



VOLUNTARY REMEDIATION INVESTIGATION WORK PLAN

**FORMER HARMAN-BECKER AUTOMOTIVE SYSTEMS, INC.
1201 SOUTH OHIO ST., MARTINSVILLE, INDIANA 46151
IDEM VOLUNTARY REMEDIATION PROGRAM SITE #6170501
SESCO GROUP PROJECT #3872**

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January 11, 2021

TABLE OF CONTENTS

Executive Summary	1
1.0 Introduction.....	4
2.0 Investigation Objectives	4
2.1 VRI Work Plan Objectives.....	4
2.2 Historic Remediation Activities	5
3.0 Background.....	6
3.1 Site Information	6
3.1.1 Location, Ownership, and Contacts.....	6
3.1.2 Facility Operational History	6
3.2 Hydrogeologic Setting	7
3.2.1 Geology.....	7
3.2.2 Hydrogeology.....	9
3.3 Surface Water	9
3.4 Groundwater Use.....	9
3.4.1 Municipal Wells	9
3.4.2 Private Wells.....	10
4.0 Summary of Site Investigations and Results.....	11
5.0 Contamination Nature and Extent.....	13
5.1 Soil.....	13
5.1.1 East-Central Plant Area (Ketones Release).....	13
5.1.2 East Parking Lot Area.....	13
5.1.3 Southwest Plant Area	14
5.2 Groundwater	15
5.2.1 VOC Impacts to Potable Water-Supply Wells.....	18
5.3 Vapor Intrusion	20
5.3.1 Former Harman-Becker Facility.....	20
5.3.2 Residential Settings.....	21
6.0 Historical Remedial Actions	23
6.1 Underground Storage Tank Removals	23

6.2	<i>East-Central Plant Area (Ketones Release)</i>	23
6.3	<i>East Parking Lot Area</i>	24
6.4	<i>Groundwater</i>	24
7.0	<i>Wellhead Protection Areas</i>	25
8.0	<i>Further Site Investigation</i>	25
9.0	<i>Monitoring Plan</i>	28
9.1	<i>Soil</i>	28
9.2	<i>Groundwater</i>	28
9.2.1	<i>Monitoring Wells</i>	28
9.2.2	<i>Water-Supply Wells</i>	28
9.2.3	<i>Sampling and Handling Procedures; Sample Collection</i>	29
9.2.4	<i>Labeling</i>	30
9.2.5	<i>Transportation</i>	31
9.2.6	<i>Chain-of-Custody Procedures</i>	31
9.2.7	<i>Investigative Derived Wastes</i>	31
9.2.8	<i>Chemical Analyses</i>	31
9.2.9	<i>Quality Assurance/Quality Control</i>	32
10.0	<i>Vapor Sampling</i>	32
11.0	<i>Institutional Controls</i>	32
11.1	<i>City of Martinsville Environmental Restrictive Ordinance</i>	32
12.0	<i>Health and Safety Plan</i>	33
13.0	<i>References</i>	34
14.0	<i>Environmental Professionals Signature</i>	38
	<i>List of Appendices</i>	39
	<i>Appendix 1</i>	40
	<i>Appendix 2</i>	41

Executive Summary

SESCO Group has prepared this *Voluntary Remediation Investigation Work Plan* (“*VRIW*”) on behalf of the ERG Martinsville, LLC for the former Harman-Becker facility located in Martinsville, Indiana (“Site”). This work is being performed under the Indiana Department of Environmental Management (IDEM) Voluntary Remediation Program Site #6170501.

The Site is located at 1201 S. Ohio Street, Martinsville, Morgan County, Indiana on the southeast side of Martinsville. The Site consists of one (1) parcel (Parcel 55-13-04-490-002.000-021) totaling approximately 25.1-acres, owned by For Bare Feet Inc. for the manufacture of sportswear. The Site is developed with one (1) 197,739-square-foot industrial building located on the western portion of the Site with parking lots to the north, south, and east. The Site is also improved with a 17,500-square foot outbuilding located northwest of the main building.

