POTESTA
Engineers and Environmental Consultants

TRANSMITTAL MEMO

7012 MacCorkle Avenue, SE, Charleston, WV 25304 ▪ Phone: (304) 342-1400

To: Mr. Joseph E. Hager, III
Department of Administration
Purchasing Division
2019 Washington Street, E
Charleston, West Virginia 25305

Date: July 29, 2020
Project No.: 0101-20-0226

Sent Via: ☐ Mail ☐ Federal Express ☐ United Parcel Service
☒ Hand Carried ☐ Other: _____

Quantity	Description
1	Response to Solicitation No. CRFQ 0313 DEP2100000002 Open-end Contract for Environmental Risk Assessment • Completed Forms • Resume (David Corsaro) • CD with Sample Risk Assessment
Remarks:	

By: David J. Corsaro/mh

c: _____

	Purchasing Divison **2019 Washington Street East** **Post Office Box 50130** **Charleston, WV 25305-0130**	**State of West Virginia** **Request for Quotation** **10 — Consulting**

Proc Folder: 713506

Doc Description: Open-end contract for Environmental Risk Assessment

Proc Type: Central Master Agreement

Date Issued	Solicitation Closes	Solicitation No	Version
2020-07-14	2020-07-29 13:30:00	CRFQ 0313 DEP2100000002	1

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Name, Address and Telephone Number:

Potesta & Associates, Inc.
7012 MacCorkle Avenue, SE
Charleston, WV 25304
(304) 342-1400

FOR INFORMATION CONTACT THE BUYER

Joseph E Hager III
(304) 558-2306
joseph.e.hageriii@wv.gov

Signature X Dana L. Burns **FEIN #** 31-1509066 **DATE** July 28, 2020

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION:

Request for Quotation

The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Department of Environmental Protection to establish an open-end contract for an Environmental Risk Assessor to determine ecological and human health risks that may be associated with projects managed by WVDEP.

INVOICE TO	SHIP TO
ENVIRONMENTAL PROTECTION OFFICE OF ENVIRONMENTAL REMEDIATION 601 57TH ST SE CHARLESTON WV25304 US	ENVIRONMENTAL PROTECTION 601 57TH ST CHARLESTON WV 25304 US

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Risk or hazard assessment	700.00000	HOUR	$110.00	$77,000.00

Comm Code	Manufacturer	Specification	Model #
77101501			

Extended Description :

Environmental Risk Assessor Open end contract for service, bid sheet represents an estimated number of hours for bidding purposes to establish a contracted set price per hour.

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Name, Title)
David J. Corsaro, Senior Scientist
(Printed Name and Title)
7012 MacCorkle Avenue, SE, Charleston, WV 25304
(Address)
(304) 342-1400 / (304) 343-9031
(Phone Number) / (Fax Number)
djcorsaro@potesta.com
(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

Potesta & Associates, Inc.
(Company)

(Authorized Signature) (Representative Name, Title)

Dana L. Burns, Vice President
(Printed Name and Title of Authorized Representative)

July 28, 2020
(Date)

(304) 342-1400 / (304) 343-9031
(Phone Number) (Fax Number)

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received: NONE
(Check the box next to each addendum received)

- ☐ Addendum No. 1
- ☐ Addendum No. 2
- ☐ Addendum No. 3
- ☐ Addendum No. 4
- ☐ Addendum No. 5
- ☐ Addendum No. 6
- ☐ Addendum No. 7
- ☐ Addendum No. 8
- ☐ Addendum No. 9
- ☐ Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Potesta & Associates, Inc.
Company

Dana L. Burns
Authorized Signature

July 28, 2020
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

7.2.3 Any other remedies available in law or equity.

8 MISCELLANEOUS:

8.1 No Substitutions: Vendor shall supply only Contract Items submitted in response to the Solicitation unless a contract modification is approved in accordance with the provisions contained in this Contract.

8.2 Vendor Supply: Vendor must carry sufficient inventory of the Contract Items being offered to fulfill its obligations under this Contract. By signing its bid, Vendor certifies that it can supply the Contract Items contained in its bid response.

8.3 Reports: Vendor shall provide quarterly reports and annual summaries to the Agency showing the Agency's items purchased, quantities of items purchased, and total dollar value of the items purchased. Vendor shall also provide reports, upon request, showing the items purchased during the term of this Contract, the quantity purchased for each of those items, and the total value of purchases for each of those items. Failure to supply such reports may be grounds for cancellation of this Contract.

8.4 Contract Manager: During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager:	Dana L. Burns
Telephone Number:	(304) 342-1400
Fax Number:	(304) 343-9031
Email Address:	dlburns@potesta.com

Environmental Risk Assessor
Exhibit A
Pricing Page

ITEM NO.	ESTIMATED QUANTITY	DESCRIPTION	UNIT PRICE PER HOUR	AMOUNT
1	700	Environmental Risk Assessor	$110.00	$77,000
		TOTAL BID AMOUNT		

Quantities listed on the bid schedule are for bid evaluation purposes only are are not a guarantee of quantities to be ordered over the life of the contract. Actual quantities may be more or less than those stated on this schedule.

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (*W. Va. Code* §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Potesta & Associates, Inc.

Authorized Signature: Dana L Burns Date: July 28, 2020

State of West Virginia

County of Kanawha, to-wit:

Taken, subscribed, and sworn to before me this 28 day of July, 2020.

My Commission expires February 14, 2024.

AFFIX SEAL HERE

OFFICIAL SEAL
Rhonda L. Henson
Notary Public
State of West Virginia
My Commission Expires
February 14, 2024
1978 Wolf Pen Drive
Charleston, WV 25312

NOTARY PUBLIC Rhonda L Henson

DAVID J. CORSARO, L.R.S.

Senior Scientist

EDUCATION

M.S. Environmental Science, 2008
Marshall University

B.S. Safety Technology, 1999
Marshall University

EMPLOYMENT HISTORY

2000-Present Potesta & Associates, Inc.
1997-2000 Clearon Corporation

PROFESSIONAL REGISTRATIONS

- Licensed Remediation Specialist – West Virginia
- Certified Monitoring Well Driller – West Virginia

PROFESSIONAL CERTIFICATIONS

Hazardous Waste Operations and Emergency Response – 40-hour

AREAS OF SPECIALIZATION

Educational background in industrial health/safety and environmental science. Highly experienced with West Virginia Voluntary Remediation and LUST Programs, RCRA, and CERCLA/USEPA Brownfields. Project management and field experience includes site assessment and remediation of commercial, industrial, and residential sites; environmental emergency response; and hazardous waste management.

PROFESSIONAL EXPERIENCE

LRS of Record:

Current

- Heritage Holdings, LLC – Wellsburg, Brooke County, West Virginia
  - Distribution Center Site
  - Manufacturing Plant Site
- McJunkin-Red Man Corporation - Charleston, Kanawha County, West Virginia

Certificates of Completion

- Heritage Holdings, LLC – Wellsburg, Brooke County, West Virginia
  - Cabinet Plant Site
  - Fabrication Plant Site
- R. M. Roach & Sons, Inc. – Martinsburg, Berkeley County, West Virginia
- Three Springs Drive Site - Weirton, West Virginia

Hazardous Waste/RCRA/Corrective Action

RCRA compliance assistance regarding waste analysis, recordkeeping, storage areas, applicable exemptions, and point of generation issues. Have also managed large amounts of hazardous and non-hazardous wastes as part of remediation projects.

ESAs (Phase I and II)

Phase I Environmental Site Assessments (ESAs) on various types of sites, including:

- Large land transaction totaling over 145,000 acres.
- Former industrial sites as part of a USEPA Brownfields Assessment Grant.
- Numerous active and former industrial and commercial facilities.
- Undeveloped and residential properties.

Phase II/Sampling ESAs, including soil boring advancement and sampling, monitoring well installation and sampling, surface water sampling, and soil gas sampling:

- West Virginia Voluntary Remediation Program (VRP).

- West Virginia Leaking Underground Storage Tank (LUST) Program.
- Ohio Bureau of Underground Storage Tank Regulation (BUSTR).
- Resource Conservation and Recovery Act (RCRA) Corrective Action.
- Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) Site Assessment and United States Environmental Protection Agency (USEPA) Brownfields.
- Environmental emergency response (petroleum and chemical spills related to transportation incidents), typically performed under state environmental response or enforcement programs.
- Property transaction-related (*i.e.*, due diligence or baseline ESAs).

Remediation

Experienced with remediation of sites impacted by petroleum, volatile and semi-volatile organics (including chlorinated solvents), metals, dioxin, and polychlorinated biphenyls (PCBs). Experience with bioremediation (aerobic and anaerobic), excavation, slurry walls, solidification/stabilization, pump and treat, soil vapor extraction, dual phase extraction, capping, and institutional controls.

Environmental Emergency Response

Performed and/or managed environmental response, assessment, and/or remediation on over 40 transportation related incidents in West Virginia, Kentucky, Ohio, Pennsylvania, and Virginia. These have included response to and assessment and remediation of releases from chemical and petroleum tankers and fuel tanks, transfer and/or removal of cargo, and coordination with regulatory agencies and affected property owners.

- Gasoline tanker release of over 3,500 gallons in northern Kentucky onto private property and railroad right of way (ROW). Remediation included excavation of soil and subsurface injection of a bioremedial compound on both sides of railroad ROW.
- Formaldehyde tanker release of 4,500 gallons in western Virginia. Project included initial containment, sampling and monitoring of groundwater contamination, soil remediation, hazardous waste characterization and disposal, US Army Corps of Engineers permitting for access roads, and ambient air sampling.
- Gasoline tanker release of over 3,000 gallons to frozen stream in central Ohio. Remediation included excavation of impacted areas of streambed (with United States Army Corps of Engineers approval) and additional soil, and subsurface injection of a bioremedial compound.
- Trailer load of white paint spilled adjacent to an interstate highway in West Virginia. Remediation included onsite solidification and removal of free liquids.
- Acid and caustic releases requiring stabilization of remaining load and on-site neutralization and removal of spilled material.
- Errant deliveries of products resulting in spills or damage to facility and/or inventory.
- Chemical lime spill to stream in western Virginia requiring long-term biological monitoring.

Additional Experience

Storage Tanks:

- Oversight of removal of USTs in West Virginia, Ohio, and Michigan, and management of UST components from over 30 sites in support of litigation.
- Compliance assistance and management of UST removals.

Biological Studies and Sampling:

- Performed surface water and sediment sampling and benthic invertebrate collection as part of an evaluation of environmental impact of a coal slurry spill.
- Performed baseline water quality sampling for several projects as part of mixing zone and metals translator studies.

