ref. 43, pp. 143, 144, 146, 147, 161, 162, 72. pp. 24, 26, 29, 31, 33, 35; 98, p. 1). From these three borings, PCE contamination was detected in ten (10) subsurface soils samples; however, only six (6) samples (those that were collected above the ground water table) were used to calculate the volume of contaminated soil (Ref. 83, pp. 1, 2; Source Soil Sample Table in Section 2.2.2 of this HRS documentation record). The six (6) source samples used to calculate the vertical and horizontal extent of soil contamination are as follows: E1LM7, E1LM9, E1LP2, E1LP4, E1LM2, and E1LM4. Based on the PA/SI data, a contaminated soil volume was calculated using the lateral and vertical extent of source contamination. Note: The Source Soil Sample Table also shows soil samples collected during the reassessment; however these samples were not used when calculating the volume of contaminated soil.

The volume of contaminated soil was calculated as follows:
First the area of contaminated soil was determined by measuring the distance between each source sample point that was obtained during the 2003 PA/SI. The distance was measured using the measuring bar on the GIS software (Ref. 92, pp. 1, 2).

Distance from Boring 5 (Ref. 43, p. 24; 82, p. 1; 71, p. 5) to Boring 6 (Ref. 43, p. 24; 82, p. 1; 71, p. 6) = 33.9 feet

Distance from Boring 6 (Ref. 43, p. 24; 82, p. 1; 71, p. 6) to Boring 4 (Ref. 43, p. 24; 82, p. 1; 71, p. 4) = 54.3 feet

Distance from Boring 4 (Ref. 43, p. 24; 82, p. 1, 71, p. 4) to Boring 5 (Ref. 43, p. 24; 82, p. 1; 71, p. 5) = 50.9 feet

Total area = 840 sq. ft. (Ref. 92, pp. 1, 2).

Volume was determined by calculating the Area and multiplying it by the Depth.

Boring 6: The contaminated sample depth is from 1 foot to 19 feet. Therefore the depth of contaminated soil is 18 feet.
Volume = 840 x 18 = 15,120 cubic feet. 15,120 cubic feet divided by 27 = **560 cubic yards**

Boring 5: The contaminated sample depth is from 7 feet to 17 feet. Therefore the depth of contaminated soil is 10 feet.
Volume = 840 X 10 = 8,400 cubic feet. 8,400 cubic feet divided by 27 = **311 cubic yards**

Boring 4: The contaminated sample depth is from 2 feet to 12 feet. Therefore the depth of contaminated soil is 10 feet.
Volume = 840 square feet X 10 feet = 8,400 cubic feet. 8,400 cubic feet divided by 27 = **311 cubic yards**

Therefore, the average volume of contaminated soil = 560 cu. yd. + 311 cu. yd. + 311 cu. yd. = 1,182 cu. yd./3 = 394 cubic yards.
394/2,500 = 0.1576 (Which is greater than 0 but less than 1. Therefore a value of 1 is assigned according to the rule, Table 2-6).

Hazardous Wastestream Quantity Value assigned: 1

2.4.2.1.4 Area (Tier D)

Description

Area, Tier D, is not scored (NS) for source type "other" (Ref. 1, Table 2-5, p. 65).

Area Assigned Value: NA (Not Available)

2.4.2.1.5 Source Hazardous Waste Quantity Value

However, since the hazardous constituent quantity is not adequately determined (because the source samples obtained from the PA/SI and Reassessment were not collected from the boundaries of the contaminated source area and that no records exist that depict the exact amount of spilled waste) the total volume of contaminated soil cannot be adequately determined. A value of "unknown but greater than 0" is assigned for the source and a target (Municipal Well #3) is subject to level 1 or level 2 concentrations, therefore the assigned value is either obtained from Table 2-6 or given a value of 100, whichever is greater. Therefore an assigned value of 100 is given for the Hazardous Waste Quantity Factor Value (Ref. 1, Section 2.4.2.2, pp. 65, 66; 43, pp. 21, 22, 23, 108, 116; 88, pp. 102, 119, 221, 222, 223, 224; 89, pp. 3, 4; 55, pp. 9, 10, 11, 12, 69, 70, 71, 72, 73, 74; 56, pp. 29, 32, 35, 38, 86, 87, 278, 279).

Area of Observed Contamination:	>0 but unknown
Source Hazardous Waste Quantity Value:	>0 but unknown

Hazardous Wastestream Quantity Value (W): 100

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Source Hazardous Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway				
			Ground Water (GW) (Ref. 1, Table 3-2)	Surface Water (SW)		Air	
				Overland/flood (Ref. 1, Table 4-2)	GW to SW (Ref. 1, Table 3-2)	Gas (Ref. 1, Table 6-3)	Particulate (Ref. 1, Table 6-9)
1	Unknown, but >0	N	10	NS	NS	NS	NS

NS Not Scored

2.4.2.2 Hazardous Waste Quantity Factor Value

According to Section 2.4.2.2 of the HRS Rule (Ref. 1, Sec. 2.4.2.2, p. 66), if the hazardous constituent quantity is not adequately determined for one or more sources, and if any target for the migration pathway under consideration is subject to Level I (or Level II) concentrations, assign either the value from Table 2-6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for that pathway. Because Level I concentrations are present in a drinking water well at the site (as presented in this HRS documentation record), a hazardous waste quantity factor value of 100 is assigned.

Hazardous Waste Quantity Factor Value: 100

Description of Other Possible Sources:

There are at several other possible sources of chlorinated solvents in the area. The names of the possible sources are as follows (Ref. 91, p. 1).

1) Former Black Lumber Company, 333 West Washington Street, Martinsville, IN (EPA ID: IND980794432): A Phase II Environmental Site Assessment (December 27, 1994, Earth Tech) indicated levels of tetrachloroethene at levels in the groundwater exceeding the U.S. EPA Maximum Contaminant Level (MCL) of 5.0 ppb. The property was addressed in the IDEM State Clean-Up Program and was given closure in January 2012. There is no evidence that this site ever used or stored PCE on-site (Ref. 67, p. 8). The source of the PCE may be originating from an off-site source (Ref. 67, pp. 5, 6).

1) Junkyard located south and adjacent to Black Lumber Company (Ref. 67, pp. 5, 6, 19). According to the Phase II Environmental Site Assessment (December 27, 1994, Earth Tech), a series of samples were obtained along the south property line of the Black Lumber property to investigate the potential impacts from the junkyard. PCE was detected in ground water above MCL in one of these locations which may indicate that there is a potential source on the junkyard property (Ref. 67, pp. 11, 19).

3) Semi-truck repair facility, southeast of Black Lumber Company, Martinsville, IN. This facility was identified in the 12/27/94 Phase II ESA performed at the Black Lumber Company Site as a potential source of the PCE detected at the Black Lumber site (Ref. 67, p. 8).

4) Twigg Corporation, 659 East York Street, Martinsville, IN (EPA ID: IND056100274). This facility manufactured metal alloy parts for the aerospace industry using a process that included the use of chlorinated solvents (Ref. 81, p. 4). VOC detections in soils around the facility indicate the presence of contamination going back as far as 1992 (Ref. 81, p. 4). This facility is located one mile southeast of the Master Wear site. The extent of VOC appears to be well defined and extends to the south southwest from the Twigg Corporation (Ref. 81, pp. 6, 44).

5) Former Harmon-Motive, 1201 S. Ohio Street, Martinsville, IN (EPA ID: IND067469437). The Twigg Corporation's Oct. 30, 1998 Phase II Investigation report mentioned a September 6, 1996 report prepared by Harmon-Motive that indicates that there were subsurface VOC detections, including PCE, near this facility, which adjoins the Twigg facility (Ref. 81, p. 5; 102, pp. -------).

6) Martinsville City Garage, 1349 Blue Bluff Road, Martinsville, IN (EPA ID: IND980682959). A complaint filed with IDEM alleged that 25-30 drums of degreasers, specifically PCE, were buried in the 1970's near the city garage. The IDEM Industrial Waste Compliance Section investigated in 2003 and did not find any evidence of burial (Ref. 82, pp. 14, 15). The IDEM Site Investigation program conducted a Pre-CERCLIS Screening at the site in 2005 and did not find any evidence of ground water contamination emanating from the site (Ref. 82, pp. 2, 3).

- Other Drycleaners in Martinsville: As part of the Master Wear Reassessment conducted by IDEM, other current and former drycleaning operations were identified through a search of Martinsville City Directories. A total of six (6) drycleaning facilities were identified with approximate dates of operation:

7) Central Dry Cleaners was located at 259 East Jackson Street. The facility operated from 1954-1976. This former facility is located approximately 1000 feet up-gradient to the Master Wear facility. This facility is located up-gradient to a background well (MW4S) which was installed during the remedial phase in 2005. Originally no contaminants of concern were found in the water in this monitoring well. However, elevated levels of PCE began showing up in this well during quarterly monitoring of the well by the consultant from 2006 through 2008. To confirm that the original shallow background well (MW4S) was still contaminated with elevated levels of PCE IDEM collected a sample from the well in 2010 as part of the Reassessment. Analytical results showed that this well continued to be impacted. Additional subsurface investigations need to be conducted to determine if Central Dry Cleaners is the source. Since ground water flow from Central Dry Cleaners is to the northwest toward the Master Wear facility, the plume associated with monitoring well MW4S may have become comingled with the plume at the Master Wear facility.