Subsurface conditions consist of predominantly silt and clay to a depth of about 10 feet below ground surface (bgs). This is underlain by approximately 60 to 90 feet of sand and gravel that rests on shale bedrock. The water table is approximately 10 feet bgs, and the sand and gravel form an aquifer with flow from east to west beneath the Site.

The Site has reportedly been industrially developed since the early 1950s with past uses that include a slaughter house, the manufacture of aluminum consumer products, aircraft parts, residential cabinetry, and automotive audio speakers. As previously mentioned, the Site is currently used to manufacture sportswear / socks. Some of the historic manufacturing operations included the use of chlorinated volatile organic compounds (VOCs), primarily tetrachloroethene (PCE).

Previous investigation and remediation efforts were conducted at the Site from 1995-2010; however, the investigations and remedial actions have generally been focused on specific locations, environmental media, and exposure pathways at different times verses Site-wide and simultaneous. The size of the plume, coupled with the complexity of the exposure pathways results in a conceptual site model that requires a comprehensive and structured monitoring program to evaluate seasonal fluctuations and plume behavior. Although Site characterization conducted to-date has determined subsurface geologic characteristics and defined the overall nature and extent of impacts to soil, the nature and extent of impacts to groundwater require additional investigation to close data gaps and complete off-Site groundwater plume delineation horizontally and vertically.

The primary source of PCE impacts is associated with a former drum storage area in the area referred to as the “east parking lot”. In addition, a second PCE source area was suspected in the southwest corner of the building. Given the size of the plume, historic uses, preferential pathways, etc., identifying specific source areas verses areas containing degradation products and/or influenced by preferential pathways is challenging at best.

Recent groundwater sampling completed in 2016 and 2017 reported dissolved concentrations of PCE, trichloroethene (TCE), vinyl chloride (VC), cis-1,2-dichloroethene (cDCE), and 1,1-dichloroethene (DCE) in groundwater samples collected and analyzed from both on and off-Site groundwater monitoring wells. Although other VOCs were detected, the above listed constituents were detected at concentrations exceeding either/or the IDEM Remediation Closure Guide (RCG) Groundwater Tap Residential Screening Level (RSL), Residential Vapor Exposure, and/or Commercial/Industrial Vapor Exposure Groundwater Screening Levels (VEGWSLs). The groundwater impacts extend over 5,000-feet west of the Site and appear to have reached a steady-state equilibrium. Given the age of the dissolved plume (likely 50 years in age), combined with the Site's hydrogeological setting, significant seasonal fluctuations of contaminant concentrations are not suspected.

Soil impacts are limited in concentration and appear to remain below on-Site pavement or the manufacturing building floor on the Site. Groundwater impacts extend off-Site to the west in the direction of groundwater flow beneath an area of mixed commercial and residential property approximately parallel and beneath Poston Road. The western edge of the VOCs extends beneath farmland in the White River floodplain to the west of the City. VOCs are found near the water table immediately west of the Site, but a wedge of clean groundwater forms above the VOCs as precipitation infiltrates to the water table. Several years of historical remedial actions have included air sparging and vapor extraction along the north side of the manufacturing building, engineered enhanced *in situ* reductive de-chlorination in the primary PCE release area referred to as the "eastern parking lot, and air sparging and vapor extraction of groundwater leaving the plant area.

Twenty-three (23) residential wells have reportedly been identified in the general vicinity of the VOCs leaving the Site in groundwater. Twelve (12) of these wells have reported total depths of 20 feet bgs, two (2) have total depths between 22-24 feet bgs, one (1) well is reportedly set at 115 feet bgs, and the remaining total depths are unknown. According to a *Remediation Work Plan (RWP)* prepared by ReSolution Partners, LLC in April 2014 (VFC# 80011737), as part of Site investigations being performed under the IDEM State Cleanup Program (SCP), all of the residential wells are used for non-potable purposes with the exception of "Well #1" located at 309 W. Poston Road, approximately 4,500 feet west of the Site. The 2014 *RWP* (VFC# 80011737), states there are no known potable water-supply wells affected by the VOCs in the groundwater.