Industrial Health and Safety:

- Served as Health and Safety Officer for several WV VRP RCRA and Corrective Action projects.
- Developed Health and Safety Plans for sampling activities for numerous types of projects.

File Review/Environmental Audits:

- Participated in review of more than 1,000 state CERCLIS files as an audit for West Virginia Department of Environmental Protection file system.
- Managed compliance audit field team for client with numerous facilities throughout West Virginia.

RISK ASSESSMENT AND REMEDIAL ACTION REPORT

Fabrication Plant – VRP Parcel #3
Heritage Holdings, LLC
1901 Commerce Street
Wellsburg, Brooke County, West Virginia 26070
VRP #18016

Prepared for:

Heritage Holdings, LLC
111 Park View Lane
Wheeling, West Virginia 26003

Prepared by:

Potesta & Associates, Inc.
7012 MacCorkle Avenue, SE
Charleston, West Virginia 25304
Phone: (304) 342-1400 Fax: (304) 343-9031
E-mail: potesta@potesta.com

Project No. 0101-18-0086-300

May 17, 2019

POTESTA

TABLE OF CONTENTS

APPENDICES

ACRONYMS

Agreement	Voluntary Remediation and Redevelopment Act Agreement
Application	Voluntary Remediation and Redevelopment Act Application
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DRO	Diesel Range Organics
Eagle	Eagle Manufacturing Company
ESA	Environmental Site Assessment
FRTR	Remediation Technologies Screening Matrix and Reference Guide
GRO	Gasoline Range Organics
Heritage	Heritage Holdings, LLC
LRS	Licensed Remediation Specialist
LUC	Land Use Covenant
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
µg/L	Micrograms per Liter
PAH	Polynuclear Aromatic Hydrocarbons
POTESTA	Potesta & Associates, Inc.
PPM	Priority Pollutant Metals
PQL	Practical Quantitation Limit
Ramboll	Ramboll Environ US Corporation
RAO	Remedial Action Objectives
RBC	Risk-Based Concentration
RSL	Regional Screening Level
SAWP	Site Assessment Work Plan
SVOC	Semi-Volatile Organic Compounds
TMP	Temporary Monitoring Point
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compounds
VRP	Voluntary Remediation Program
VRRR	Voluntary Remediation and Redevelopment Rule
WVDEP	West Virginia Department of Environmental Protection

RISK ASSESSMENT AND REMEDIAL ACTION REPORT

Fabrication Plant – VRP Parcel #3
Heritage Holdings, LLC
1901 Commerce Street
Wellsburg, Brooke County, West Virginia
VRP #18016

1.0 EXECUTIVE SUMMARY

The Heritage Holdings, LLC (Heritage) property located at 1901 Commerce Street in Wellsburg, Brooke County, West Virginia, is operated as a fabrication plant by Eagle Manufacturing Company (Eagle). The site has been in continuous commercial/industrial use by various entities since the early 1900s. In 2018, Heritage elected to enter the property into the West Virginia Voluntary Remediation and Redevelopment Act program (VRP) with the goal of conducting an environmental assessment and remediating the site to standards established for non-residential facilities.

Previous environmental assessments of the site were conducted in 2003 and 2017. Potesta & Associates, Inc. (POTESTA) conducted an additional limited environmental site assessment (ESA) of the site in general accordance with an approved *Site Assessment Work Plan* (SAWP) in April 2018. The results of the ESAs were presented in the *Site Assessment Report* (POTESTA, 2018) which included data from the sampling of surface soil, subsurface soil, groundwater, spring water, and soil vapor. Target analytes for the sampled media included metals, total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) including polynuclear aromatic hydrocarbons (PAHs).

This *Risk Assessment and Remedial Action Report* evaluates the risks to potential human and ecological receptors based on the conditions currently at the site and once the proposed remedial actions have been implemented. The maximum concentrations of contaminants of potential concern (COPCs) obtained from the field assessment activities were used as the exposure point concentrations in the risk evaluations. The human exposure risks were evaluated using *de minimis* and site-specific parameters for residential and industrial receptors.

The following table summarizes the proposed remedies for use as a non-residential property and the residual contaminants of concern (COCs) for human receptors and migration to groundwater risks:

RESIDUAL COC ASSESSMENT SUMMARY			
Medium	**COCs**	**Standard Exceeded**	**Remedy**
Spring Water	None	None	None
Groundwater	arsenic, trichloroethene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene	Groundwater RBCs	Land Use Covenant - Groundwater Use Restriction
Surface Soil	benzo(a)pyrene, dibenz(a,h)anthracene, arsenic	Residential RBCs	Land Use Covenant – Residential Use Restriction
Subsurface Soil	tetrachloroethene, benzo(a)pyrene, dibenz(a,h)anthracene, arsenic	Residential RBCs	Land Use Covenant – Residential Use Restriction
Subsurface Soil	Arsenic	Migration to Groundwater RBCs (and Detected in Groundwater)	Land Use Covenant - Groundwater Use Restriction
Soil Vapor	1,4-dichlorobenzene, benzene, bromodichloromethane, chloroform, tetrachloroethene	USEPA VISL Residential Screening Levels	Land Use Covenant – Residential Use Restriction

RBC – Risk-Based Concentration
USEPA VISL – United States Environmental Protection Agency Vapor Intrusion Screening Level

The *de minimis* ecological screening of the site used the *Checklist to Determine Applicable Ecological Standards*, as provided in the *West Virginia Remediation Redevelopment Act Guidance Manual*, Appendix C-2. According to the results, as established using the Checklist, there is no significant risk to potential ecological receptors and "no further ecological evaluation is required."

The protection of human health and the environment and continued non-residential use of the site is the goal for the proposed remedial actions at the site. The COPC screening identified contaminants in the soil and groundwater at the site requiring additional evaluation or remediation. The licensed remediation specialist (LRS) for the project has concluded that the risks associated with those COCs at the site may be mitigated through the implementation of institutional controls in the form of a land use covenant (LUC). The remedial actions selected for the site are:

- The Fabrication Plant site shall be used as a non-residential property.
- The extraction of groundwater for uses other than groundwater monitoring or remediation shall be prohibited.

Once implemented, the remedial actions will sever the pathway between residual concentrations of COCs and potential receptors so that the site will meet the requirements for use as an industrial/commercial facility.

2.0 INTRODUCTION

The Heritage Holdings, LLC property at 1901 Commerce Street in Wellsburg, West Virginia, has operated as various commercial/industrial entities continuously since the early 1900s. Environmental assessments of the site have identified constituents in the soil and groundwater which are the residue from those past, historical activities.

POTESTA, on behalf of Heritage, prepared an Application, dated February 14, 2018, and entered the property into the West Virginia VRP. After the site was accepted into the VRP, Heritage and the West Virginia Department of Environmental Protection (WVDEP) executed a VRP Agreement on March 9, 2018.

POTESTA conducted a limited ESA of the site in general accordance with an approved SAWP in April 2018. Combined with data from previous ESA activities, which were conducted in 2003 and 2017, the environmental evaluation of the site consisted of a review of current and past uses of the property and sampling the surface soil, subsurface soil, soil vapor, spring water, and groundwater. The results generated by the SAWP activities were presented in the *Site Assessment Report*, which was approved by the WVDEP in November 2018.

This *Risk Assessment and Remedial Action Report* evaluates risks to current human and ecological receptors, proposes remedies to reduce the potential exposure risks to meet applicable remediation standards as established by the VRP, and assesses the residual risks assuming the successful implementation of the remedial actions.

2.1 Purpose

Heritage wishes to assess and remediate the Fabrication Plant in compliance with applicable state regulations and continue to use the property for non-residential purposes. To achieve that end, an Application was submitted to the WVDEP to enter the site into the VRP. The Agreement, signed by Heritage and WVDEP, contains provisions for identifying human health and ecological risks associated with current and potential future uses of the site in order to establish appropriate cleanup standards. The Agreement also includes provisions for conducting remedial actions to meet those standards. This *Risk Assessment and Remedial Action Report* is being submitted in support of establishing the applicable remediation standards to be implemented at the site.

2.2 Contact Information

The principle parties involved with this project can be reached through the contact information provided in the following.

Heritage Holdings, LLC (Property Owner)	Joe C. Eddy Manager 111 Park View Lane Wheeling, West Virginia 26003 Telephone: (304) 281-9205 jceddy@heritageholdingsllc.net
WVDEP Contact:	John Meeks Brownfields Program Manager – South Region Charleston Office 601 57th Street S.E. Charleston, West Virginia 25304 Telephone: (304) 926-0499 Fax: (304) 926-0457 john.m.meeks@wv.gov
POTESTA Contact:	David J. Corsaro Licensed Remediation Specialist (LRS) No. 192 Potesta & Associates, Inc. 7012 MacCorkle Avenue, S.E. Charleston, West Virginia 25304 Telephone: (304) 342-1400 Fax: (304) 343-9031 E-Mail: djcorsaro@potesta.com
Eagle Manufacturing: Site Operator	David Harvey Vice President of Operations Eagle Manufacturing Company 2400 Charles Street Wellsburg, West Virginia 26070 Telephone: (304) 737-3171 dharvey@eagle-mfg.com
Laboratory Contractor:	Pace Analytical Services, LLC 5 Weatheridge Drive Hurricane, West Virginia Telephone: (304) 757-8954 Fax: (304) 757-9676 E-mail: brian.richards@pacelabs.com

Alpha Analytical
320 Forbes Boulevard
Mansfield, Massachusetts 02048
Telephone: (508) 822-9300
Fax: (508) 822-3288
www.alphalap.com

2.3 Project Bibliography

Reports, plans, and/or other relevant documents incorporated by reference into this project are listed below:

- *Phase I Environmental Site Assessment Report, ADM Milling Facility, Wellsburg, Brooke County, West Virginia.* SECOR, circa June 2003.
- *Phase I Environmental Site Assessment and Limited Compliance Review, Eagle Manufacturing - 1901 Commerce Street, Wellsburg, West Virginia.* Ramboll Environ US Corporation, May 2017.
- *DRAFT Phase II Environmental Site Assessment, Eagle Manufacturing - Fabrication Plant, 1901 Commerce Street, Wellsburg, West Virginia.* Ramboll Environ US Corporation, July 2017.
- *DRAFT Supplemental Phase II Environmental Site Assessment, Eagle Manufacturing - Fabrication Plant, 1901 Commerce Street, Wellsburg, West Virginia.* Ramboll Environ US Corporation, October 2017.
- *Site Assessment Work Plan Heritage Holdings, LLC, 2400 Charles Street Wellsburg, Brooke County, West Virginia 26070, VRP Parcel 1 – Main Manufacturing Plant VRP Parcel 2 - Distribution Center VRP Parcel 3 - Fabrication Plant VRP Parcel 4 - Cabinet Plant.* Potesta & Associates, Inc., April 2018.
- *Site Assessment Report, Fabrication Plant – VRP Parcel #3, Heritage Holdings, LLC, 1901 Commerce Street, Wellsburg, Brooke County, West Virginia 26070, VRP #18016.* Potesta & Associates, Inc., October 2018.
- *Data Validation Report, Fabrication Plant – VRP Parcel #3, Heritage Holdings, LLC, 1901 Commerce Street, Wellsburg, Brooke County, West Virginia 26070, VRP #18016.* Potesta & Associates, Inc., April 2019.