8) The Manitorium Cleaners was located at 50 West Washington Street. The facility operated from 1954 to 1962. The Manitorium Cleaners was located near the Master Wear facility. Sampling of monitoring wells installed near the Manitorium Cleaners for the investigation of the Master Wear facility revealed elevated levels of PCE. However, due to the close proximity of the Manitorium Cleaners to the Master Wear facility, additional subsurface investigations are needed to determine if this is a potential source.

9) Kent Cleaners/Richard Deering was located at 55 West Morgan Street. The facility operated from 1962 to1978. Sampling of monitoring wells installed near this former dry cleaning operation for the investigation of the Master Wear facility revealed elevated levels of PCE. However, due to the close proximity of the Kent Cleaners to the Master Wear facility, additional subsurface investigations are needed to determine if this is a potential source.

10) Artesian City Cleaners is located at 165 East Morgan Street. The facility operated from 1954 to 1999. Elevated levels of PCE were detected in a background soil and ground water sample obtained by direct push method in the vicinity of the former Artesian City Cleaners for the PA/SI investigation. Additional subsurface investigations are needed to determine if this is a potential source.

11) Martinsville Cleaners is located at 690 E. Morgan Street. The cleaners operated in 1989. This

facility is located approximately ½ mile to the east of the Master Wear facility. No investigation has been conducted in this area to determine if this facility is a potential source.

12) O'Neal's Clothes Depot is located at 833 E. Morgan Street. The facility operated from 1983 to present. This facility is located approximately ½ mile to the east of the Master Wear facility. No investigation has been conducted in this area to determine if this facility is a potential source.

Hazardous Substances Released
Cis-1,2-Dichloroethylene
Trichloroethyelene (TCE)
Tetrachloroethylene (PCE)

Ground Water Observed Release Factor Value: 550

3.0 GROUND WATER MIGRATION PATHWAY

3.0.1 GENERAL CONSIDERATIONS

Ground Water Migration Pathway Description

The ground water plume associated with the Master Wear site is located in the glacial outwash (sands and gravel) of Wisconsinan, Illinoian, and pre-Illinoian time events and overlie bedrock in the area (Ref. 59, p. 2). Most unconsolidated deposits in the study area range from less than 50 to over 100 ft thick (Ref. 59, p. 2). A veneer of topsoil less than 10 feet thick overlies the glacial deposits in the study area (Ref. 59, p. 2). The Borden Group (comprised of mainly of siltstones and shales) underlie the unconsolidated deposits (Ref. 59, p. 2). The Borden Group ranges from 485 to 800 ft. thick (Ref. 59, p. 2). The bedrock is weathered and fractured shale and siltstone (Ref. 59, p. 2). The City of Martinsville municipal wells utilize ground water from the unconsolidated aquifer located above the bedrock (Ref. 59, p. 3). The influence of pumping at the City of Martinsville Municipal Well Field is pulling the ground water contaminant plume emanating from the Master Wear site toward the municipal wells (Ref. 59, p. 2; 33, p. 10). Peziometric maps and reports show that ground water flow from the Master Wear facility area is toward the Martinsville municipal wells (Ref. 84, p. 8; 85, p. 1; 86, p. 1; 87, p. 1).

Description

The surficial aquifer is the aquifer being evaluated. The aquifer consists of sand and gravel and is contaminated with elevated levels of tetrachloroethene (Ref. 59, pp. 1, 2, 3; 46, p. 23). This aquifer is the primary source of drinking water for the residents of Martinsville, Indiana. This aquifer is utilized by the Martinsville municipal well system. (Refer to the Contaminated Ground Water Monitoring Well Sample Table, Contaminated Ground Water Municipal Well Sample Table, Level I Samples (Municipal Well #3) Table, and the Level I Samples (Monitoring Wells) Table found in Section 3.1.1 of this Documentation Record). Wells that have penetrated the bedrock are not evaluated for this documentation record.

3.0.2 GEOLOGY AND HYDROGEOLOGY

Regional Background

The site is located in the Norman Upland physiographic unit of the White River Basin in south-central Indiana. The Norman Upland is characterized by narrow, flat-topped divides and deep V-shaped valleys; local relief is typically 125 to 250 ft. The Norman Upland is well drained by a strongly dendritic stream pattern (Ref. 59, p. 1).

Site-Specific Considerations

The unconsolidated deposits and upper weathered and fractured bedrock form a single aquifer beneath the study area. Along the White River near Martinsville, the entire river valley is filled from bedrock to land surface with sand and gravel and is classified as a single surficial sand and gravel aquifer. The entire thickness of sand and gravel in the area may or may not represent a single, continuous deposit, but is instead a single area of stratigraphic and hydraulic connectivity. Hydraulic conductivities for sand and gravel aquifers within the White River Basin, similar to the one in the study area, range from 24 to 1,500 ft/day and produce well yields from 10 to 2,000 gal/min. The aquifer in the study area extends beneath the White River and local streams. The streams are connected hydraulically to the aquifer and usually gain water from it; however, during drought or when heavy pumping is present nearby, the streams can

act as recharge sources for the aquifer (USGS, 1992, p. 122). Based on attached Astbury Figures 6 and 12, the influence of pumping at the City of Martinsville Municipal Well Field is pulling the groundwater contaminant plume emanating from the Master Wear Site towards the municipal wells and is preventing the contamination from migrating toward any surface water features (Ref. 37, p. 4, 59, p. 2; 84, p. 8; 85, p. 1; 86, p. 1; 87, p. 1).

3.0.2.1 Stratigraphy and Water-Bearing Properties

Ground Water Usage

Groundwater usage is high in the vicinity of the site. The City of Martinsville municipal wells, as well as private wells in the area, utilize groundwater from the unconsolidated aquifer; however, one private well near the study area, drilled to a depth of 952 ft-below ground surface (bgs), is known to obtain groundwater from a deeper carbonate bedrock aquifer. It is unknown what bedrock aquifer this well utilizes and no information appears to be available concerning it. No other wells near the study area appear to utilize it (Ref. 59, p. 3).

IDENTIFIED CONTAMINATION IN THE SURFICIAL AQUIFER

PCE and TCE contamination have been identified in Municipal Well #3 of the City of Martinsville Municipal Well Field (IDEM, 2010). Soils containing PCE and TCE contamination are present on the Master Wear facility from immediately beneath the paved surface of the site to the top of the aquifer, and coincide with the origin of a ground water contaminant plume which trends toward Municipal Well #3. Both the highest groundwater concentrations and the greatest vertical extent of contamination within the aquifer are found directly beneath the Master Wear facility. Horizontally, contaminant concentrations within the groundwater plume are highest along a transect from the Master Wear facility toward Municipal Well #3. A narrow plume of chlorinated VOC contamination is expected, given the weak forces of dispersion that are typically present in sand and gravel aquifers. Two additional distinct VOC contaminant plumes are also present in the study area; however, these two plumes are smaller and do not appear to extend to Municipal Well #3. The detection of the plume southeast of the Master Wear facility is a relatively recent occurrence and originates from an unknown upgradient source (Ref. 59, p. 3).

SUMMARY OF AQUIFER(S) BEING EVALUATED

Aquifer No.	Aquifer Name	Is Aquifer Interconnected with Upper Aquifer within 2 miles? (Y/N/NA)	Is Aquifer Continuous within 4-mile TDL? (Y/N)	Is Aquifer Karst? (Y/N)
1	Sand and Gravel	Y	Y	N

The sand and gravel; is the only aquifer being evaluated. All wells in the study area are screened in this aquifer. Bedrock beneath the aquifer is shale and is not believed to be an aquifer (Ref. 59, p. 1, 2, 3; Sections 2.2.2 and 3.1.1 of this HRS documentation record).

Background Ground Water Samples:

In February 2003 and March 2004, a total of five (5) background ground water samples were collected up-gradient of the ground water plume as part of the EPA-funded PA/SI (Ref. 43, pp. 22, 26, 28, 31, 34, 141, 160, 366, 368, 369, 371; 72, pp. 1, 2; 74, pp. 46, 47, 48). Following the March 2004 investigation, a monitoring well network consisting of 46 monitoring wells was completed (Ref. 46, p. 11). These wells were installed at various depths (Ref. 46, p. 11; 56, p. 31). Six (6) of these installed wells are up gradient to the Master Wear facility (Ref. 46, p. 31; 85, p. 1; 86, p. 1; 87, p. 1). The six (6) wells are identified as MW4S, MW4M, MW4B, MW 19S, MW 20S, and MW 21S (Ref. 56, p. 31). At the time these six (6) wells were installed, no volatile organic compounds were detected (Ref. 46, pp. 42, 49). However, since August 2006, PCE has been detected in all samples obtained in well MW4S (Ref. 46, p. 42; 63, p. 1). In 2010, PCE was detected in MW19S and MW20S (Ref. 63, p. 1; 56, p. 114). The detection of PCE in these three (3) wells (MW4S, MW19S and MW20S) indicates another source up gradient of the Master Wear facility (Ref. 46, p. 12; 59, p. 3). This source may also impact the Martinsville municipal wells since potentiometric maps show that the ground water flow from this area is to the northwest toward the municipal well field (Ref. 84, p. 8; 85, p. 1; 86, p. 1; 87, p. 1).

In August 2010, as part of the EPA-funded Reassessment, a total of two (2) background ground water samples were collected up gradient of the ground water plume. A total of seven (7) background ground water samples were obtained during the sampling events for the two IDEM investigations. All necessary quality assurance/quality control reviews were conducted for both of these samples (Ref. 43, pp. 207, 208, 209, 210, 211, 212, 213, 388, 389, 390, 391, 292, 293, 394, 395, 396, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419; 56, pp. 108, 109, 110, 111, 112, 113, 114, 133, 134, 135, 136, 137, 151, 152, 153, 154, 155, 183, 184, 185, 186, 187; Section 2.2.2 of this HRS documentation record).