Due to the volatile nature of PCE and its breakdown products to off-gas into the unsaturated soil, assessment to determine the potential for vapor intrusion (VI) has been conducted both on-Site and off-Site by others. The on-Site VI pathway has reportedly been determined to be complete, but does not present any unacceptable risk to human health, even when a previously installed subsurface vapor mitigation system is not operating.

Off-site VI investigation evaluations conducted to-date have also found the VI pathway to be complete. Vapor mitigation systems (VMS) were reportedly installed by others in seven (7) residential homes located downgradient (west) of the Site in February-March 2009.

Following installation of the VMSs, several summer & winter paired vapor intrusion investigations were completed between 2010 to 2012 inside these homes, in addition to several others in the same general area. Concentrations of PCE and TCE were not detected inside the homes when the VMSs were operating.

The focus of this *VRWIP* is to detail additional Site characterization, which will occur in a phased approach with the first phase concentrated on impact delineation downgradient of the Harman-Becker facility. The first phase of investigation will identify permanent well locations north and south of the suspected plume location based on groundwater GW data collected by others in 2016/2017 and/or known or suspected plume location. New well locations will be determined by the collection of “grab” groundwater samples at various depths and locations to identify well screen placement. In addition, the *VRWIP* includes replacing key downgradient wells that have been destroyed during road construction, snowplows, ROW improvements, etc.

In order to identify and access the existing monitoring well network, determine potential data gaps, and develop an investigation work plan to address the data gaps, SESCO mobilized to the Site in November 2019 and January 2020 to locate, inspect, and gauge the groundwater monitoring well network proposed in the 2016 *Groundwater Sampling & Analysis Plan* prepared by ReSolution Partners in addition to several wells IDEM requested be included. Based on this evaluation, SESCO verbally proposed an investigative approach to IDEM in February 2020 to complete groundwater delineation. Following several discussions, the enclosed *VRWIP* was agreed upon that primarily focuses on delineating groundwater impacts off-Site, in the commercial and residential areas located west of the Site.

Following new/replacement well installation, SESCO will remobilize to the Site to sample both the newly installed wells and existing wells previously agreed upon by IDEM. Once IDEM and SESCO agree that the plume is adequately delineated, SESCO and IDEM will discuss the need for additional investigation inside the plume boundaries, in or near likely source areas, potentially including inside the Harman-Becker plant and the “eastern parking lot”. It is anticipated that at the conclusion of proposed Site characterization activities, data acquired will support the development of a Remedial Work Plan.

1.0 Introduction

SESCO Group has prepared this *Voluntary Remediation Investigation Work Plan* (“*VRIW*”) on behalf of the ERG Martinsville I, LLC for the former Harman-Becker facility located in Martinsville, Indiana (“*Site*”). This work is being performed under the IDEM Voluntary Remediation Program Site #6170501.

The *Site* is located at 1201 S. Ohio Street, Martinsville, Morgan County, Indiana on the southeast side of Martinsville. The *Site* consists of one (1) parcel (Parcel 55-13-04-490-002.000-021) totaling approximately 25.1-acres, owned by For Bare Feet Inc. for the manufacture of sportswear. The *Site* is developed with one (1) 197,739-square-foot industrial building located on the western portion of the *Site* with parking lots to the north, south, and east. There are no basements or underground structures. The *Site* is also improved with a 17,500-square foot 3-sided outbuilding located northwest of the main building.