2.4 Public Repository

Interested individuals may review and/or copy the VRP Application for this project at the following location:

Brooke County Public Library
945 Main Street
Wellsburg, West Virginia 26070
Telephone: (304) 737-1551

3.0 SITE INFORMATION

The Fabrication Plant site is comprised of approximately 1.7 acres of property located in Wellsburg, West Virginia. This section provides a description of the site, discusses ownership, historical and current uses of the site and adjacent properties, and the geologic and hydrogeologic conditions present.

3.1 Site Location

The site is located at 1901 Commerce Street in Wellsburg, Brooke County, West Virginia 26070. The general location of the site is presented as **Figure 1** (Figures and Drawings are presented in **Appendix A**), which was reproduced from the United States Geological Survey (USGS) 7.5-minute Steubenville East topographical quadrangle. The approximate coordinates for the center of the site are:

Latitude:	N	40° 16' 56.02"
Longitude:	W	80° 36' 31.75"

3.2 Site Legal Description

The Fabrication Plant site consists of five tax parcels of land that were obtained by Heritage in 2018. The site is identified as Tax Parcels 262, 263, 264, 265, 266, and 267 on Tax Map W22K for the Wellsburg Corporation District. The current deed for the property is recorded in Deed Book 380 on Page 619, dated February 6, 2018.

Eagle acquired Tax Parcels 263 through 267 in December 2013, and Parcel 262 in July 2014. The property was acquired by Heritage in 2018 and continues to be operated by Eagle.

A survey plat that illustrates the site boundaries is included as **Figure 2**.

3.3 Site Description

The topography at the subject site is flat, located on the valley floor of the Ohio River. The structure on the site covers a footprint approximately 46,230 square feet in size. The areas

outside of the structure are paved, with the exception of an approximately 14-foot wide strip of ground along the western side of the property that was formerly "Yankee Street" but is now landscaped grass.

Site features, characteristics, and Tax Parcels are illustrated on the aerial photograph of the site presented as **Drawing 1**.

3.4 Historical Site Use

Historical uses of the subject site are summarized as follows:

- 1900s to 1910s - Hemp rope manufacturing
- 1910s to 1920s - Decorative glass manufacturing
- 1920s to 1930s - Blacksmith (central portion)
- 1920s – Petroleum products warehouse facility (southern portion)
- 1930s to 1990s - Paper bag manufacturing
- 1990s to 2012 - Wax paper manufacturing

Companies that have operated on the site prior to Eagle Manufacturing include: Standard Oil Company, Pillsbury Mills, Inc., ADM Milling Company, and Rig Packaging.

Heavy metals were likely used at the site for the production of colored glass. Bulk quantities of petroleum products were stored on the site during use as a warehouse for the Standard Oil Company. Regulatory database records included with the Phase I Environmental Site Assessment conducted by Ramboll Environ US Corporation (Ramboll) indicated Rig Packaging used chlorinated solvents for the time-period 2011 through 2013.

3.5 Adjoining Properties

Properties to the north and south are, and historically have been, used for single-family residential homes. A railroad spur is located along the western boundary of the property with residential properties beyond. To the south are a mix of commercial and industrial entities now operating as a carry-out restaurant with an automotive dealership beyond.

3.6 Geologic Setting

The site is located in the eastern United States, within the Appalachian Plateau Physiographic Province. The topography of the area is generally characterized as gently sloping broad ridges with moderate side slopes and flat-bottomed river valleys.

The site is located on the valley floor of the Ohio River and underlain by a clastic fluvial sedimentary column over shallow bedrock. The site's bedrock geology consists of strata in the Conemaugh Group, late Pennsylvanian to early Permian age sedimentary deposits consisting of

cyclic siltstone and sandstone with inter-bedded red and gray shales. The elevation of the site is approximately 670 feet above mean sea level.

3.7 Hydrogeologic Setting

The site is situated in the Ohio River watershed. The western boundary of the site is approximately 0.5 mile east of the Ohio River. The groundwater in the unconsolidated sediments under the site is presumed to flow from east to west across the site following the topography.

Topographic maps reviewed for this assessment indicate that Skull Run once flowed from east to west across a portion of the property. No surface expression of Skull Run remains on or adjacent to the site.

A natural-spring daylights in a sub-grade room along the central-western portion of the site. Flow from the spring is controlled and directed to a sump from which it discharges to the public sanitary sewer system.

3.8 Current Use of the Site

Since acquiring the property in 2013, Eagle Manufacturing has used the subject site as a metal and plastic fabrication facility and warehouse.

3.9 Future Use of the Site

The future use of the site will be restricted to non-residential enterprises.

4.0 ENVIRONMENTAL SITE ASSESSMENTS

The results from previous and current environmental assessments of the Fabrication Plant site are reviewed and evaluated in this report. Summaries of those assessments are presented in the following sections.

4.1 2003 Phase I ESA

A Phase I ESA was conducted was conducted by SECOR International, Inc. in 2003. The text portion of that report was reviewed by POTESTA with pertinent information included in this report where appropriate. The SECOR assessment did not identify a recognized environmental condition at the site.

4.2 May 2017 Phase I ESA

Ramboll Environ US Corporation conducted a Phase I ESA of the site in a report published in May 2017. Although no releases of petroleum products or hazardous materials were identified at

the site, the report's conclusion recommended analyses of the site media due to the length of time that the property was used for industrial purposes and because fill material from an unknown source had been placed at the site to build up the ground around Skull Run.

4.3 July 2017 Soil and Groundwater Sampling Assessment

Ramboll's July 2017 physical assessment of the Fabrication Plant consisted of eight soil borings, six of which were converted into temporary monitoring points (TMPs) for groundwater sampling. A total of 11 soil samples and 6 groundwater samples were collected and analyzed for VOCs, PAHs, priority pollutant metals (PPMs), and TPH – diesel range organics (DRO). The groundwater samples were also analyzed for TPH - gasoline range organics (GRO).

4.4 October 2017 Supplemental Site Assessment Sampling

In a report dated October 2017, Ramboll presented the results of additional sampling of the Fabrication Plant site media. Three groundwater samples were collected from additional TMPs and analyzed for VOCs. Seven soil vapor samples were collected and analyzed for VOCs.

4.5 April 2018 Spring Water Assessment

In accordance with the approved *Site Assessment Work Plan Heritage Holdings, LLC* (POTESTA, 2018), a sample of the spring water in the basement of the Fabrication Plant was analyzed for VOCs, SVOCs that include PAHs, and metals.

5.0 QUALITY ASSURANCE / QUALITY CONTROL PROGRAM

With the exception of the spring water sample collected by POTESTA in 2018, the soil, groundwater, and soil vapor samples evaluated in this assessment were collected by Ramboll. The Ramboll activities were conducted in 2017 prior to the site being entered in the VRP.

One trip blank sample was analyzed from a sample shipment in June 2017. No replicate or rinse blank samples were analyzed.

POTESTA collected the 2018 spring water sample in accordance with the SAWP that was approved by the WVDEP.

POTESTA's data validation report was provided to the WVDEP in a separate submittal.

6.0 HUMAN HEALTH RISK ASSESSMENT

This *Risk Assessment and Remedial Action Report* was prepared using the laboratory data from the 2017 and 2018 sampling events. The LRS reviewed the environmental data and prepared summaries of sample analytical results by medium. This section presents the results of a *de*

minimis and site-specific human health risk assessment for the site. Statistical screening was conducted for those target analytes detected at or above their respective method detection limits (MDLs) or practical quantitation limits (PQLs) in at least one sample for the specified medium. The risk assessment evaluates the risks to potential human receptors based on the conditions currently at the site and after the proposed remedial actions have been implemented. The maximum concentrations of COPCs obtained from the field assessment activities were used as the exposure point concentrations in risk evaluations.

Statistical summaries of the detected concentrations of COPCs compared to the *de minimis* RBC values are presented in **Appendix B** on **Tables 1** through **4**.

6.1 Applicable Statistical Screening Values

The LRS compared the maximum concentrations of COPCs in the soil and groundwater to the *de minimis* RBCs established by the Voluntary Remediation and Redevelopment Rule (VRRR) on Table 60-3B (revised 2017) and site-specific risk values for those COPCs detected in the groundwater and soil vapor samples to screening values calculated using the USEPA's Vapor Intrusion Screening Levels calculator (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator). Groundwater COCs were submitted for additional screening for exposure to construction worker receptors calculated using the USEPA's Regional Screening Level (RSL) Calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). Since there are no ecological receptors to the spring water discharges, that medium was evaluated for exposure risks to humans using groundwater screening values.

6.2 Evaluation of Total Petroleum Hydrocarbons

Some soil and groundwater samples were analyzed for total petroleum hydrocarbons. The laboratory results from those analyses are presented on the tables included with this report. However, no risk-based screening values are established for TPH in the VRP and, therefore, no statistical screening was performed for those constituents. Target analytes included with VOC and SVOC analyses are used to evaluate the potentially hazardous components that may be found in TPH.

6.3 Chromium Analysis

The samples evaluated in this assessment were analyzed for total chromium content. The concentrations of total chromium in the soil samples ranged from 9.6 milligrams per kilogram (mg/kg) to 19.9 mg/kg. Chromium was detected in 100 percent of the soil samples and is evenly distributed both areally about the site and vertically over the 15 feet of soil column sampled by Ramboll. The natural background screening concentration for total chromium in the West Virginia VRP is 70 mg/kg, which is greater than the maximum concentration detected at the site. The LRS interprets these data to indicate the total chromium detected at the site is naturally occurring and concluded the total chromium concentrations reported on the laboratory results can be evaluated using trivalent chromium screening values.

6.4 Screening Methods for COPCs in the Groundwater and Spring Water

The maximum concentrations of the COPCs identified in the groundwater and spring water samples were screened against their respective Groundwater RBCs. VOCs detected in the groundwater were also screened using the USEPA's VISL calculator for industrial receptors. COPCs detected in the groundwater at concentrations greater than their Groundwater RBCs or VISL values were designated as COCs for additional evaluation or remediation.

COCs detected in the groundwater or spring water at concentrations greater than their Groundwater RBCs were also screened for exposure to construction workers using the USEPA's RSL calculator to establish the human health risks for those receptors.