All groundwater grab samples were collected with the direct push boring device and continuous soil samples were obtained using direct push equipment and screened with a photo-ionization detector. A peristaltic pump was used to purge at least three (3) rod volumes of groundwater before each sample was collected. Samples were collected with a peristaltic pump (Ref. 43, p. 22; 56, p. 13).

All ground water samples collected from permanent wells (monitoring wells) for the 2010 Reassessment were obtained by purging the well until stable geochemical parameters were observed. A field meter was used to obtain dissolved oxygen, temperature, specific conductivity and pH. Other measurements recorded included water level and the amount of water pumped prior to sample collection. Samples were collected with a stainless steel bladder pump at a low flow rate to minimize volatilization of any contaminants present. Nitrile surgical gloves were worn and discarded between the collection of each sample and sample containers were immediately place on ice after collection (Ref. 55, p. 13).

The table below provides a summary of the background ground water samples that were obtained from direct push methods located up-gradient of the former Master Wear facility. All direct push ground water samples in the area were collected in the sands and gravels of the glacial outwash aquifer and are of the same aquifer (Ref. 59, pp. 1, 2, 3; 56, pp. 372, 373, 374, 375: 71, pp. 1 through 13; 80, pp. 1, 2, 3).

Background Ground Water Grab Sample Table
(Obtained by Direct Push Method)

EPA CLP #	IDEM #	Control #	Sample Date	Location	Hazardous Substance	Sample Concentration	Contract Required Quantitation Limit (CRQL)	Depth (Feet)	Reference
E1LK3	GW 1	N/A	2/17/03	Next to Martinsville city utility payment office; Boring #1	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	16-20 ft.	Ref. 43, pp. 25, 141; 72, p. 1; 73 pp. 118-119, 151-153; 71, p. 1; 93, p. 6
E1LL5	GW2	N/A	2/18/03	Southwest corner of Sycamore and Morgan; Boring #2	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	8 µg/L Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	16-20 ft.	Ref. 43, pp. 25, 160; 72, p. 2; 73 pp. 124-125, 205-207;71, p. 2; 93, p. 6
E2AY6	B1-25	N/A	3/31/04	South of utility payment office	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	0.11 µg/L (J) (0.5 µg/L)* Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	25 ft.	Ref. 43, pp. 28, 366; 74, p. 46; 75 pp. 7, 34-35, 87-89;90, p. 1; 93, p. 8
E2AY7	B1-40	N/A	3/31/04	South of utility payment office	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	40 ft.	Ref. 43, pp. 28, 368; 74, p. 47; 75 pp. 36-37, 90-92; 90, p. 1; 93, p. 8
E2AY8	B1-55	N/A	3/30/04	South of utility payment office	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	55 ft.	Ref. 43, pp. 28, 371; 74, p. 48; 75 pp. 36-37, 93-95; 90, p. 1 ; 93, p. 2
E2RA6	GW4	GW57	8/4/10	Ground Water Boring (#3), Columbus St. west of Wayne St.	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	12-13 ft.	Ref. 55, pp. 392, 429-431;56, pp. 90, 285; 56, p. 404; 93, p. 13
E2RA8	GW5	GW58	8/4/10	Ground Water Boring (#4), Columbus St. east of Jefferson St.	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect * Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	14 ft.	Ref. 55: pp. 392, 432-434; 56, pp. 91, 286; 56, p. 405; 93, p. 13

*E2AY6 and E2RA8 Tetrachloroethene result J-Flagged and adjusted using the procedure described in EPA 540-F-94-028, Using Qualified Data to Document an Observed Release and Observed Contamination, November 1996.

The table below provides a summary of the background ground water samples that were obtained from permanent monitoring wells located up-gradient of the former Master Wear facility. All of these wells listed are completed in the sands and gravels of the glacial outwash of the aquifer and are of the same aquifer (Ref. 59, p. 2; 80, p. 1).

Background Ground Water Monitoring Well Sample Table (Obtained from Monitoring Wells)

EPA CLP #	IDEM #	Control #	Sample Date	Location	Hazardous Substance	Sample Concentration (ug/l)	Contract Required Quantitation Limit (CRQL)	Depth (Feet)	Reference
E2R49	MW4B	GW19	7/27/10	Monitoring Well #4, Bedrock @ Sycamore St. north of Jackson St.	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	94 ft.	Ref. 55, pp. 145, 196-198; 56, pp. 56, 247, 392; 93, p. 14
E2R50	MW4M	GW20	7/27/10	Monitoring Well #4, Medium @ Sycamore St. north of Jackson St.	Tetrachloroethene Cis 1,2–Dichloroethene Trichloroethene	Non-detect Non-detect Non-detect	0.5 µg/L 0.5 µg/L 0.5 µg/L	58 ft.	Ref. 55, pp. 145, 199-201; 56, pp. 55, 248, 393; 93, p. 14

3.1 LIKELIHOOD OF RELEASE

3.1.1 OBSERVED RELEASE

Aquifer Being Evaluated: 1 Surficial

Chemical Analysis

Establishing an observed release by chemical analysis requires analytical evidence of a hazardous substance in the media significantly above background level. If the background concentration is not detected (or is less than the detection limit), an observed release is established when the sample measurement equals or exceeds its own sample quantitation limit (SQL) and that of the background sample. If the SQL cannot be established, the EPA contract-required quantitation limit (CRQL) is used in place of the SQL (Ref. 1, Section 2.3, p. 63).

- Contaminated Samples:

The outer boundaries of the contaminated ground water plume have tentatively been established from west to east along East Washington Street from Shirley Drive to South Main Street, north on Shirley Drive from East Washington Street to West Cunningham Street (municipal well field) along the west, and north on South Main from East Washington Street to West Cunningham Street along the east (Ref. 63, p. 1; Master Wear Ground Water Boundary Plume Map, Figure 1-4 of this documentation record; Contaminated Ground Water Monitoring Well Sample Table listed below in this section; Section 2.2.2 of this HRS documentation record). Background wells were identified upgradient of the plume (Ref. 63, p. 1; 43, pp. 25, 28, 205, 493; Background Ground Water Grab Sample Table and the Background Ground Water Monitoring Well Sample Table found in section 3.0.2.1 of this documentation record; Section 2.2.2 of this HRS documentation record).

The water from fourteen (14) wells, consisting of monitoring wells and municipal wells were found to be contaminated with chlorinated VOCs (Ref. Sections 2.2.2, 3.1.1, 3.3.2.2, and the Contaminated Ground Water Monitoring Well Sample Table found in the section of this HRS documentation record). These fourteen (14) wells are within a one (1) mile radius of the center of the plume (Ref. 56, p. 36: Master Wear Groundwater Plume Boundary Map, Figure 1-4 of this HRS Documentation Record).

In 2003 and 2004, IDEM's Site Investigation Section conducted PA/SI activities at Master Wear (Ref. 43, pp. 22, 26, 31, 34; 72, pp. 1 through 51; 74, pp. 1 through 59). IDEM utilized the EPA Contract Laboratory Program (CLP) for sample analysis (Ref. 73, pp. 1 through 375; 75, pp. 1 through 305). Sample results showed that the concentrations of PCE were above the EPA cancer risk level of 1.6 ug/l for PCE in ground water samples obtained by direct push method (Ref. the Contaminated Ground Water Sample (Direct Push Method) Table). Concentrations of PCE were found to be as high as 2,200 ug/l and as high as 3.3 ug/l TCE (Ref. Sections 2.2.2 of this HRS documentation record; Contaminated Ground Water Monitoring Well Sample Table; the Contaminated Ground Water Municipal Well Sample Table found in Section 3.1.1; Section 3.3.2.2 of this HRS documentation record).

In 2010, IDEM's Site Investigation Section began Reassessment activities at Master Wear (Ref. 56, pp. 1 through 37). Sample results obtained from the CLP for the Reassessment showed that the concentrations of PCE were above the EPA cancer risk level of 1.6 ug/l for PCE in fourteen (14) wells. in a range of 1.6 ug/l to 170 ug/l and from .25 ug/l to 1.20 ug/l for TCE (Ref. Section 2.2.2 of this HRS documentation record;

Contaminated Ground Water Monitoring Well Sample Table and the Contaminated Ground Water Municipal Well Sample Table found in Section 3.1.1; Section 3.3.2.2 of this HRS documentation record).

The Master Wear facility, the source, was a commercial/industrial laundry and drycleaning operation that released chlorinated solvents into the environment, resulting in the contamination of soil and groundwater (Ref. Site Summary, first paragraph, of this documentation record). The contaminated groundwater eventually reached the City of Martinsville's municipal drinking water wells (Ref. 59, pp. 2, 3; Figure 1-4 of this documentation record; Contaminated Ground Water Sample (Municipal Well #3) Table). The Master Wear facility was located approximately 2,000 feet to the southeast of the municipal water wells (Ref. Figure 1-4 of this documentation record).

The extent of this plume has not been completely delineated at this time but has been characterized by data from monitoring wells, grab samples obtained by direct push methods, and municipal wells (Ref. Sections 2.2.2 and 3.1.1, 3.3.2.2 and 3.3.2.3 of this HRS documentation record; Figure 1-4 of this documentation record).