A *Remediation Work Plan (RWP)* was prepared by ReSolution Partners, LLC in April 2014 (VFC# 80011737) as part of *Site* investigations being performed under the IDEM State Cleanup Program (SCP). According to the *RWP*, the *Site* was historically occupied by a slaughterhouse and manufacturing facilities since the early 1950s to present. Several past operations at the *Site* included use of PCE and ketones as part of the manufacturing of colored aluminum consumer products, aircraft engines, residential cabinetry, and automotive audio speakers. Environmental investigations beginning in approximately 1988 have identified the presence of VOCs in soil and groundwater, including ketones and chlorinated ethenes—primarily PCE and its degradation products. Several investigations and remedial actions have been completed over the last 24 years to address groundwater and vapor intrusion. These activities culminate in this *VRIW*.

The *VRIW* scope and content is guided by the IDEM, including the *RCG* guidance document, dated March 22, 2012, with yearly updates through 2020.

2.0 Investigation Objectives

2.1 VRI Work Plan Objectives

The goal of the *VRIW* is to complete delineation of chlorinated VOC impacts to groundwater originating from the former Harman-Becker facility.

According to the 2014 *RWP*, three (3) groundwater plumes have been identified at the *Site*, which co-mingle and migrate to the west. The plumes are referred to as the north (shallow) plume that originates in the East Parking Lot area; the central (deep) plume which originates beneath the building; and the southern (shallow) plume that begins near the southwest corner of the *Site* building. Chlorinated VOCs are present in the plumes exceeding *RCG* Residential Tap Water screening levels over 5,000-feet west of the *Site*. Concentrations on-*Site* and properties to the west also exceed the *RCG* Residential Vapor Exposure Groundwater screening levels, and/or Commercial/Industrial Vapor Exposure Groundwater screening levels for several cVOCs.

2.2 Historic Remediation Activities

Several years of historical remedial actions have included air sparging and vapor extraction along the north side of the manufacturing building, engineered enhanced in-situ reductive de-chlorination in the primary PCE release area referred to as the “eastern parking lot”, and air sparging and vapor extraction of groundwater leaving the plant area along the west side of the Site.

Historical remedial actions have substantially reduced the concentrations of VOCs in on-Site groundwater. However, residual VOC concentrations above RCG risk-based screening levels remain in groundwater (2016/2017). Groundwater flow over the approximately 50 years since the potential earliest release of VOCs to the environment has resulted in VOC migration for a distance of at least 5,000 feet from the Site, crossing the City of Martinsville to undeveloped farmland between the City and the White River. Potential exposure pathways by ingestion of groundwater were investigated in 2011 by SESCO and presented in a *Further Site Investigation Report* (FSI) July 8, 2011 (VFC# 68298934). According to the 2011 report, exposure pathways by ingestion were not present at that time.

Modeling and perhaps more importantly, recent (2016/2017) groundwater sampling results suggest the plume has reached an approximate steady-state with respect to migration. Natural attenuation processes are reducing the concentrations of VOCs in groundwater with a glide-path towards the RCG screening levels in the deep plume and the southern shallow plume.

According to a theory presented by ReSolution Partners in their 2014 *RWP*, the groundwater monitoring data suggest that residual VOCs may be found in soil beneath the southeast corner of the plant. There is a potential for worker exposure if there are excavations below the plant.

Off-Site VI investigation evaluations conducted to-date have found the VI pathway to be complete. Vapor mitigation systems (VMS) were reportedly installed by a previous consultant in seven (7) residential homes located downgradient (west) of the Site in February-March 2009. Following installation of the VMS, several years of paired vapor intrusion investigations were completed inside these homes, in addition to several others in the same general area. Concentrations of PCE and TCE were not detected inside the homes when the VMSs were operating. On-Site vapor intrusion studies in 2013 found no exceedances of default commercial/industrial screening levels when the on-Site mitigation system was turned off.