6.4.1 Spring Water Analytical Results and Screening Summary

One spring water sample was collected and analyzed for this assessment. The sample was analyzed for VOC, SVOC, and metal content. Five target analytes, one VOC and five metals, were detected at concentrations greater than their laboratory detection limits and designated as COPCs. No COPCs were detected at a concentration exceeding a Groundwater RBC.

Laboratory analytical results from the spring water sample are screened on **Table 1**.

The approximate spring water sampling location is illustrated in **Drawing 2**.

6.4.2 Groundwater Analytical Results and Screening Summary

Nine groundwater samples collected in 2017 were used to evaluate the site groundwater. A total of 25 target analytes were detected in the groundwater at the Fabrication Plant site: 2 TPHs, 8 VOCs, 8 SVOCs, and 7 metals. A *de minimis* screening of the concentrations of those COPCs to West Virginia Groundwater RBCs identified six COCs that exceeded their respective Groundwater RBCs in at least one sample: trichloroethene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene and arsenic. Laboratory analytical results from the Ramboll groundwater sample data are screened on **Table 2**.

The maximum concentrations of the VOCs detected in groundwater were screened for vapor intrusion risks to industrial receptors using the VISL calculator. The calculated cumulative risks to industrial receptors are 3.01E-06 for carcinogenic risk and an 8.44E-01 health index value, which are within the acceptable levels of 1.0E-05 and 1.0E+00, respectively. Copies of the VISL calculations are presented in **Appendix D**.

Additional screening of the COCs in groundwater was conducted by comparing the maximum concentration to a site-specific, risk-based standard calculated for a potential future receptor, a construction worker, using the USEPA RSL calculator. The calculated exposure risks for an exposure period of 120 days during one year (2.63E-05 carcinogenic and 5.82E+00 human health risks) are greater than the *de minimis* risks for an industrial receptor (1.0E-05 carcinogenic risk and 1.0E+00 human health).

The LRS also calculated exposure risks to persons that may be involved with collecting periodic samples from groundwater monitoring wells over a period of time. With the RSL calculator set to evaluate exposure to an adult receptor for 4 days a year (quarterly sampling events) during a 10-year period, the cumulative carcinogenic risk is 2.59E-06 with a human health risk of 4.03E-01. Both risk values are within the acceptable range for an industrial receptor.

Copies of the RSL calculations are presented in **Appendix C**.

A drawing illustrating the groundwater sampling locations and the locations of the COCs in groundwater is presented in **Drawing 2**.

Additional evaluation of groundwater COCs is presented in **Section 6.9**.

6.5 Screening Methods for COPCs in the Soil

The following procedures were used to screen the COPCs in the soil samples.

- The West Virginia VRRR states that when a De Minimis Standard for an analyte is less than the natural background, the natural background value may be used in place of the De Minimis Standard. Using procedures provided by the WVDEP, the LRS compared the maximum concentration for the inorganic COPCs to their respective maximum natural background for West Virginia. Published maximum natural background concentrations in West Virginia soil used in this assessment were obtained from Table 2.3 Natural Background Levels of Inorganics in Soil in West Virginia and Surrounding Areas in the *West Virginia Remediation Redevelopment Act Guidance Manual* (WVDEP, 2000).

- To evaluate whether leaching to groundwater is a concern, the LRS compared soil sample results to the Migration to Groundwater values presented in Table 60-3B of the VRRR. The list of analytes exceeding Migration to Groundwater values was compared to the list of target analytes detected in the groundwater at concentrations greater than their respective Groundwater RBCs. Those analytes appearing on both lists were subjected to additional evaluation for their migration to groundwater potential in **Section 6.8**.

- The LRS screened the maximum concentration of a COPC in soil against its Residential and Industrial RBCs found in Table 60-3B of the VRRR.

6.6 Soil Analytical Results and Screening Summary

The laboratory analytical data from 11 soil samples were evaluated in this assessment. Only one of the samples, GP-04 (0'-2') was collected from the surface soil. The only portion of the site that is not paved or covered by the site structure is a strip of landscaped grass approximately 14 feet in width along the western side of the property, which is where GP-04 (0'-2') was located.

Due to the lack of exposed surface soil at the site, the results from GP-04 (0'-2') have been included with the remaining 10 samples, all of which were collected from depths greater than 2 feet below ground surface.

A review of the soil analytical data from 11 samples identified 37 COPCs with concentrations greater than their respective laboratory detection limits. By chemical group, those COPCs consisted of 1 TPH, 5 VOCs, 18 SVOCs, and 13 metals.

Four soil COPCs were detected at concentrations greater than their respective Residential RBCs: tetrachloroethene, benzo(a)pyrene, dibenz(a,h)anthracene, and arsenic.

No target analytes were detected at concentrations exceeding an Industrial RBC in the site soil.

The maximum concentrations of 14 COPCs exceeded their respective Migration to Groundwater screening values: tetrachloroethane, trichloroethene, 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, naphthalene, antimony, arsenic, cadmium, copper, lead, and silver. Four of those analytes were also detected in the groundwater at concentrations greater than their respective Groundwater RBCs: trichloroethene, benzo(a)anthracene, dibenz(a,h)anthracene, and arsenic. A discussion concerning the migration to groundwater potential for those four COPCs is presented in **Section 6.8**.

A drawing illustrating the soil sampling locations and COC concentrations is presented in **Drawing 3**. Screening summaries of the soil data compared to the *de minimis* RBC values are presented on **Table 3**.

6.7 Screening Methods for COPCs in the Soil Vapor

The concentrations of target analytes detected in the seven soil vapor samples were screened using values obtained from the USEPA at https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Thirty-two COPCs were detected in one or more of the soil vapor samples. The maximum concentrations of the COPCs were first compared to *de minimis* values published for residential receptors. The maximum concentrations for five of those COPCs, 1,4-dichloroethene, benzene, bromodichloromethane, chloroform, and tetrachloroethene, exceeded their respective residential screening values and are designated as COCs.

The VISL calculator was next used to calculate risks for the soil vapor COPCs to industrial receptors. The cumulative carcinogenic risk from the 32 COPCs is 4.22E-06 with a cumulative human health risk value of 2.47E-01. Those calculated risks to industrial receptors are less than their *de minimis* soil vapor screening values.

A table summarizing the soil vapor laboratory data and *de minimis* residential screening results is presented as **Table 4**. The VISL calculations for industrial receptors to soil vapor are presented in **Appendix D**.

6.8 Migration to Groundwater Potential

Trichloroethene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and arsenic were detected in both the soil and groundwater at concentrations that indicate a potential for continued impact to groundwater from the migration of the COCs through the soil. This section provides an additional evaluation of the risk to groundwater from those COCs.

Trichloroethene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected in only one sample at concentrations exceeding their respective Migration to Groundwater screening values, the surface soil sample from GP-04 (0'-2'). A deeper sample collected from that same location, GP-04 (13.4'-15.4'), had no detectable concentrations of trichloroethene, benzo(b)fluoranthene, or dibenz(a,h)anthracene. Trichloroethene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were not detected in the groundwater from the GP-04 TMP.

Benzo(a)anthracene was detected at concentrations exceeding its Migration to Groundwater screening value in two samples: GP-04 (0'-2') and GP-06 (8'-10'). Benzo(a)anthracene was not detected in the deeper GP-04 sample from (13.4'-15.4') or in the groundwater from the GP-04 TMP. No groundwater sample was collected from GP-06.

Arsenic was detected in all the soil samples analyzed but only in two samples at concentrations exceeding its Migration to Groundwater screening value of 13 mg/kg (the natural background screening value). Arsenic in the GP-04 (0'-2') sample was detected at 15.4 mg/kg. Arsenic in the deeper GP-04 sample from (13.4'-15.4') was detected at a concentration of 2.1 mg/kg, less than its Migration to Groundwater screening value. Arsenic was detected in the groundwater at GP-04 at a concentration of 10.5 micrograms per liter (µg/L), which is slightly greater than the arsenic Groundwater RBC, 10 µg/L.

Arsenic was detected in GP-03 (13.6'-15.6') at 26.3 mg/kg. A shallow soil sample from GP-03 (4'-6') contained 7 mg/kg, less than its Migration to Groundwater screening value. Groundwater was detected in the GP-03 TMP water sample at a concentration of 12.4 µg/L.

No soil samples were analyzed from GP-05 where the highest concentration of arsenic in the groundwater was identified.

Four SVOCs were detected in groundwater from GP-05 at concentrations greater than their respective Groundwater RBCs (no soil samples were analyzed from that boring). Several SVOCs were detected in the soil samples up gradient of GP-05 in soil borings GP-06, GP-07 and GP-08. Benzo(a)anthracene, in soil sample GP-06 (8'-10'), was the only SVOC detected at a concentration greater than its Migration to Groundwater screening value. No SVOC, including benzo(a)anthracene, was detected in the groundwater sample from GP-07, which was advanced adjacent to the GP-06 location.

The only detection of trichloroethene in the groundwater at the site was in the groundwater collected from GP-07. Trichloroethene was not detected in groundwater from the three other co-located wells: GP-09, GP-10, and GP-11. Trichloroethene was not detected in the soil samples from GP-06, GP-07, and GP-08. No soil samples were analyzed from the GP-09 boring. The only detection of trichloroethene in the soil at the site was identified in GP-04 (0'-2') but was not detected in the groundwater collected from that TMP.

The LRS has concluded, based on low concentrations and limited areal extent of trichloroethene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene in the soil and groundwater, there is not a significant risk of the migration of those site related COPCs to impact groundwater and no additional assessment or remediation of those COPCs is required.

An additional evaluation of arsenic at the site is presented in **Section 6.9.2** of this report.

6.9 Additional Evaluation of Groundwater COCs

The groundwater screening presented in **Section 6.4.2** identified two issues for further consideration: potential exposure risks to construction workers and the potential for off-site migration of impacted groundwater.

6.9.1 Exposure Risks to Construction Workers from Groundwater

A site-specific risk evaluation for construction workers identified a calculated exposure risk from exposure to arsenic and trichloroethene during 120 days of on-site activity. For both COCs, the risk concerns can be mitigated if the ingestion of groundwater pathway is not complete. The LRS has concluded that the actual exposure potential to construction workers would be from an accidental ingestion during a single event, which would not result in a significant risk, not from the ingestion of groundwater continuously for 120 days. Without an ingestion exposure pathway, the exposure risks to construction workers from arsenic and trichloroethene fall within the acceptable *de minimis* range for industrial receptors and no additional remediation is required.

6.9.2 Off-Site Migration of Groundwater

The LRS has also evaluated the potential for trichloroethene, SVOCs, and arsenic in groundwater to migrate off-site.