The following set of tables depicts the samples that meet the observed release criteria. These tables list the organic hazardous substances with their concentrations and SQLs for each sample. All necessary quality assurance/quality control reviews were conducted for all of these samples (Ref. 55, pp. 1, 2, 3, 4, 5, 6, 7, 8, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43,137, 138, 139, 140, 141, 159, 160, 161, 162, 163, 255, 256, 257, 258, 259, 279, 280, 281, 282, 283, 284, 285, 286, 287, 386, 387, 388, 389, 390, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 452, 453, 454, 455, 456, 457, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484; 73, pp. 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 22, 23, 111, 112, 113, 114, 115, 116, 117, 139, 140, 141, 142, 248, 249, 250, 251, 252, 253, 254, 255, 256, 277, 278, 279, 280, 281, 282, 374, 375; 75, pp. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 22, 23, 24 , 25, 26, 27, 28, 29, 30, 31, 50, 51, 52, 53, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176,196, 197, 198, 199, 200; 43, pp. 113, 114, 115, 116).

These samples were qualified as "releases" based on the criteria in the HRS Rule (Ref. 1, Table 2-3, p. 63). The well locations can be seen in the Sample Location and Contaminant of Concern Map (Ref. 63, p. 1). The table below presents the typical well depth that drinking water wells are drilled and screened at in the area. As addressed in Sections 3.0.1 and 3.0.2 of this HRS documentation record, all wells that are screened within the unconsolidated deposits are considered the same aquifer (Ref. 59, pp. 1, 2, 3; 56, pp. 372, 373, 374, 375: 71, pp. 1 through 13; 80, pp. 1, 2, 3).

The following table lists ground water samples that were obtained from monitoring wells that were found to be contaminated with elevated levels of chlorinated compounds. All monitoring well water samples in the area were collected in the sands and gravels of the glacial outwash aquifer and are of the same aquifer as the permanent well samples (Ref. 59, pp. 1, 2, 3; 56, pp. 372, 373, 374, 375: 71, pp. 1 through 13; 80, pp. 1, 2, 3).

Contaminated Ground Water Monitoring Well Sample Table

EPA CLP #	IDEM #	Sample Date	Location	Hazardous Substance	Sample Concentration	Contract Required Quantitation Limit (CRQL	Depth	References
E2R88	MW20S	7/28/10	Washington St. west of Main St.	Tetrachloroethene	5.1 µg/L	0.5 µg/L	16 ft.	Ref. 55, pp. 14, 91-93; 56, pp. 84, 270, 364; 93, p. 16
E2R59	MW7M	7/28/10	Pike St. east of Mulberry St.	Tetrachloroethene	6.7 µg/L	0.5 µg/L	38 ft.	Ref. 55, pp. 10, 56-59; 56, pp. 64, 272, 398; 93, p. 15
E2R60	MW7M	7/28/10	Pike St. east of Mulberry St. **(dup of E2R59)**	Tetrachloroethene	8.2 µg/L	0.5 µg/L	38 ft.	Ref. 55, pp. 10, 60, 61, 62; 56, pp. 65, 273, 398; 93, p. 15
E2R89	MW22S	7/28/10	Morgan St. west of Main St.	Tetrachloroethene	11 µg/L	0.5 µg/L	18 ft.	Ref. 55, pp. 14, 94-96; 56, pp. 85, 274, 363; 93, p. 16
E2R62	MW13S	7/28/10	Pike St. east of Shirley St.	Tetrachloroethene	1.6 µg/L	0.5 µg/L	14 ft.	Ref. 55, pp. 10, 66-68; 56, pp. 81, 277, 381; 93, p. 16
E2R43	MW6S	7/26/10	Marion St. south of Morgan St.	Tetrachloroethene	1.9 µg/L	0.5 µg/L	13 ft.	Ref. 55, pp. 145, 187-189; 56, pp. 60, 232, 388; 93, p. 13
E2R71	MW5S	7/26/10	Marion St. south of Morgan St.	Tetrachloroethene	2.3 µg/L	0.5 µg/L	10 ft.	Ref. 55, pp. 149, 217-219; 56, pp.57, 237, 376; 93, p. 14
E2R77	MW11S	7/27/10	Harrison St. west of Marion St.	Tetrachloroethene	1.6 µg/L	0.5 µg/L	15 ft.	Ref. 55, pp. 149, 223-225; 56, pp. 76, 249, 374; 93, p. 14
E2R51	MW4S	7/27/10	Sycamore St. north of Jackson St.	Tetrachloroethene	210 µg/L (J) **(180 µg/L)***	10 µg/L*	14 ft.	Ref. 55, pp. 147, 202 – 207; 56, pp. 53, 252, 394; 57, pp. 1 through 18; 93, p. 14
E2R52	MW4S	7/27/10	Sycamore St. north of Jackson St. **(dup of E2R51)**	Tetrachloroethene	180 µg/L (J) **(170 µg/L)***	10 µg/L*	14 ft.	Ref. 55, pp. 147, 208-213; 56, pp. 54, 253, 394; 57, pp. 1-18; 93, p. 14
E2R46	MW2S	7/27/10	Mulberry St. south of Morgan St.	Tetrachloroethene	66 µg/L	4 µg/L*	13 ft.	Ref. 55, pp. 261, 300-305; 56, pp.46, 241, 386; 93, p. 17
E2R53	MW1S	7/28/10	Master Wear site behind building	Tetrachloroethene	120 µg/L	8 µg/L*	18 ft.	Ref. 55, pp. 261, 312 – 317;56, pp. 42, 259, 383 ; 93, p. 18
E2R54	MW1S	7/28/10	Master Wear site behind building **(dup of E2R53)**	Tetrachloroethene	120 µg/L	8 µg/L*	18 ft.	Ref. 55, pp. 263, 318-323; 56, pp. 43, 260, 383; 93, p. 18
E2R57	MW15S	7/28/10	Highland St. west of Elliot Ave.	Tetrachloroethene	4.5 µg/L	0.5 µg/L	14 ft.	Ref. 55, pp. 265, 330-331; 56, pp.82, 263, 396; 93, p. 19
E2R75	MW9S	7/27/10	Washington St. west of West St.	Tetrachloroethene Trichloroethene Cis-1,2-Dichloroethene	4.6 µg/L 1.2 ug/L 1.3 ug/L	0.5 µg/L 0.5 µg/L 0.5 ug/L	15 ft.	Ref. 55, pp. 266, 267, 345-347; 56, pp. 69, 244, 379; 93, p. 18
E2R76	MW9S	7/27/10	Washington St. west of West St. **(dup of E2R75)**	Tetrachloroethene Trichloroethene Cis-1,2-Dichloroethene	4.6 µg/L 1.0 ug/L 1.3 ug/L	0.5 µg/L 0.5 µg/L 0.5 ug/L	15 ft.	Ref. 55, pp. 266, 267, 348–350;56, pp. 70, 245, 379; 93, p. 18
E2R84	MW3S	7/28/10	Morgan St. east of Mulberry St.	Tetrachloroethene Trichloroethene	15 µg/L 0.21 µg/L	0.5 µg/L 0.5 µg/L	17 ft.	Ref. 55, pp. 266, 267, 354-356; 56, pp. 49, 264, 368; 93, p. 19

E2R85	MW3S	7/28/10	Morgan St. east of Mulberry St. **(dup of E2R84)**	Tetrachloroethene Trichloroethene	13 µg/L 0.28 µg/L	0.5 µg/L 0.5 µg/L	17 ft.	Ref. 55, pp. 268, 269, 357-359; 56, pp. 50, 265, 368; 93, p. 19

*E2R46 Tetrachloroethene SQL increased due to dilution factor.

*E2R54 Tetrachloroethene SQL increased due to dilution factor.

*E2R52 Tetrachloroethene SQL increased due to dilution factor.

*E2R52 Tetrachloroethene Result Biased High and adjusted using the procedure described in EPA 540-F-94-028, *Using Qualified Data to Document an Observed Release and Observed Contamination*, November 1996.
*E2R52 is the field duplicate of sample E2R51.

*E2R51 and E2R52 Tetrachloroethene Result Biased High and adjusted using the procedure described in EPA 540-F-94-028, Using Qualified Data to Document an Observed Release and Observed Contamination, November 1996.*E2R46, E2R53, and E2R54 CRQL increased due to dilution factor.

Level I Samples (Monitoring Wells) Table

Sample ID	Hazardous Substance	Hazardous Substance Concentration (unit)	Benchmark Concentration (µg/L)	Benchmark	Reference for Benchmark
E2R88	Tetrachloroethene	5.1 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R59	Tetrachloroethene	6.7 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R60	Tetrachloroethene	8.2 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R89	Tetrachloroethene	11 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R62	Tetrachloroethene	1.6 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R43	Tetrachloroethene	1.9 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R71	Tetrachloroethene	2.3 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R77	Tetrachloroethene	1.6 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R51	Tetrachloroethene	210 µg/L (J) **(180 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R52	Tetrachloroethene	180 µg/L (J) **(170 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R46	Tetrachloroethene	66 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R53	Tetrachloroethene	120 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R54	Tetrachloroethene	120 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R57	Tetrachloroethene	4.5 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R75	Tetrachloroethene Trichloroethene	4.6 µg/L 1.2 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2R76	Tetrachloroethene Trichloroethene	4.6 µg/L 1.0 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2R84	Tetrachloroethene	15 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R85	Tetrachloroethene	13 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8

Level II Samples (Monitoring Wells) Table

Sample ID	Hazardous Substance	Hazardous Substance Concentration (unit)	Benchmark Concentration (µg/L)	Benchmark	Reference for Benchmark
E2R75	Cis 1,2-Dichloroethene	1.3 µg/L	70 µg/L	MCL	Ref. 2, p. 6
E2R76	Cis 1,2-Dichloroethene	1.3 µg/L	70 µg/L	MCL	Ref. 2, p. 6
E2R84	Trichloroethene	0.21 µg/L	1.0 µg/L	Cancer Risk	Ref. 2, p. 10
E2R85	Trichloroethene	0.21 µg/L	1.0 µg/L	Cancer Risk	Ref. 2, p. 10

The following table lists the ground water samples that were obtained from Municipal Well #3 that were used for drinking water purposes and found to contain elevated levels of VOCs at level I concentrations. The municipal well water samples were collected in the sands and gravels of the glacial outwash aquifer and are of the same aquifer as the permanent well samples (Ref. 59, p. 2; 80, p. 1).