3.0 Background

3.1 Site Information

3.1.1 Location, Ownership, and Contacts

The Site is located at 1201 South Ohio Street, Martinsville, Morgan County, Indiana (T11N, R1E, Sec. 4; Lat. 39.414894, Long. 86.421096). The facility has been owned by For Bare Feet, Inc. since February 2014 when it began operations for the production of sportswear (athletic socks primarily). A list of contacts for the Site project is provided here:

Site Owner:

Kelly Baugh, President
Derrick Raymer, Director of Operations, For Bare Feet, Inc.
1201 South Ohio Street
Martinsville, IN 46151

Responsible Party (RP) for Remedial Action:

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3.1.2 Facility Operational History

Cities Service Oil Company reportedly acquired the Site in 1948. Known industrial operations on the Site began in the mid-1950's. Heritage Environmental Services (HES, October 1995) noted that the Site has been occupied by a slaughterhouse and several manufacturing operations since the early 1950's as follows:

Unidentified slaughter house	late 1940's or early 1950's
Basco Aluminum	1955 (colored aluminum consumer products)

Twigg Corporation	1960 (aircraft engines)
Altamil Cabinet	1973 (residential cabinetry)
Essex Group, Inc. (UTC)	October 1975 (automotive and cabinet audio speakers)
Harman-Motive, Inc.	July 1981 (automotive audio speakers)
Harman-Becker Automotive	2007 (automotive audio speakers) Systems, Inc.
ERG	October 2009 (no use of the facility)
Wal Mart, Inc.	June 2010 (warehouse)
T. S. Magnuson, Inc.	November 2010 (sportswear)
For Bare Feet, Inc.	January 2014 (sportswear)

ERG Martinsville I, LLC purchased the property in October 2009 and maintains the responsibility for the remediation of historical environmental conditions.

Heritage (October 1995) notes that Harman-Motive used ketones in the manufacturing of automotive audio speakers, however chlorinated solvents were not used. Heritage (October 2003) states that the Twigg Corporation used the eastern portions of the Site for the storage of as many as 500 drums that may have contained chlorinated ethenes. This area is also referred to as the “Eastern Parking Lot” and is the primary source of groundwater impacts at this Site.

Oversight of the remediation of the Site by the IDEM State Cleanup Section began in 1996 under IDEM Site #1996-06-183. In 2017, the Site was transferred into the IDEM Voluntary Remediation Program as Site #6170501

3.2 Hydrogeologic Setting

According to the 2014 *RWP* prepared by ReSolution Partners, LLC, Site hydrogeologic characterizations have previously been prepared by Heritage Environmental Services (HES, October 1995), SESCO in July 2011, and by Bruce Carter & Associates, Inc. (BCA, October 2011) for the adjacent Twigg Corporation facility. The findings of these documents are summarized in the following paragraphs. According to the files, the regional hydrogeologic characterization in the area of Martinsville was prepared by Wittman Hydro Planning Associates, Inc. (Wittman, November 2004) and Hydrophase, Inc. (Hydrophase, March 2005).

3.2.1 Geology

Bedrock below the area consists of poorly permeable siltstone and shale with minor sandstone and limestone units of the 500- to 800-foot thick Mississippian Borden Group. The rock dips toward the center of the Illinois Basin to the southwest. The upper 150 feet of the bedrock can be sufficiently weathered to serve as a water-supply aquifer when glacial outwash is not present.

The Site is just to the south of the furthest extent of glacial advances approximately 15,000 to 20,000 years ago. Melt waters from the retreat of this glacier and subsequent glaciers that stopped further to the north carved a large valley into the bedrock, which is followed by today’s White River. Regionally, the valley was filled

with sand and gravel that was washed southward from the melting glaciers. Lenses of clay can be found interbedded with the sand and gravel, especially near the base of the deposits. The valley can be up to four (4) miles wide and the deposited sand and gravel can be up to 120 feet deep. The sand and gravel deposits are the primary water- supply aquifers in the region when present.