A review of the spatial distribution of the COCs finds that a detectable quantity of trichloroethene is limited to the GP-07 location, which was advanced in the south-central portion of the property. No trichloroethene was detected in the three monitoring wells within approximately 80 feet of the GP-07 location. Based on the limited areal extent of trichloroethene in the groundwater, no off-site migration concern has been identified for trichloroethene contamination.

Four SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected in GP-05 along the property boundary on the western side of the site structure at concentrations greater than their Groundwater RBCs. Historically, a former Standard Oil petroleum storage facility was located near the GP-05 location and may have been the source of the SVOC contamination detected there. The SVOC contamination is very limited in areal extent. No other detections of SVOCs were identified in the groundwater in this assessment, including in GP-07 immediately up gradient of GP-05. The LRS notes that the concentrations of the four SVOC COCs were extremely low in GP-05, each less than one tenth of one part per billion. With no indication of a larger SVOC contamination plume, and once dispersion naturally attenuates the known concentrations, the LRS has concluded the potential that off-site migration of the groundwater would result in off-site levels of SVOCs greater than their respective Groundwater RBCs does not warrant additional assessment or remediation.

Arsenic was detected at levels exceeding its Groundwater RBC in each of the five monitoring wells along the western property boundary over a distance of approximately 450 feet. The levels of arsenic detected in the groundwater in monitoring wells GP-01 through GP-04 are noticeably consistent over a relatively long distance, approximately 350 feet running north to south, just barely greater than its Groundwater RBC. A spike in the level of arsenic was detected in the groundwater at GP-05, which was collected approximately 100 feet south of GP-04.

No evidence was identified in the soil samples indicating an elevated level of arsenic is present at the site. Rather, the levels of arsenic in the soil samples are within range of the naturally occurring arsenic levels for the locale.

The five groundwater samples with elevated concentrations of arsenic were collected along the western side of the property, which is down gradient of and perpendicular to the east to west groundwater flow across the property. Arsenic was not detected in the only up gradient well analyzed for arsenic content, GP-07, which was located approximately 80 feet from GP-05, an indication that there is not an undetected arsenic source at that portion of the property.

This assessment has not identified evidence that current or past activities at the site are the source of the arsenic in the groundwater. The LRS is not able to produce a conceptual site model to explain how current or past industrial activities at the Fabrication Plant site would have produced such a large arsenic plume, which appears to have spread in a pattern contrary to the local groundwater flow direction. The LRS reviewed the site data in an attempt to identify sources of the arsenic from multiple locations. As documented on Sanborn Fire Insurance maps evaluated in the *Site Assessment Report,* and reproduced here in **Appendix E**, there is no evidence of past buildings or activities which would have released arsenic at multiple locations along the western edge of the property and create a plume 450 feet in length. A glass manufacturing facility operated near the center of the subject site in the 1920s and was evaluated as a potential single point source. To create the plume identified at the Fabrication Plant, arsenic released from the former glass facility would have to have spread from that location several hundred feet both to the north and south, perpendicular to the direction of groundwater flow. Such a dispersion pattern is not typical of contaminate flow in clastic sediment aquifers, as is present in the Ohio River valley sediments at this location. Based on the information reviewed for this report, no

site-related arsenic source has been identified. The possibility that the arsenic contamination is not site related cannot be discounted.

Regardless of the source(s) of contamination, the LRS has not identified a risk of exposure to current or future receptors, both on- and off-site, from contaminated groundwater. There is no vapor intrusion risk from the arsenic or SVOCs in the groundwater, which eliminates the inhalation pathway. Although a groundwater use restriction will be implemented for the site, the LRS has established that the City of Wellsburg already requires residents/businesses to connect with the local public utility for water service. Therefore, is it reasonable to expect that no water wells will be drilled for potable use by the down gradient residents and a direct-contact pathway (dermal and ingestion) from groundwater to potential on- and off-site receptors is and will remain incomplete. Further efforts to establish whether the Fabrication Plant site was the source of the arsenic in the groundwater are not warranted based on the lack of risks identified for the site and adjoining properties.

7.0 *DE MINIMIS* ECOLOGICAL EVALUATION

The ecological evaluation was conducted to establish if detected concentrations of COPCs pose an unacceptable risk to ecological receptors. The ecological evaluation was performed using the procedure outlined in the *VRRA Guidance Manual* (WVDEP, 2000), specifically Section 4.0, Ecological Risk-Based Standards.

The ecological assessment considered whether valued resources are present. According to USEPA guidance, valued ecological resources are those that either: a) provide critical habitat (e.g., wetlands, fisheries); b) are critical to sustaining the populations and habitat present at the site; c) are reflective of public concerns (e.g., preservation of habitat for game animals or sport fishing); or d) are federal or state listed species that could be exposed and susceptible to site-related constituents.

7.1 Terrestrial Habitat

No terrestrial habitat is present on or adjacent to the site.

7.2 Wetland Habitat

No wetland habitat is present on or adjacent to the site.

7.3 Riparian Habitat

There is no wetland habitat on or adjacent to the site.

7.4 Aquatic Habitat

There is no aquatic habitat on or adjacent to the site.

7.5 Ecological Evaluation Summary

The ecological screening process is outlined in West Virginia Code of State Rules 60 CSR 3-9.5 - *Ecological De Minimis Screening Evaluation* and Section 4.1 of the *VRRA Guidance Manual.* The *de minimis* screening uses a *Checklist to Determine Applicable Ecological Standards*, as provided in the *VRRA Guidance Manual*, Appendix C-2. According to the Checklist, "no further ecological evaluation is required."

A copy of the *Checklist to Determine Applicable Ecological Standards* is presented in **Appendix F** of this report.

8.0 REMEDIAL ACTION OBJECTIVES

The protection of human health and the environment to permit non-residential use of the site is the goal for the proposed remedial actions at the site. Remedial Action Objectives (RAOs) are a general description of what remediation at the site is intended to accomplish based on the exposure scenarios of the anticipated future human and ecological receptors. RAOs consider human health and environmental protection concerns in compliance with regulatory requirements governing the site. RAOs can describe the endpoint concentrations or risk levels for contaminants expected to be accomplished at the site and are used as a basis to design the remedial alternatives to be considered for the site.

8.1 RAOs for Spring Water

Spring water meets the requirements for unrestricted use. No RAOs are proposed for the spring water at the site.

8.2 RAOs-Groundwater

Arsenic, four SVOCs, and trichloroethene were designated as COCs in the groundwater at the site. The RAO for groundwater will be to sever the potential direct contact pathway to human receptors.

8.3 RAOs-Surface and Subsurface Soil

The RAO for soil is to sever the potential for sustained direct contact with impacted surface soil by residential human receptors.

8.4 RAOs-Vapor Intrusion to Indoor Air

There is a calculated risk to residential receptors from long-term exposure to vapors that may accumulate in site structures. The RAO for soil vapor is to restrict residential uses of the property.

9.0 REMEDIAL ACTION PLAN

The results from the screening of COPCs identified COCs in the soil and groundwater at the site that will be the targets for remediation. The LRS has concluded that the risks associated with the site COCs may be mitigated and remediated through the recording of institutional controls with the deed for the property.

9.1 Land Use Covenant

A Land Use Covenant will be recorded to provide an institutional remedy for the site. The LUC will require that future uses of the site remain non-residential. Groundwater use will be prohibited.

The surface and subsurface soil at the site meets the requirements for use as an industrial/commercial facility without additional restrictions.

The LUC will be recorded citing the deed for the property and will be binding on current and future owners of the site.

10.0 REMEDY EVALUATION SCREENING

A screening of the laboratory analytical results conducted in this assessment identified COCs to be present at concentrations exceeding a human health screening value. The LRS completed a comparative analysis of the site remedy using guidance provided by the *VRRA Guidance Manual* (WVDEP, 2000) and USEPA *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (USEPA, 1999), and *Remediation Technologies Screening Matrix and Reference Guide* (FRTR, 2000). The LRS qualitatively evaluated the site remedy, using information provided in these documents, against the following criteria:

- effectiveness in protecting human health and the environment,
- long-term reliability to achieve standards,
- net environmental benefits,
- short-term risks posed by implementation,
- implementability and technical practicability,
- cost evaluation,
- governmental agency acceptance, and
- community acceptance.

10.1 Identification of Candidate Remedies

According to the *VRRA Guidance Manual* (WVDEP, 2000), the first step in the remedy selection and evaluation process is to identify candidate remedies from a wide range of remedial

technologies that are available based on what is known about the site. Information concerning the type of contamination, site conditions, anticipated future use, and RAOs is evaluated during the candidate identification process. However, it is not necessary to screen a variety of remedies if the selection of a remedy for COCs at the site accommodates the conditions at the site and the criteria established in the VRRR legislative rules are met.

The proposed remedial options for the Fabrication Plant site are institutional controls to:

- prohibit residential uses of the property, and
- prohibit the use of groundwater.

Restricting exposure through institutional controls is a remedy that isolates contaminated media from potential harmful human exposure. In this remedy, a deed restriction will prohibit residential uses of the property and potable groundwater use.

10.2 Effectiveness in Protecting Human Health and the Environment

The effectiveness in protecting human health and the environment is established by evaluating how exposure pathway risks are eliminated, reduced, or controlled through engineering and/or institutional controls. The prohibition of residential and groundwater uses through institutional controls is protective of human health by reducing or eliminating exposure to contaminated media at the site. There is no change in exposure to ecological receptors with institutional controls.

10.3 Long-Term Reliability to Achieve Standards

Institutional controls will prohibit residential uses of the site. Access to groundwater will be limited to monitoring or remediation. Use restrictions through institutional controls will provide long-term protection of human health.

10.4 Net Environmental Benefits

10.4.1 Projected Reduction in Quality, Toxicity, Mobility and Risk

Use restrictions for the site and groundwater through institutional controls will reduce the risk to human receptors by eliminating the direct exposure pathway to impacted media.

10.4.2 Potential Site Reuse

This assessment anticipates non-residential future use of the property. The site will be available for reuse and/or continued use after institutional controls have been recorded.

10.5 Short–Term Risks Posed by Implementation

10.5.1 Short-Term Risks to Workers

Short-term risks to workers at the site are not increased during the implementation of institutional controls.

10.5.2 Short-Term Risks to Site Neighbors and the Community

There are no additional risks to site neighbors or the community from the implementation of institutional controls.

10.5.3 Short-Term Risks to the Environment

There are no additional risks to the environment from the implementation of institutional controls.

10.5.4 Time Required for Remediation Implementation

The institutional controls are effective upon implementation.

10.6 Implementability and Technical Practicability

10.6.1 Technical and Engineering Feasibility

Property and groundwater use restrictions can be implemented by recording deed restrictions with the Clerk of the Brooke County Commission.