Contaminated Ground Water Sample (Municipal Well #3) Table

EPA CLP #	IDEM #	Control #	Sample Date	Location	Hazardous Substance	Sample Concentration	Contract Required Quantitation Limit (CRQL)	Depth	References
N/A	TK7202	N/A	1/22/03	Municipal Well #3, north of Cunningham St., west of Elliot Ave.	Tetrachloroethene Trichloroethene	4.2 µg/L 0.75 µg/L (J)	1.0 µg/L 1.0 µg/L	83 ft.	Ref. 43, pp. 21, 22, 23, 108,116; 88, pp. 102, 221-222; 89, p. 3
N/A	TK7203	N/A	1/22/03	Municipal Well #3, north of Cunningham St., west of Elliot Ave. (Duplicate of TK7202)	Tetrachloroethene Trichloroethene	2.2 µg/L 0.73 µg/L (J)	1.0 µg/L 1.0 µg/L	83 ft.	Ref. 43, pp. 21, 22, 23, 108,116; 88, pp. 119, 223-224; 89, p. 4
E2R63	PW1	GW50	8/3/10	Municipal Well #3, north of Cunningham St., west of Elliot Ave.	Tetrachloroethene Trichloroethene	11 µg/L 0.25 µg/L	0.5 µg/L 0.5 µg/L	83 ft.	Ref. 55, pp. 9, 10, 69, 70, 71; 56, pp. 29, 32, 35, 38, 86, 278; 93, p. 16
E2R64	PW4	GW51	8/3/10	Municipal Well #3, north of Cunningham St., west of Elliot Ave. (Duplicate of E2R63)	Tetrachloroethene Trichloroethene	12 µg/L 0.32 µg/L	0.5 µg/L 0.5 µg/L	83 ft.	Ref. 55, pp. 11, 12, 72, 73, 74; 56, 29, 32, 35, 38, 87, 279; 93, p. 16

J=Estimated Concentration Above The Method Detection Limit, But Below The Laboratory Reporting Limit. No adjustments can be made using the procedure described in EPA 540-F-94-028, *Using Qualified Data to Document an Observed Release and Observed Contamination*, November 1996, since no background samples were collected.

Level I Samples (Municipal Well #3) Table

Sample ID	Hazardous Substance	Hazardous Substance Concentration (µg/L)	Benchmark Concentration (µg/L)	Benchmark	Reference for Benchmark
TK7202	Tetrachloroethene	4.2 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
TK7203	Tetrachloroethene	2.2 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R63	Tetrachloroethene	11 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2R64	Tetrachloroethene	12 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8

Notes: µg/L – micrograms per liter. TCE was detected in the municipal ground water sample at Level I concentrations. Samples E2R63 and E2R64 (Duplicate) (Municipal #3) are the only Level I samples that are associated with targets. All other ground water samples were obtained either by a direct push method or collected from an established monitoring well.

Level II Samples (Municipal Well #3) Table

Sample ID	Hazardous Substance	Hazardous Substance Concentration (unit)	Benchmark Concentration (µg/L)	Benchmark	Reference for Benchmark
TK7202	Trichloroethene	0.75 µg/L (J)	1.0 µg/L	Cancer Risk	Ref. 2, p. 10
TK7203	Trichloroethene	0.73 µg/L (J)	1.0 µg/L	Cancer Risk	Ref. 2, p. 10
E2R63	Trichloroethene	0.25 µg/L	1.0 µg/L	Cancer Risk	Ref. 2, p. 10
E2R64	Trichloroethene	0.32 µg/L	1.0 µg/L	Cancer Risk	Ref. 2, p. 10

The following two tables are provided in support to show that an observed release to the ground water pathway had occurred resulting in an associated ground water plume with the Master Wear property. Also the tables show a potential of vapor intrusion to the overlying residential/business neighborhood (Ref. 63, p. 1; 91, p. 1; 96, p. 1; 97, p. 1; 98, p. 1; 99, p. 1).

Contaminated Ground Water Sample (Direct Push Method) Table

EPA CLP #	IDEM #	Control #	Sample Date	Location	Hazardous Substance	Sample Concentration (Adjusted Value)	Contract Required Quantitation Limit (CRQL)	Depth	References
E1LK4	GW4	N/A	2/17/03	Master Wear on-site by loading dock	Tetrachloroethene	20,000 µg/L J **(2,200 µg/L)***	1,000 µg/L*	18-22 ft.	Ref. 43, pp. 33, 145; 71, p. 4; 72, p. 4; 73, pp. 119, 154, 155, 156, 157, 158, 159; 93, p. 6
E1LK5	GW4	N/A	2/17/03	Master Wear on-site by loading dock **(Duplicate of E1LK4)**	Tetrachloroethene	21,000 µg/L **(2,100 µg/L)***	1,000 µg/L*	18-22 ft.	Ref. 43, pp. 33; 71, p. 4; 72, p. 5; 73, pp. 119, 160, 161, 162, 163, 164, 165; 93, p. 6
E1LK6	GW5	N/A	2/17/03	Master Wear on-site at utility access	Tetrachloroethene Trichloroethene	660 µg/L **(66 µg/L)*** 3 µg/L	25 µg/L* 0.5 µg/L	20-24 ft.	Ref. 43, pp. 33, 148; 71, p. 5; 72, p. 6; 73, pp. 120, 121, 166, 167, 168, 169, 170, 171; 93, p. 6
E1LK7	GW8	N/A	2/17/03	Southwest corner of Morgan and Mulberry Streets	Tetrachloroethene	8,100 µg/L **(630 µg/L)***	250 µg/L*	16-20 ft.	Ref. 43, pp. 33, 150; 71, p. 9; 72, p. 10; 73, pp. 121, 172, 173, 174, 175, 176, 177; 93, p. 6
E1LK9	GW3	NA	2/17/03	Northwest corner of West Washington and South Mulberry	Tetrachloroethene	48 µg/L **(4.2 µg/L)***	2.5 µg/L*	16-20 ft.	Ref. 43, pp. 33, 152;71, p. 3; 72, p. 3; 73, pp. 123, 181, 182, 183, 184, 185, 186; 93, p. 2

E1LL1	GW10	NA	2/17/03	Jackson and Jefferson Street, south of Black Lumber site	Tetrachloroethene	31 µg/L **(2.8 µg/L)***	1.0 5 µg/L*	16-20 ft.	Ref. 43, pp. 33, 156; 71, p. 11; 72, p. 12; 73, pp. 123, 190, 191, 192, 193, 194, 195; 93, p. 6
E1LL6	GW6	N/A	2/18/03	Master Wear on-site near southwest corner of lot	Tetrachloroethene	16,000 µg/L **(1,200 µg/L)***	500 µg/L*	20-24 ft.	Ref. 43, pp. 33, 163; 71, pp. 6, 7; 72, p. 7; 73, pp. 125, 127, 208, 209, 210, 211, 212, 213; 93, p. 7
E1LL7	GW6	N/A	2/18/03	Master Wear on-site near southwest corner of lot **(Duplicate of E1LL6)**	Tetrachloroethene	17,000 µg/L **(1,600 µg/L)***	500 µg/L*	20-24 ft.	Ref. 43, pp. 33, 163; 71, p. 6, 7; 72, p. 8; 73, pp. 127, 218, 219, 220, 221, 222, 223; 93, p. 7
E1LL9	GW11	N/A	2/18/03	Southwest corner of Shirley and Morgan Streets	Tetrachloroethene	72 µg/L **(64 µg/L)***	2.5 µg/L*	16-20 ft.	Ref. 43, pp. 33, 167; 71, p. 12; 72, p. 13; 73, pp. 129, 227, 228, 229, 230, 231, 232; 93, p. 7
E2AY3	B3-20	N/A	3/30/04	Southeast corner of Pike and Marion Streets	Tetrachloroethene Trichloroethene Cis-1,2-Dichloroethene	800 µg/L 3.3 µg/L 1.8 µg/L	75 µg/L* 0.5 µg/L 0.5 µg/L	20 ft.	Ref 43, pp.34, 363; 90, p. 3; 74, p. 8; 75, p. 32, 33, 69, 70, 71, 72, 73, 74; 93, p. 8
E2AY4	B3-30	N/A	3/30/04	Southeast corner of Pike and Marion Streets	Tetrachloroethene Trichloroethene	890 µg/L 2.4 µg/L	75 µg/L* 0.5 µg/L	30 ft.	Ref 43, pp.34, 365; 90, p. 3;74, p. 9; 75, pp. 32, 33, 34, 35, 75, 76, 77, 78, 79, 80; 93, p. 8
E2AY5	B3-45	N/A	3/30/04	Southeast corner of Pike and Marion Streets	Tetrachloroethene	77 µg/L **(95 µg/L)**	4.0 µg/L*	45 ft.	Ref 43, pp.34, 367;90, p. 3; 74, p. 10,; 75, p. 35, 81, 82, 83, 84, 85, 86; 93, p. 8
E2AY9	B11-20	N/A	3/31/04	South side of Highland Street north of Maple Street	Tetrachloroethene	9.0 µg/L	0.5 µg/L	20 ft.	Ref 43, pp.34, 370; 90, p. 10; 74, p. 31; 75, pp. 37, 96, 97, 98; 93, p. 8
E2AZ0	B11-50	N/A	3/30/04	South side of Highland Street north of Maple Street	Tetrachloroethene	1.8 µg/L	0.5 µg/L	50 ft.	Ref 43, pp. 374; 90, p. 10; 74, p. 33; 75, p. 37, 99, 100, 101; 93, p. 8
E2AZ2	B6-20	N/A	3/31/04	Northwest corner of Cherry and Harrison Streets	Tetrachloroethene Trichloroethene	190 µg/L 1.9 µg/L	0.5 µg/L 0.5 µg/L	20 ft.	Ref 43, pp.34, 375; 90, p. 5; 74, p. 14; 75, pp. 38, 39, 105, 106, 107, 108, 109, 110 ; 93, p. 9
E2AZ3	B6-20	N/A	3/31/04	Northwest corner of Cherry and Harrison Streets **(Duplicate of E2AZ2)**	Tetrachloroethene Trichloroethene	180 µg/L 1.8 µg/L	0.5 µg/L 0.5 µg/L	20 ft.	Ref 43, pp.34, 375; 90, p. 5; 74, p. 15; 75, pp. 38, 39, 111, 112, 113, 114, 115, 116; 93, p. 9
E2AZ4	B6-35	N/A	3/31/04	Northwest corner of Cherry and Harrison Streets	Tetrachloroethene	46 µg/L	0.5 µg/L	35 ft.	Ref 43, pp.34, 377; 90, p. 5; 74, p. 16; 75, pp. 41, 117, 118, 119, 120, 121, 122; 93, p. 9
E2AZ5	B6-50	N/A	3/31/04	Northwest corner of Cherry and Harrison Streets	Tetrachloroethene	8.2 µg/L	0.5 µg/L	50 ft.	Ref 43, pp.34, 377; 90, p. 5; 74, p. 17; 75, pp. 41, 123, 124, 125; 93, p. 9