The geology below the Site and extending approximately 5,000 feet west-southwest (downgradient) of the Site was defined by multiple subsurface investigations that included soil borings completed to the bedrock surface and the installation of approximately 56 wells on-Site and approximately 50 wells off-Site. Many of these groundwater monitoring wells extended to the unconsolidated-bedrock interface beneath the Site and along the migration pathway of the impacts. Additional investigations completed by Eco-Innovators in January and February 2013 included the installation of nine (9) off-Site CMT wells to bedrock. Each CMT well contains three (3) to four (4) screened intervals that are all located within the 2-inch well in a circular pattern. The diameter of each CMT channel is approximately the width of a #2 pencil. Locations for off-Site borings, monitoring wells, and residential wells are provided on **Figures 1-A through 1-C, Appendix 2**. As summarized in the 2014 *RWP*, several units were identified from bottom to top in the off-site borings as follows:

- Unit 5: Is stiff clay to very hard weathered shale found at depths of approximately 95 feet bgs, at an elevation of 500 to 510 feet mean sea level (MSL). The western-most boring (CMT-A) has the clay appearing at a shallower depth of 63 ft bgs or elevation of 532 ft MSL. This results in a thinning of the overlying units that form an unconfined aquifer across the Site.
- Unit 4: Is a fine to coarse, generally well-graded sand with a trace of silt and varying amounts of gravel, from a trace of gravel to gravelly overlies the shale at a thickness between 15 to 25 feet. A grain-size analysis contained 22 percent gravel, 74 percent sand, and 4 percent silt and clay (SESCO *FSI*, July 2011). One (1) test for total organic carbon (defined as loss on ignition) yielded a value of 0.048 percent.
- Unit 3: Is fine to coarse poorly- to well-graded sand with a trace of silt, and occasional clayey layers.
- Unit 2: Approximately 4,000 feet west of the Site, the geology between approximately 15 to 70 feet bgs is predominantly fine to coarse poorly- to well- graded sand with a trace of silt and varying amounts of gravel; from no gravel to gravelly, with occasional thin lenses of silt.
- Unit 2a: Beyond 4,000 feet of the Site, the unit appears to converge with Unit 4 (described above) to an alternating fine to coarse poorly- to well-graded sand; and fine to coarse well-graded gravel, all with a trace of silt. Three (3) grain-size analyses contained from 0 to 12 percent gravel, 85 to 97 percent sand, and 3 to 12 percent silt and clay (SESCO *FSI*, July 2011).

Investigations at the nearby Twigg Corporation found the hydraulic conductivity of the unit to range from 2.6×10^{-3} to 1.3×10^{-1} cm/s with a geometric mean value of 1.9×10^{-2} cm/s (BCA, October 2011).

- Unit 1: The uppermost unit above the sand and gravel outwash deposits is a mantel of less permeable clay, silt, clayey sand, silty sand and fine to medium poorly- to well-graded sand. The sandy zones have no to some silt and occasionally have a trace of gravel. The surface, 1 to 1.5 feet, occasionally has gravelly fill. The unit tends to thin and have a higher clay concentration to the west. This uppermost geologic unit is from 15 to 25 feet thick.

3.2.2 Hydrogeology

The glacial outwash sands and gravels in the Martinsville area form the primary aquifer for the White River floodplain (White River aquifer system) (Hydrophase, March 2005). The aquifer is generally confined upgradient of CMT-B by the silty and clayey sand of Unit 1, where Unit 1 thins. The aquifer is generally 100 feet thick and is underlain by relatively impermeable rock of the Borden Group (Wittman, November 2004). The aquifer has a production potential of 100 to 2,000 gpm (Hydrophase, March 2005).

3.3 Surface Water

The Site and the City of Martinsville lies in the lower end of the Upper White River Watershed (USGS Cataloging Unit: 05120201), where the water in the floodplain flows to the White River. The White River lies between 2,500 to 7,700 feet west of the Martinsville city limits and lies more approximately 11,000 feet west of the Site, where the river flows to the south-southwest.

Indian Creek is a tributary to the White River and lies approximately 6,500 feet south of the Site and south of Highway 37, where Indian Creek flows to the west. Indian Creek joins the White River approximately 18,000 feet southwest of the Site.