10.6.2 Administrative Feasibility

No permits are required to implement the institutional controls.

10.6.3 Availability of Services, Equipment, and Materials

Legal services are available to assist with the recording of institutional controls. No equipment and/or materials are required to implement the institutional controls.

10.7 Cost Evaluation

10.7.1 Capital Costs

Legal costs to establish the institutional controls are considered to be low.

10.7.2 Operating, Monitoring, and Reporting Costs

Annual reporting will be necessary to confirm that the site is not being used for residential purposes and the groundwater is not being used. The property owner will submit an annual statement to the WVDEP affirming that the use restrictions are being maintained.

10.8 Governmental Agency Acceptance

This assessment follows VRP guidance and will be reviewed and approved by the WVDEP. At the end of this project Heritage will request that a Certificate of Completion be issued by the WVDEP.

10.9 Community Acceptance

A public notice was published when the site was entered in the VRP. A public repository containing VRP Application is maintained at the Brooke County Courthouse.

Environmental site assessment activities and reports for this project are reviewed and approved by the WVDEP. Copies of the project documents are on file with the WVDEP.

11.0 CONCEPTUAL SITE MODEL – POST-REMEDIATION CONDITIONS

The conceptual site model (CSM) was prepared based on historical data, site assessment laboratory analytical results, and current and anticipated future uses of the site. The CSM describes potential contaminant sources, potential release mechanisms, potential contaminant migration routes and potential exposure pathways for the site. This evaluation assumes the proposed remedies are in place and functioning as designed.

11.1 Identification of Contaminant Sources and Migration Pathways

11.1.1 Primary Sources

The primary sources of COCs are the residue in the soil and groundwater from the past releases of materials historically used at the site. No source for the arsenic in groundwater was identified in this assessment.

11.1.2 Release Mechanisms

The primary release mechanism for COCs is through the leaching of those compounds, driven by the infiltration of precipitation, through subsurface soil and potentially to groundwater. Vapors from volatile compounds may migrate through the soil and be released into the air above the ground surface.

The buildings and pavement cover all but a small strip of landscaped grass along the western side of the property, which eliminates the exposure of surface soils to wind erosion and storm water runoff.

11.1.3 Potential Contaminant Migration

The potential contaminant migration pathway would be the migration of COCs in the subsurface soil to groundwater and off-site migration. This assessment has not identified evidence that significant migration to groundwater has occurred. The LRS concluded there is not a significant release mechanism for contaminant migration from the site.

11.2 Potential Human Receptors

Residential activities at the site will be prohibited and residential receptors not evaluated further. Currently, the subject site is an active metal and plastic fabrication facility. The following potential human receptors were identified, based on the site setting and land uses at and adjacent to the site: site workers, construction/utility workers, and visitors/trespassers.

Because the site is an active industrial facility and not open to the general public, visitor/trespasser receptors are evaluated as other industrial workers present to conduct commercial/industrial activities on a periodic basis.

11.3 Potential Ecological Receptors

No significant ecological receptors were identified on the site. An evaluation of the ecological receptors is presented in the *Checklist to Determine the Applicable Ecological Standard* presented in **Appendix E**.

11.4 Exposure Pathways

The potential pathways of chemical release and transport, as well as the human and ecological activity patterns, were used to evaluate potential exposures at the site. An exposure pathway consists of:

- Source of contaminant
- Mechanism of contaminant release to the environment
- Transport or exposure medium containing the contaminant
- Exposure point where receptors can contact the exposure medium
- Exposure route (i.e., inhalation, absorption, or ingestion)
- Receptor

Exposure can only occur if these six elements are present.

Potential routes of exposure at the site included:

- Ingestion of soil, dust, or groundwater
- Dermal contact with soil, dust, or groundwater
- Inhalation of vapors and/or particulate-bound chemicals.

In this assessment, receptors were evaluated to establish that there is a complete exposure pathway to site media that contains concentrations of COCs in excess of the applicable remediation standard. Exposure pathways are classified as complete if a receptor is exposed to a medium contaminated at a level greater than the applicable human health screening value, incomplete if there is no exposure by a receptor to a contaminated medium at a concentration greater than the applicable human health screening value, or not of concern if the concentration of a COC in the medium is less than the applicable screening value, or if there is no receptor or medium for the exposure pathway.

At present, there is no direct-contact human exposure to site's soil and groundwater, with the exception of the narrow strip of grass covered lawn along the western side of the site building. To evaluate the possibility that the soil at the site may be disturbed by future construction activities, dermal contact, ingestion, and the inhalation of dust from the subsurface soil at the site were included as potential exposure pathways. There is a direct contact potential for exposure to spring water.

11.4.1 Not of Concern Exposure Pathways

The following pathways were classified as Not of Concern:

- Surface soil – All exposure routes for industrial and construction workers, visitors/trespassers, and ecological receptors
- Subsurface soil – All exposure routes for industrial and construction workers, visitors/trespassers, and ecological receptors
- Groundwater - All exposure routes for construction workers, visitors/trespassers, and ecological receptors, and inhalation routes for industrial worker receptors
- Spring water – All exposure routes for industrial and construction workers, visitors/trespassers, and ecological receptors
- Soil vapor – Inhalation exposure routes for industrial and construction workers, visitors/trespassers, and ecological receptors

11.4.2 Incomplete Exposure Pathways

The following pathways are classified as Incomplete for current receptors:

- Groundwater – Dermal and ingestion pathways to industrial worker receptors

11.4.3 Complete Exposure Pathways

There are no Completed pathways identified from the residual risk conditions at the site.

11.5 Conceptual Site Model for Residual Risk – Diagram

A CSM diagram provides a graphic interpretation of the potential contaminant sources, release mechanisms, contaminant migration routes, and exposure pathways for a site. A copy of the CSM diagram is presented in **Appendix G**.

11.6 Uncertainty Analysis

Uncertainty is inherent in the risk assessment process. The LRS has attempted to identify the uncertainties in the risk assessment in this section. This *Risk Assessment and Remedial Action Report* is based on the assumption that the available monitoring data adequately describe the occurrence of analytes in media at the site. Environmental sampling itself introduces some uncertainty. This uncertainty was minimized through a well-designed and inclusive sampling plan, use of appropriate sampling methods, and implementation of QA/QC procedures.

Uncertainties in quantitation via laboratory analyses can result in either underestimates or overestimates of risk. Accepted, well-developed analytical methods were implemented by WVDEP-certified laboratories to support the assessment. For purposes of this risk assessment, the volume of analytical data is considered adequate. Numerous samples of the environmental media were collected using accepted protocols. Samples were collected in areas suspected to be potential areas of concern or where maximum exposure would be expected to occur, as well as in areas less likely to have been impacted by site activities. In accordance with 60 CSR 3.8.2.d of the VRRR, a percentage of analytical data were subjected to additional validation techniques such as Level III reporting using standard USEPA protocols (e.g., Contract Laboratory Protocol or SW-846). Data reports were also reviewed for completeness by the LRS. Nonetheless, multiple sources of uncertainty exist with respect to the risk assessment for the site. Uncertainties are expected to result in conservative (i.e., overestimated) evaluations of risks. The LRS considers a quantitative uncertainty assessment is unnecessary given the low risks identified for this site.

Some uncertainty may also exist with respect to the selection of receptor characteristics (i.e., body weight) and exposure input (toxicity) parameters (i.e., soil ingestion rates, inhalation rates, etc.). Such input parameters are generally based on population data that encompasses a broad range of values. In many instances, the exposure input parameters may have resulted in an overestimation of risks. The LRS used USEPA and WVDEP recommended input parameters when calculating risk.

Maximum concentration values were used in this risk assessment. Portions of the sampling and analysis at the facility were directed at the suspected sources and where maximum exposure was expected. Actual exposures may occur at lower concentrations since the exposure areas are

likely to be much larger than the individual sources considered. The use of maximum concentration values may result in overestimates of human health risks.

12.0 CONCLUSIONS AND RECOMMENDATIONS

The site assessment data were evaluated by exposure media as established by the VRRR. The conclusions and recommendations of the LRS are based on the information presented in this report. The following table summarizes the proposed remedies for use as a non-residential property and the residual contaminants of concern (COCs) for human receptors and migration to groundwater risks:

RESIDUAL COC ASSESSMENT SUMMARY			
Medium	**COCs**	**Standard Exceeded**	**Remedy**
Spring Water	None	None	None
Groundwater	arsenic, trichloroethene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene	Groundwater RBCs	Land Use Covenant - Groundwater Use Restriction
Surface Soil	benzo(a)pyrene, dibenz(a,h)anthracene, arsenic	Residential RBCs	Land Use Covenant – Residential Use Restriction
Subsurface Soil	tetrachloroethene, benzo(a)pyrene, dibenz(a,h)anthracene, arsenic	Residential RBCs	Land Use Covenant – Residential Use Restriction
Subsurface Soil	Arsenic	Migration to Groundwater RBCs (and Detected in Groundwater)	Land Use Covenant - Groundwater Use Restriction
Soil Vapor	1,4-dichlorobenzene, benzene, bromodichloromethane, chloroform, tetrachloroethene	USEPA VISL Residential Screening Levels	Land Use Covenant – Residential Use Restriction

No COPCs were designated as COCs for ecological receptors.

The LRS has concluded that the potential risks to human receptors by COCs can be remediated through the recording of a LUC that restricts residential uses of the site and the use of groundwater.

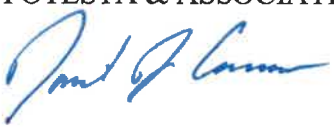
Following the recording of the LUC, no additional assessment or remediation is required.

13.0 CLOSING

This report has been prepared to assist Heritage Holdings, LLC in evaluating and planning with respect to the subject site. Heritage and POTESTA mutually devised the scope of this study, and are limited to the specific project, location and time-period described herein. The report represents POTESTA's understanding of the site conditions as discernible from information provided by others and obtained by POTESTA using the methods specified. POTESTA assumes no responsibility for information provided or developed by others or for documenting conditions detectable with methods or techniques not specified in the scope of services. In addition, no activity, including sampling, assessment or evaluation of material or substance, may be assumed to be included in this study unless specifically considered in the scope of services and this report. Sketches and maps in this report are included only to aid the reader and should not be considered surveys or engineering studies. If additional data concerning this site become available, POTESTA should be informed so that we may examine the information and, if necessary, modify this report accordingly.

Respectfully submitted,

POTESTA & ASSOCIATES, INC.



David J. Corsaro, LRS No. 192
Senior Scientist

DJC:DLL/mh

14.0 REFERENCES

Phase I Environmental Site Assessment Report, ADM Milling Facility, Wellsburg, Brooke County, West Virginia. SECOR, circa June 2003.