E2AZ6	B7-20	N/A	3/31/04	South side of Harrison Street, east of Elliott Street	Tetrachloroethene	82 µg/L	0.5 µg/L	20 ft.	Ref 43, pp.34, 376; 90, p. 6; 74, p. 18; 75, pp. 41, 126, 127, 128, 129, 131 ; 93, p. 9
E2AZ7	B7-35	N/A	3/31/04	South side of Harrison Street, east of Elliott Street	Tetrachloroethene	32 µg/L	0.5 µg/L	35 ft.	Ref 43, pp.34, 378; 90, p. 6; 74, p. 19; 75, pp. 43, 132, 133, 134, 135, 136, 137; 93, p. 9
E2AZ8	B7-50	N/A	3/31/04	South side of Harrison Street, east of Elliott Street	Tetrachloroethene	7.4 µg/L	0.5 µg/L	50 ft.	Ref 43, pp.34, 379; 90, p. 6; 74, p. 20; 75, pp. 43, 138, 139, 140; 93, p. 9
E2B00	B9-25	N/A	4/1/04	Southeast corner of Marion Street and Highland Street	Tetrachloroethene	7.9 µg/L	0.5 µg/L	25 ft.	Ref 43, pp.34, 380; 90, p. 8; 74, p. 26; 75, pp. 43, 144, 145, 146; 93, p. 9
E2AW6	B2-55	N/A	3/29/04	Northwest corner of Morgan and Mulberry	Tetrachloroethene Trichloroethene	200 µg/L 1.7 µg/L	0.5 µg/L 0.5 µg/L	55 ft.	Ref 43, pp.34, 336; 90, p. 2; 74, p. 3; 75, pp. 184, 185, 214, 215, 216, 217, 218, 219; 93, p. 9
E2AW7	B2-40	N/A	3/29/04	Northwest corner of Morgan and Mulberry	Tetrachloroethene	130 µg/L **(150 µg/L)**	0.5 µg/L 10 µg/L*	40 ft.	Ref 43, pp.34, 335; 90, p. 2; 74, p. 2; 75, pp. 185, 220, 221, 222, 223, 224 ,225; 93, p. 9
E2AW8	B2-25	N/A	3/29/04	Northwest corner of Morgan and Mulberry	Tetrachloroethene Trichloroethene Cis-1,2-Dichloroethene	850 µg/L 3.2 µg/L 20 µg/L (2.0 µg/L)*	0.5 µg/L 0.5 µg/L 0.5 µg/L 0.5 µg/L	25 ft.	Ref 43, pp.34, 333; 90, p. 2; 74, p.1; 75, pp. 184, 185, 186, 187, 226, 227, 228, 229, 230, 231; 93, p. 9
E2AW9	B13-25	N/A	3/29/04	Pike Street next to Police/Fire garage	Tetrachloroethene Trichloroethene	21 µg/L 3.0 µg/L	0.5 µg/L 0.5 µg/L	25 ft.	Ref 43, pp.34 337; 90, p. 12, 74, p. 4,; 75, pp. 186, 187, 232, 233, 234; 93, p. 9
E2AX0	B13-25	N/A	3/29/04	Pike Street next to Police/Fire garage **(Duplicate of E2AW9)**	Tetrachloroethene Trichloroethene	19 µg/L 2.6 µg/L	0.5 µg/L 0.5 µg/L	25 ft.	Ref. 43, pp. 34, 337; 90, p.12; 74, p. 5; 75, pp. 186, 187, 235, 236, 237; 93, p. 10
E2AX1	B13-50	N/A	3/29/04	Pike Street next to Police/Fire garage	Tetrachloroethene	4.1 µg/L	0.5 µg/L	50 ft.	Ref 43, pp.34, 340; 90, p. 12; 74, p. 7; 75, pp. 187, 238, 239, 240; 93, p. 10
E2AX2	B5-35	N/A	3/29/04	Southwest corner of Harrison and Marion Streets	Tetrachloroethene Trichloroethene	3.6 µg/L 2.9 µg/L	0.5 µg/L 0.5 µg/L	35 ft.	Ref 43, pp.34, 343; 90, p. 4; 74, p. 12; 75, pp. 188, 189, 241, 242, 243; 93, p. 10
E2AX4	B10-25	N/A	3/29/04	South side of Highland Street west of Elliott Street	Tetrachloroethene	9.6 µg/L	0.5 µg/L	25 ft.	Ref 43, pp.34, 345; 90, p. 9; p. 74, p. 28; 75, pp. 189, 247, 248, 249; 93, p. 10
E2AX7	B12-80	N/A	3/30/04	Vacant lot at northwest corner of Elliott and Cunningham next to Municipal Well #3	Tetrachloroethene	3.9 µg/L	0.5 µg/L	80 ft.	Ref 43, pp.34; 90, p. 11; 74, p. 50; 75, pp. 191, 256, 257, 258; 93, p. 10
E2B01	B9-40	N/A	4/1/04	Southeast corner of Marion Street and Highland Street	Tetrachloroethene	12 µg/L	0.5 µg/L	40 ft.	Ref 43, pp.34, 380; 90, p. 8; 74, p. 27; 75, pp. 193, 268, 269, 270; 93, p. 10

*E1LK4 and E1LK5 Tetrachloroethene CRQL increased due to 2000x dilution factor.

*E1LK6 Tetrachloroethene CRQL increased due to 50x dilution factor.

*E1LK7 Tetrachloroethene CRQL increased due to 500x dilution factor.

*E1LL9 Tetrachloroethene CRQL increased due to 5x dilution factor.

*E1LL6 Tetrachloroethene CRQL increased due to 1000x dilution factor.

*E1LK4 through E1LK7 and E1LL6 Tetrachloroethene Result Biased High and adjusted using the procedure described in EPA 540-F-94-028, *Using Qualified Data to Document an Observed Release and Observed Contamination*, November 1996.

*E2AY6 J-Flagged due to detection below CRQL.

*E2AY3 and E2AY4 Tetrachloroethene CRQL increased due to 150x dilution factor.

*E2AY5 CRQL increased due to 8x dilution factor.

*E2AZ3 Tetrachloroethene CRQL increased due to 20x dilution factor.

*E2AZ4 CRQL increased due to 5x dilution factor.

*E2AZ6 CRQL increased due to 10x dilution factor.

*E2AZ7 CRQL increased due to 4x dilution factor.

*E2AW6 J-Flagged due to contaminated instrument blank. Result biased high.

*E2AW6 Tetrachloroethene CRQL increased due to 30x dilution factor.

*E2AW7 Tetrachloroethene CRQL increased due to 20x dilution factor.

*E2AW8 Tetrachloroethene CRQL increased due to 125x dilution factor.

*E2AW6 Tetrachloroethene Result and E2AW8 cis-1,2-Dichloroethene Result Biased High and adjusted using the procedure described in EPA 540-F-94-028, *Using Qualified Data to Document an Observed Release and Observed Contamination*, November 1996.