The Site contains a relatively small retention pond to the east of the building, south of the Eastern Parking lot, along Harman Becker Drive. The pond is approximately 80-100 feet long north-south and 30-40 feet wide, surrounded by vegetation.

3.4 Groundwater Use

3.4.1 Municipal Wells

According to the IDEM Source Water Proximity tool, December 24, 2020, the Site is not located within a Wellhead Protection Area.

The Martinsville Water Utility well field (municipal wells #3, #4 and #5, located approximately one mile northwest of the Site at 410 W. Cunningham Street in Martinsville) produced an average of 635,000 gallons per day from the unconfined

glacial outwash sand and gravel aquifer between 1996 and 2000 (Wittman, November 2004). The wells draw from the groundwater at approximately 60 feet below the ground surface and draw from an area of several hundred acres (City of Martinsville, 2011). The well field is approximately 6,500 feet to the northwest of the facility and 6,300 feet from the closest edge of the VOC plume from the Site. The wells are not downgradient of the Site.

According to Indiana Public Media (October 2012), the wells have historically been contaminated with PCE from a dry cleaner site (the Master Ware facility) approximately ½ mile southeast of the well field (Wittman, 2004). The City has utilized activated carbon filters since 2005 to bring the PCE levels to 1 µg/L or less.

3.4.2 Private Wells

Twenty-three (23) residential wells are identified in the general vicinity of the VOCs leaving the Site in groundwater. The locations and depths of these wells are as follows:

Home Owner (2014)	Address in Martinsville	Well Depth (feet)
Stierwalt	1240 S. Ohio St. Well #1	24
	1240 S. Ohio St. Well #2	22
Hacker	309 W. Poston Rd. Well #1	115
	309 W. Poston Rd. Well #2	not known
Turney	340 West Poston Road	not known
Bolin	409 West Poston Road	not known
Manley	1430 RJ Boulevard	not known
Williams	1440 RJ Boulevard	not known
Pottorff	809 Hacker Drive	20
Haywood	810 Hacker Drive	20
Dunham	839 Hacker Drive	20
Barrett	859 Hacker Drive	20
Seger	860 Hacker Drive	20
Hubble	889 Hacker Drive	20
Vest	909 Hacker Drive	20
Mathews	939 Hacker Drive	20
Hacker	940 Hacker Drive	not known
Wolfla	959 Hacker Drive	20
Applegate	989 Hacker Drive	not known
O'Dell	1009 Hacker Drive	not known
Hodges	1010 Hacker Drive	20
Meadows	1020 Hacker Drive	20
Bennett	1040 Hacker Drive	20

It is SESCOs understanding that the City of Martinsville, Harman-Becker and Twigg Corp. have prepared a new ERO that not only bans the installation of new wells, it goes a step further to protect potable wells users and states that existing wells within the ERO area *“may only be used for non-potable uses which do not involve human or animal consumption, bathing, showering, cooking, or similar uses, or threaten human health and the environment”*. SESCO also understands that potable well users in the ERO area will be connected to the City municipal water utility source.

12.0 Health and Safety Plan

The Site-Specific *Health & Safety Plan* developed by SESCO for previous Site investigations will be updated for this Phase of the investigation following approval of the *VRIWP*. A copy may be provided upon request at that time.

14.0 Environmental Professionals Signature

This *VRP* was prepared in accordance with the IDEM RCG. The Environmental Professionals represent that to the best of their knowledge, the above statements and facts are true and correct and that no material facts have been suppressed or misstated.



Stephen William Gray, **LPG #1811**
Senior Project Manager
SESCO Group

January 11, 2021

Date



Carla J. Gill, **CHMM #13243**
Director of Remediation Services
SESCO Group

January 11, 2021

Date

List of Appendices

Appendix 1 Groundwater Analytical Data and Groundwater Monitoring Well Network,
2020 VRIWP

Appendix 2 Figures: Site Maps 1A, 1B, 1C

Appendix 1

Groundwater Analytical Data and Groundwater Monitoring Well Network, 2020 VRIWP