Phase I Environmental Site Assessment and Limited Compliance Review, Eagle Manufacturing - 1901 Commerce Street, Wellsburg, West Virginia. Ramboll Environ US Corporation, May 2017.

DRAFT Phase II Environmental Site Assessment, Eagle Manufacturing - Fabrication Plant, 1901 Commerce Street, Wellsburg, West Virginia. Ramboll Environ US Corporation, July 2017.

DRAFT Supplemental Phase II Environmental Site Assessment, Eagle Manufacturing - Fabrication Plant, 1901 Commerce Street, Wellsburg, West Virginia. Ramboll Environ US Corporation, October 2017.

Site Assessment Work Plan Heritage Holdings, LLC, 2400 Charles Street Wellsburg, Brooke County, West Virginia 26070, VRP Parcel 1 – Main Manufacturing Plant VRP Parcel 2 - Distribution Center VRP Parcel 3 - Fabrication Plant VRP Parcel 4 - Cabinet Plant. Potesta & Associates, Inc., April 2018.

Site Assessment Report, Fabrication Plant – VRP Parcel #3, Heritage Holdings, LLC, 1901 Commerce Street, Wellsburg, Brooke County, West Virginia 26070, VRP #18016. Potesta & Associates, Inc., October 2018.

Data Validation Report, Fabrication Plant – VRP Parcel #3, Heritage Holdings, LLC, 1901 Commerce Street, Wellsburg, Brooke County, West Virginia 26070, VRP #18016. Potesta & Associates, Inc., April 2019.

United States Environmental Protection Agency, Regional Screening Levels, https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

United States Environmental Protection Agency, Vapor Intrusion Screening Levels, https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator

United States Geological Survey 7.5-minute Steubenville East topographical map

West Virginia Department of Environmental Protection, *West Virginia Remediation and Redevelopment Act Guidance Manual*, 2000

West Virginia Geological & Economic Survey, Geologic Map of West Virginia, 1968

West Virginia Geological & Economic Survey
http://www.wvgs.wvnet.edu/www/maps/pprovinces.htm

APPENDIX A

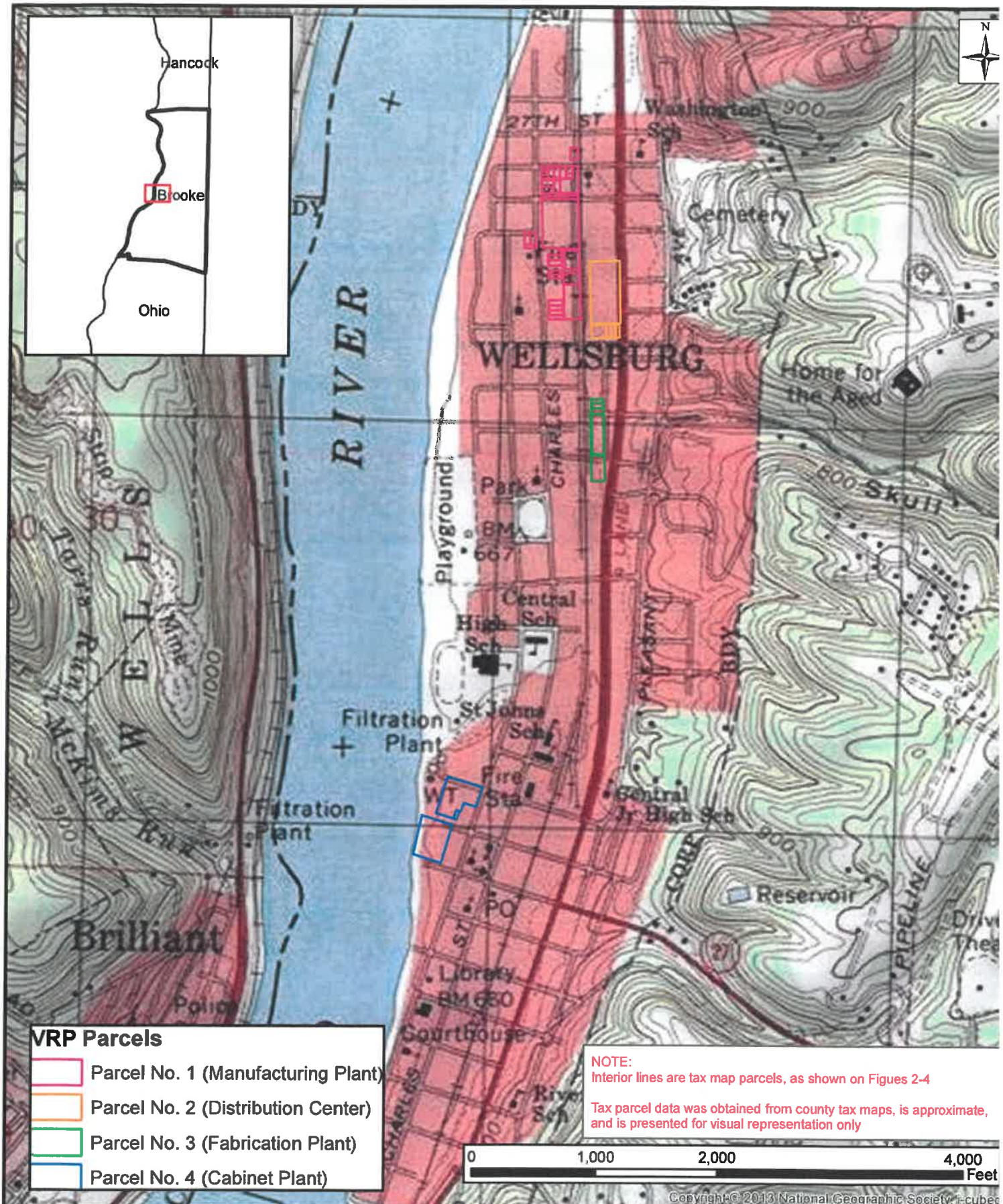


FIGURE 1

MAPPING FOR VISUAL REPRESENTATION ONLY

Heritage Holdings, LLC
Site Overview Map
Steubenville East Quadrangle
Brooke County, West Virginia