Level I Sample (Direct Push Method) Table

Sample ID	Hazardous Substance	Hazardous Substance Concentration (unit) **(Adjusted Value)**	Benchmark Concentration µg/L	Benchmark	Reference for Benchmark
E2RA1	Trichloroethene	0.52 µg/L	1.0 µg/L	Cancer Risk	Ref. 2, p. 10
E1LK4	Tetrachloroethene	20,000 µg/L **(2,200 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E1LK5	Tetrachloroethene	21,000 µg/L **(2,100 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E1LK6	Tetrachloroethene Trichloroethene	660 µg/L **(66 µg/L)*** **3** µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E1LK7	Tetrachloroethene	8,100 µg/L **(630 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E1LL6	Tetrachloroethene	16,000 µg/L **(1,200 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E1LL7	Tetrachloroethene	17,000 µg/L **(1,600 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E1LL9	Tetrachloroethene	72 µg/L **(64 µg/L)***	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AY3	Tetrachloroethene Trichloroethene	800 µg/L 3.3 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AY4	Tetrachloroethene Trichloroethene	890 µg/L 2.4 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AY5	Tetrachloroethene	77 µg/L (95 µg/L)	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AY9	Tetrachloroethene	9.0 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AZ0	Tetrachloroethene	1.8 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AZ2	Tetrachloroethene Trichloroethene	190 µg/L 1.9 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AZ3	Tetrachloroethene Trichloroethene	180 µg/L 1.8 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AZ4	Tetrachloroethene	46 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AZ5	Tetrachloroethene	8.2 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AZ6	Tetrachloroethene	82 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8

E2AZ7	Tetrachloroethene	32 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AZ8	Tetrachloroethene	7.4 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2B00	Tetrachloroethene	7.9 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AW6	Tetrachloroethene Trichloroethene	200 µg/L 1.7 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AW7	Tetrachloroethene	130 µg/L **(150 µg/L)**	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AW8	Tetrachloroethene Trichloroethene	850 µg/L 3.2 µg/L	1.6 µg/L 0.21 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AW9	Tetrachloroethene Trichloroethene	21 µg/L 3.0 µg/L	1.6 µg/L 0.21 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AX0	Tetrachloroethene Trichloroethene	19 µg/L 2.6 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AX1	Tetrachloroethene	4.1 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AX2	Tetrachloroethene Trichloroethene	3.6 µg/L 2.9 µg/L	1.6 µg/L 1.0 µg/L	Cancer Risk Cancer Risk	Ref. 2, pp. 8, 10
E2AX4	Tetrachloroethene	9.6 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2AX7	Tetrachloroethene	3.9 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8
E2B01	Tetrachloroethene	12 µg/L	1.6 µg/L	Cancer Risk	Ref. 2, p. 8

Level II Samples (Direct Push Method) Table

Sample ID	Hazardous Substance	Hazardous Substance Concentration (unit) **(Adjusted Value)**	Benchmark Concentration (µg/L)	Benchmark	Reference for Benchmark
E2AY3	Cis 1,2-Dichloroethene	1.8 µg/L	70 µg/L	MCL	Ref. 2, p. 6
E2AW8	Cis 1,2-Dichloroethene	20 µg/L **(2.0 µg/L)***	70 µg/L	MCL	Ref. 2, p. 6

Attribution

The Master Wear facility has a documented release of PCE to the ground water that has likely contaminated one of the municipal wells that supply drinking water to the City of Martinsville, Indiana (Ref. 43, pp.17, 18, 19; 21, p. 2; 22, pp. 8, 9; 24, pp. 4, 5, 6; 25, p. 3; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 59, pp. 1, 2, 3; 55, pp. 10, 14, 144, 147, 149, 145, 261, 269, 267, 271, 273, 392, 196, 197, 198, 199, 200, 201, 53, 54, 55, 56, 57, 58, 59, 66, 67, 68, 69, 70, 71, 91, 92, 93, 94, 95, 96, 187, 188, 189, 217, 218, 219, 208, 209, 210, 211, 212, 213, 223, 224, 225, 300, 301, 302, 303, 304, 305, 318, 319, 320, 321, 322, 323, 330, 331, 345, 346, 347, 357, 358, 359, 429, 430, 431, 432, 433, 434, 458, 459, 461, 462, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508; 73, pp. 10, 11, 12, 13, 14, 15, 46 through 75, 82, 83, 84, 114, 118, 119, 120, 121, 126, 127, 129, 157, 158, 159, 163, 164, 165, 169, 170, 171, 175, 176, 177, 211, 212, 213, 230, 231, 232, 259, 260, 261, 262, 318 through 329; 75, pp. 32 through 43, 69 through 80, 84, 85, 86, 96, 97, 98, 99, 100, 101, 105 through 116, 120, 121, 122, 123, 124, 125, 129, 130, 131, 135, 136, 137, 138, 139, 140, 144, 145, 146, 171, 172, 184, 185, 186, 187, 188, 189, 192, 193, 214, 215, 216, 217, 218, 219, 223 through 234, 238, 239, 240, 241, 242, 243, 247, 248, 249, 256, 257, 258, 268, 269, 270; 88, pp. 102, 119, 221, 222, 223, 224; Figure 1-4 of this HRS documentation record).

Due to the number of ground water samples obtained, the soil samples depicting a source area,

and the geology/hydrology characteristics of the area being conducive to the migration of hazardous substances, and their corresponding chemical results, Master Wear is a possible contributing source of the ground water contamination (Ref. 43, pp. 17, 18, 19; 21, p. 2; 22, pp. 8, 9; 24, pp. 4, 5, 6; 25, p. 3; 29, pp. 1, 2, 3; 32, pp. 1, 2; 39, p. 1; 44, pp. 1, 2; 59, p. 3).

Sources that are unlikely to be contributing to the ground water plume are the following facilities:

Twigg Corporation, 659 East York Street, Martinsville, IN (EPA ID: IND056100274) (Ref. 91, p. 1). This facility manufactured metal alloy parts for the aerospace industry using a process that included the use of chlorinated solvents (Ref. 81, p. 4). VOC detections in soils around the facility indicate the presence of contamination going back as far as 1992 (Ref. 81, p. 4). This facility is located one mile southeast of the Master Wear site. The extent of VOC appears to be well defined and extends in a south southwesterly direction and not toward the Martinsville well field (Ref. 81, pp. 6, 44).

Former Harmon-Motive, 1201 S. Ohio Street, Martinsville, IN (EPA ID: IND067469437) (Ref. 91, p. 1). Harmon-Motive (aka Harmon Becker Automotive Systems, Inc.) has been remediating a chlorinated solvent plume, including tetrachloroethene and trichloroethene, on their site through the IDEM State Cleanup Program that has been known since at least 1996 (Ref 102, pp. 7). The Harmon site is located approximately 1 ¼ miles to the southeast of the municipal wells. The extent of VOC appears to be well defined and extends in a westerly direction and not toward the Martinsville well field (Ref. 102, pp. 10, 65, 66).

Martinsville City Garage, 1349 Blue Bluff Road, Martinsville, IN (EPA ID: IND980682959) (Ref. 91, p. 1). Complaint filed with IDEM alleged that 25-30 drums of degreasers, specifically PCE, were buried in the 1970's near the city garage. The IDEM Industrial Waste Compliance Section investigated in 2003 and did not find any evidence of burial (Ref. 82, pp. 14, 15). The IDEM Site Investigation program conducted a Pre-CERCLIS Screening at the site in 2005 and did not find any evidence of ground water contamination emanating from the site (Ref. 82, pp. 2, 3).

Martinsville Cleaners is located at 690 E. Morgan Street (Ref. 91 p. 1; 101, p. 1). The cleaners operated in 1989 (Ref. 101, p. 1). This facility is located approximately ½ mile to the east of the Master Wear facility. No investigation has been conducted in this area to determine if this facility is a potential source.

O'Neal's Clothes Depot is located at 833 E. Morgan Street (Ref. 91 p. 1; 101, p. 1). The facility operated from 1983 to present (Ref. 101, p. 1). This facility is located approximately ½ mile to the east of the Master Wear facility. No investigation has been conducted in this area to determine if this facility is a potential source.

3.1.2 POTENTIAL TO RELEASE

As specified in the HRS Rule, since an observed release was established for the surficial aquifer, the potential to release was not scored (Ref. 1, Section 3.1.2, p. 69).

3.2 WASTE CHARACTERISTICS

3.2.1 TOXICITY/MOBILITY

The following toxicity, mobility and combined toxicity/mobility factor values have been assigned to those substances present in the observed release, which have a containment value greater than 0.

Hazardous Substance	Source No. (and/or Observed Release)	Toxicity Factor Value	Mobility Factor Value	Does Haz. Substance Meet Observed Release by Chemical Analysis? (Y/N)	Toxicity/ Mobility (Ref. 1, Table 3-9)	References
TCE	Observed Release	10,000	1	Y	10,000	Ref. 1, Section 3.2.1.3, p. 76; 2, p. 9
Cis-1,2-DCE	Observed Release	100	1	Y	100	Ref. 1, Section 3.2.1.3, p. 76; 2, p. 5
PCE	Observed Released	100	1	Y	100	Ref. 1, Section 3.2.1.3, p. 76; 2, p. 7

All hazardous substances that meet the criteria for an observed release by chemical analysis to one or more aquifers underlying the source(s) at the site, regardless of the aquifer being evaluated, are assigned a mobility factor value of 1 (Ref. 1, Section 3.2.1.2, p. 75).

Contaminant characteristic values for hazardous substances found in an observed release to the surficial aquifer were derived from the Superfund Chemical Data Matrix (Ref. 2, pp. 5, 7, 9). The hazardous substance with the highest toxicity/mobility factor value available to the ground water migration pathway is TCE (10,000). TCE was detected at level II concentrations while PCE was detected at levels above the MCL in Municipal Well #3.

Toxicity/Mobility Factor Value: 10,000
(Ref. 1, Section 3.2.1.3, p. 76)

3.2.2 HAZARDOUS WASTE QUANTITY

Source No.	Source Type	Source Hazardous Waste Quantity
1	Ground Water Plume	Unknown, but >0

The Master Wear site has been scored as a site consisting of a contaminated ground water plume with a positively identified source. According to Section 2.4.2.2 in the HRS Rule (Ref. 1, p. 66), if any target sample for the migration pathway is subject to Level I (or Level II) concentrations, assign either the value from Table 2-6 (Ref. 1, p. 65) or a value of 100, whichever is greater, as the hazardous waste quantity factor value for that pathway. Because Level I concentrations were present in a drinking water well (Ref. Sections 3.3.2.2 of this HRS documentation record), a hazardous waste quantity factor value of 100 is assigned for the ground water pathway.

Hazardous Waste Quantity Factor Value: 100
(Ref. 1, Section 2.4.2.2, p. 66)

3.2.3 WASTE CHARACTERISTICS FACTOR CATEGORY VALUE

As specified in the HRS Rule (Ref. 1, Section 3.2.3, p. 76), the Hazardous Waste Quantity Factor Value of 100 was multiplied by the highest Toxicity/Mobility Value of 10,000, resulting in a product of 1,000,000 (1.0E+06). Based on this product, a Waste Characteristics Factor Category Value of 32 was assigned from Table 2-7 of the HRS Rule (Ref. 1, Section 2.4.3.1, p. 66).

Utilizing TCE which has the highest Toxicity/Mobility Factor Value of the substances listed in Section 3.2.1 of this HRS documentation record:

Toxicity/Mobility Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 100

Toxicity/Mobility Factor Value (10,000) X
Hazardous Waste Quantity Factor Value (100): 1,000,000 = 1×10^6

Waste Characteristics Factor Category Value: 32
(Ref. 1, Table 2-7, p. 66)

3.3 TARGETS

The primary target is the Martinsville Municipal Water Well #3. This well is known to be subject to Level I contamination (Ref. 43, pp. 21, 22, 23, 108,116; 88, pp. 102, 119, 221, 222, 223, 224; 89, pp. 3, 4; 55, pp. 9, 10, 11, 12, 69, 70, 71, 72, 73, 74; 56, pp. 29, 32, 35, 38, 86, 87, 278, 279). There are 5,438 people known to be utilizing the water from this well for drinking water (Ref. 60, p. 1; 77, p. 1; Section 3.3.2.2 of this documentation record). In addition, there are two (2) nearby municipal wells (#4 and #5) that are known to be subject to potential contamination. There are 9,562 people known to be using these two nearby wells (potential concentrations) for drinking water (Ref. 60, p. 1; 77, p. 1; Section 3.3.2.2 of this HRS documentation record).

3.3.1 NEAREST WELL

Sample IDs: E2R63, E2R64, TK7202, TK7203
Level of Contamination (I, II, or potential): Level I
If potential contamination, distance from source in miles: Not Applicable

Samples TK7202 and TK7203 (duplicate of TK7202) were obtained from Municipal Well #3 on January 22, 2003 and samples E2R63 and E2R64 (duplicate of E2R63) were obtained from Municipal Well #3 on August 3, 2010. The water in Municipal Well #3 was found to contain PCE above the MCL, and TCE below the MCL but above the cancer rate during both sampling events (Ref. Contaminated Ground Water Sample (Municipal Well #3) Table and the Level I Samples (Municipal Well #3) Table, both found in Section 3.1.1 of this document). Municipal Well #3 is the nearest well.

As specified in the HRS Rule (Ref. 1, Table 3-11, p. 77), if one or more drinking water wells are subject to Level I concentrations a Nearest Well Factor Value of 50 is assigned. Level I concentrations have been documented at Municipal Well #3 within the ground water plume (Ref. Contaminated Ground Water Sample (Municipal Well #3) Table and the Level I Samples (Municipal Well #3) Table, both found in Section 3.1.1 of this document) .

Nearest Well Factor Value: 50
(Ref. 1, Table 3-11, p. 77)

3.3.2 POPULATION

3.3.2.1 Level of Contamination

3.3.2.2 Level I Concentrations

One municipal well (Municipal Well #3) is within a four (4)-mile radius of the center of the plume and contains Level I concentrations of PCE. The well draws water from the glacial outwash aquifer. The number of people served by this municipal well (5,438 people) is calculated below. The water from the municipal wells is currently the sole source of drinking water for the residents of Martinsville (Ref. 60, pp. 1, 2).

The Municipal Well #3 sample shown below includes detections in drinking water wells that meet or exceed their corresponding benchmark concentrations. An observed release to the Ground Water Migration Pathway has been established based on the detection of these compounds found in the drinking water (Ref. Sections 2.2.2 and 3.1.1 of this HRS documentation record); thus, these wells are associated with Level I concentrations (Ref. 1, Sections 3.3.2.1, 3.3.2.2, p. 77).

As specified in the HRS Rule (Ref. 1, Section 3.3.2.2, p. 77), the number of people served by drinking water from points of withdrawal subject to Level I concentrations were calculated. The total population counted from Municipal Well #3 was calculated as follows:

The number of people served by Municipal Well #3 is calculated as follows:

The number of people served by Martinsville Water Utility is 15,000 (Ref. 60, p. 1; 77, p. 1).

There are three (3) municipal wells that comprise the Martinsville Water Utility (Ref. 60, p. 2; 77, p. 1).

The pumping rates for each of the three (3) municipal wells are as follows:

The well pump records for December 2011, are the following (Ref. 94, p. 1):
Well #3 = 16,438,000 gallons
Well #4 = 13,073,000 gallons
Well #5 = 15,835,000 gallons
Total = 45,346, 000 gallons

To obtain the percentage of people serviced by each well, the number of gallons pumped from each well was divided by the total number of gallons pumped from the three wells follows:

Well #3 - 16,438,000 gallons divided by 45,346,000 gallons = 36.25 %
Well #4 - 13,073,000 gallons divided by 45,346,000 gallons = 28.83 %
Well #5 - 15,835,000 gallons divided by 45,346,000 gallons = 34.92 %

To obtain the number of people service by each well, the total 15,000 people served by the three (3) wells were multiplied by the percentage of water (in gallons) pumped per each well as follows:

Well #3 - 15,000 multiplied by .3625 = 5,438 people
Well #4 - 15,000 multiplied by .2883 = 4,324 people
Well #5 - 15,000 multiplied by .3492 = 5, 238 people
Total = 15,000 people

Level I Sample	Aquifer	Population	References
E2R63	Glacial Outwash	5,438	Ref. 60, p. 1; 77, p. 1; 94, p. 1; See calculation above

The sum of the population served by Municipal Well #3, 5,438, was multiplied by 10 for a product of 54,380 (Ref. 1, Section 3.3.2.2, p. 77).

Level I Concentrations Factor Value: 54,380

3.3.2.3 Level II Concentrations

There are no Level II targets identified.

Level II	Aquifer No.	Population	References
Not Applicable			

Sum of Population Served by Level II Wells: Not Applicable

Level II Concentrations Factor Value: Not Applicable
Due to the fact Level I concentrations of PCE were detected in Municipal well #3, the Level II concentrations of TCE were not factored.

3.3.2.4 Potential Contamination

IDEM and the U.S. EPA are concerned about populations that may be potentially exposed to contaminated drinking water.

There are two (2) other municipal wells that lie nearby Municipal Well #3 that have a potential to become contaminated with chlorinated solvents from the Master Wear facility. The number of people served by these drinking water wells is calculated as follows:

As discussed in Section 3.3.2.2, calculations show that each well of the three (3) municipal wells serve the following people in Martinsville, Indiana:

Well #3 = 5,438 people

Well #4 = 4,324 people

Well #5 = 5, 238 people

Only Municipal Well #3, was found to be contaminated with Level 1 concentrations. No detections of any VOCs were found to be detected in Municipal Wells #4 and #5. Calculations in section 3.3.2.2 show that the number of people serviced by wells #4 and #5 is 9,562 people.

Therefore the number of people that could potentially be impacted is 9,562 people.

The distance from the Master Wear source to Municipal #4 is 2,344 feet (Ref. 100, p. 1).
The distance from the Master Wear source to Municipal #5 is 2,416 feet (Ref. 100, p. 1).

Municipal Wells #4 and #5 lie greater than ¼ mile and less than ½ mile from the source (the parking lot of Master Wear).

When entering 9,562 people within the ¼ to ½ mile distance category of Table 3-12, a Distance – Weighted Population Value of 3, 233 is obtained (Ref. 1, p. 78).

3,233 is multiplied by .10 to obtain a potential value of 323.

Potential Contamination Factor Value: 323

3.3.3 RESOURCES

Resource use of the surficial aquifer within the target distance limit does not include any of the Resource Factors. Therefore, a Resource Factor value of 0 is assigned (Ref. 1, Section 3.3.3, p. 78).

Resources Factor Value: 0

3.3.4 WELLHEAD PROTECTION AREA

Master Wear is within the Wellhead Protection Area where the ground water contamination exists. Therefore, the Wellhead Protection Area Factor Value of 20 is assigned (Ref. 1, Section 3.3.4, p. 78; 95, p. 1).

Wellhead Protection Area Value: 20