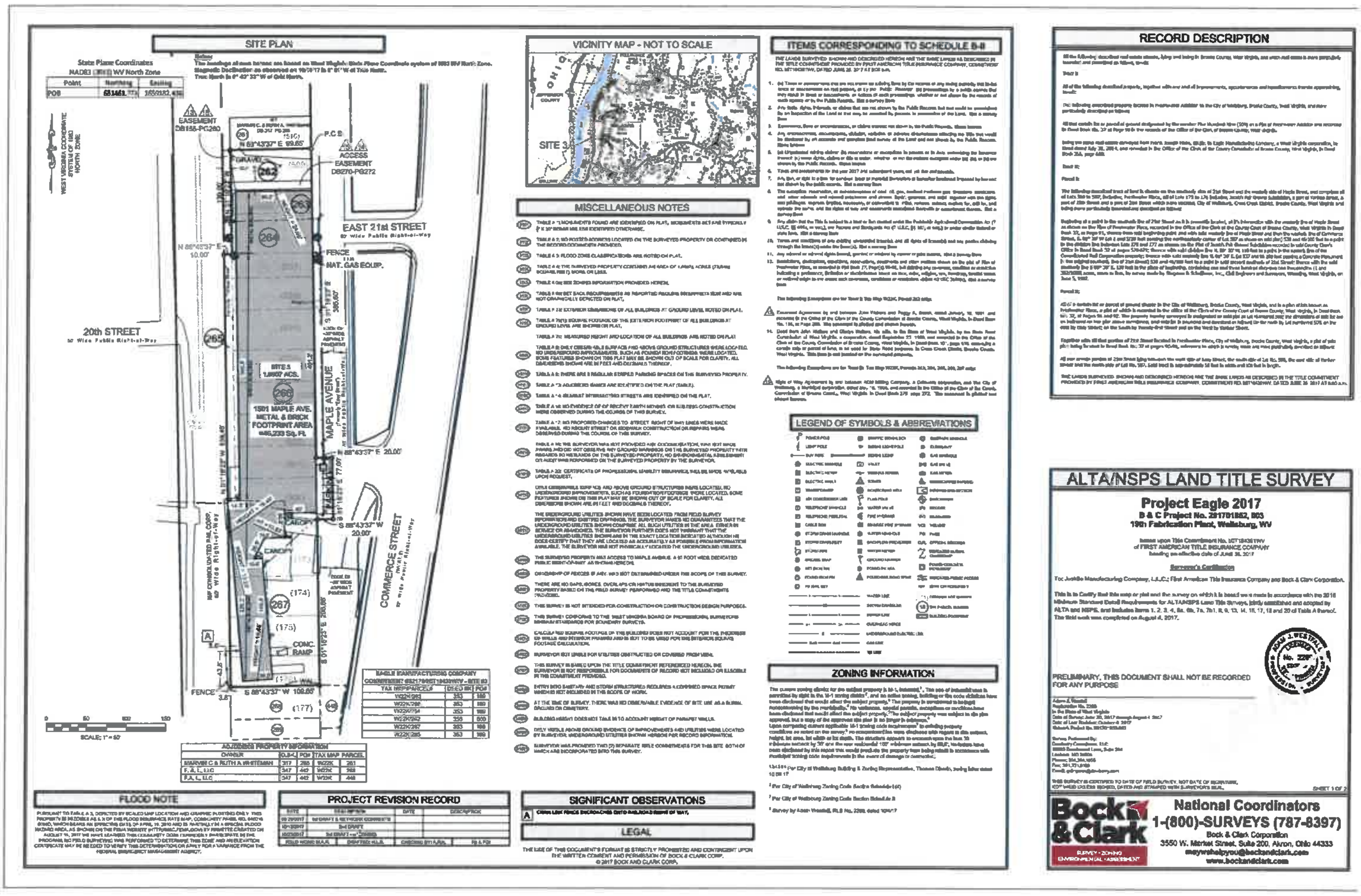
For Informational Purposes Only

POTESTA
ENGINEERS AND ENVIRONMENTAL CONSULTANTS

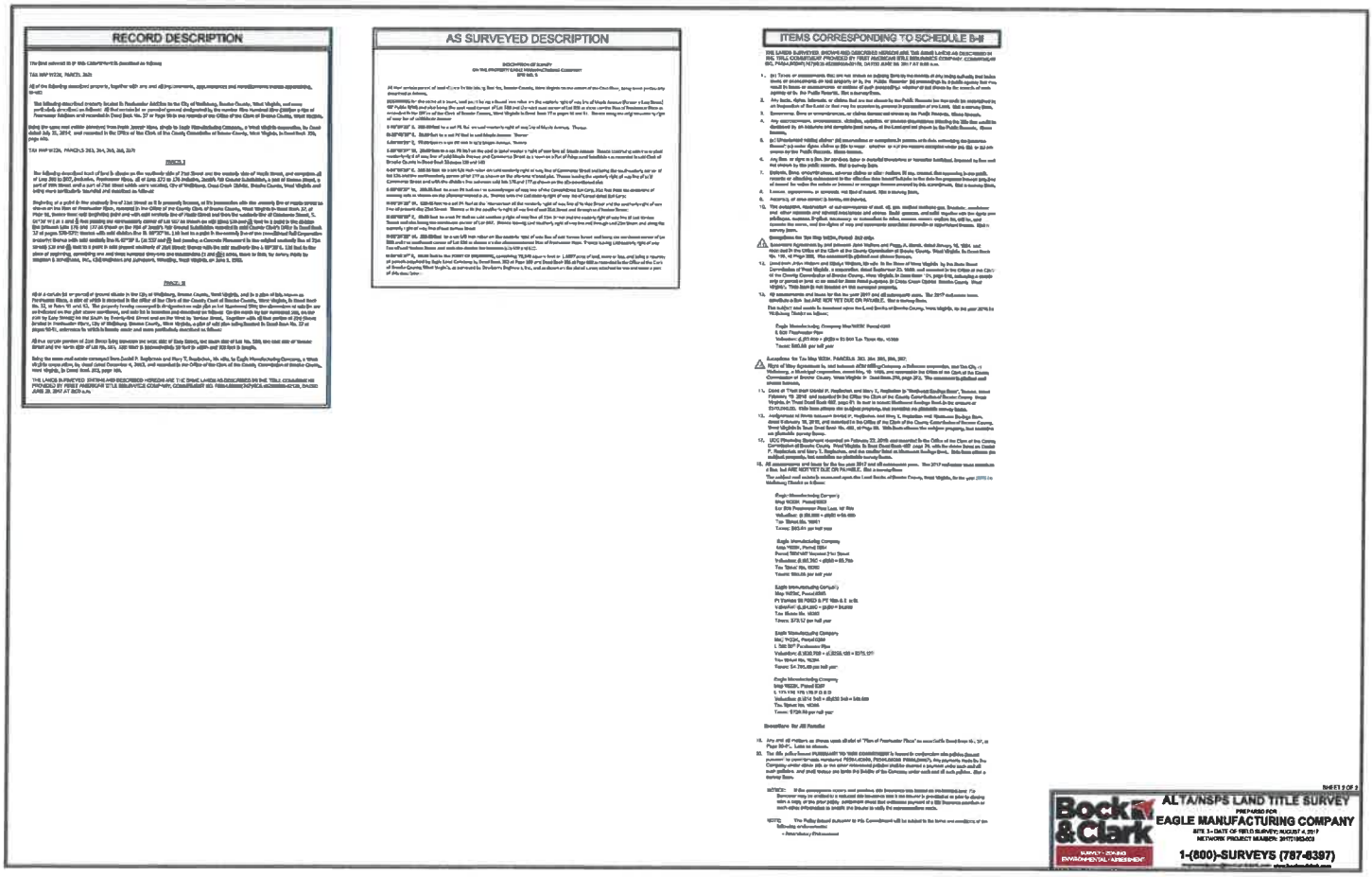
Potesta & Associates, Inc.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Avenue, S.E.
Charleston, WV 25304
Office: (304) 342-1400 Fax: (304)-343-9031
E-mail: potesta@potesta.com

SCALE: 1" : 1,000'	DATE: 11/12/2018
PN: 18-0086-400	DRAWN: LMS

P:\Projects\2018\18-0086_Heritage_Holdings\Maps\07_17_2018 Mapping\Manufacturing_Facilities\Overview_FIG_1_Portrait.mxd


SITE PLAN
VICINITY MAP - NOT TO SCALE
SITE 3
ITEMS CORRESPONDING TO SCHEDULE B-II
RECORD DESCRIPTION
MISCELLANEOUS NOTES
EAST 21st STREET
20th STREET
MAPLE AVENUE
COMMERCE STREET
1501 MAPLE AVE. METAL & BRICK FOOTPRINT AREA
LEGEND OF SYMBOLS & ABBREVIATIONS
ZONING INFORMATION
ADJOINER PROPERTY INFORMATION
FLOOD NOTE
PROJECT REVISION RECORD
SIGNIFICANT OBSERVATIONS
LEGAL
ALTA/NSPS LAND TITLE SURVEY
Project Eagle 2017
PRELIMINARY, THIS DOCUMENT SHALL NOT BE RECORDED FOR ANY PURPOSE
National Coordinators
1-(800)-SURVEYS (787-8397)
Bock & Clark Corporation
3550 W. Market Street, Suite 200, Akron, Ohio 44333
www.bockandclark.com
SURVEY • ZONING ENVIRONMENTAL • ASSESSMENT

FIGUI



RECORD DESCRIPTION

AS SURVEYED DESCRIPTION

ITEMS CORRESPONDING TO SCHEDULE B-II

ALTA/NSPS LAND TITLE SURVEY

PREPARED FOR

EAGLE MANUFACTURING COMPANY

SITE 3 - DATE OF FIELD SURVEY: AUGUST 4, 2017

NETWORK PROJECT NUMBER: 2017116043

Bock & Clark

SURVEY · ZONING · ENVIRONMENTAL · AGREEMENT

1-(800)-SURVEYS (787-8397)

FIGURE 2

Drawing 1

MAPPING FOR VISUAL REPRESENTATION ONLY

Site Features and Tax Parcels
Fabrication Plant - VRP Parcel No. 3
Heritage Holdings, LLC
1901 Commerce Street
Wellsburg, Brooke County, West Virginia

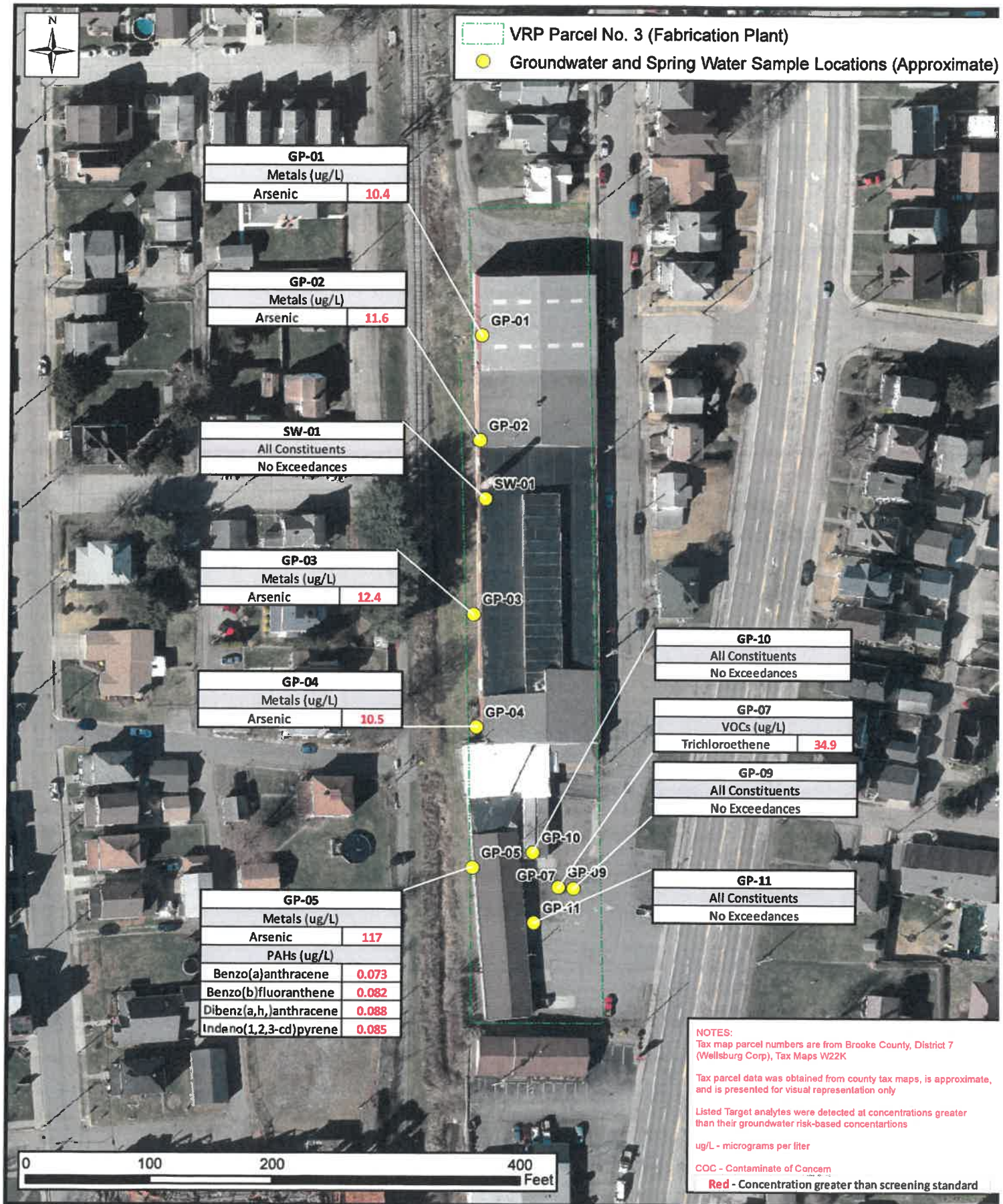
For Informational Purposes Only

POTESTA
ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Potesta & Associates, Inc.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Avenue, S.E.
Charleston, WV 25304
Office: (304) 342-1400 Fax: (304)-343-9031
E-mail: potesta@potesta.com

SCALE: 1" : 100'
DATE: 10/17/2018
PN: 18-0086
DRAWN: CHH

I:\Projects\2018\18_0086_Heritage_Holdings\Maps\10_17_2018\HeritageHoldings_2018Layout_Drawing_1.mxd



NOTES:
Tax map parcel numbers are from Brooke County, District 7 (Wellsburg Corp), Tax Maps W22K

Tax parcel data was obtained from county tax maps, is approximate, and is presented for visual representation only

Listed Target analytes were detected at concentrations greater than their groundwater risk-based concentartions

ug/L - micrograms per liter

COC - Contaminate of Concern

Red - Concentration greater than screening standard

Drawing 2

MAPPING FOR VISUAL REPRESENTATION ONLY

Groundwater and Spring Water Sample Locations and COC's
Fabrication Plant - VRP Parcel No. 3
Heritage Holdings, LLC
1901 Commerce Street
Wellsburg, Brooke County, West Virginia

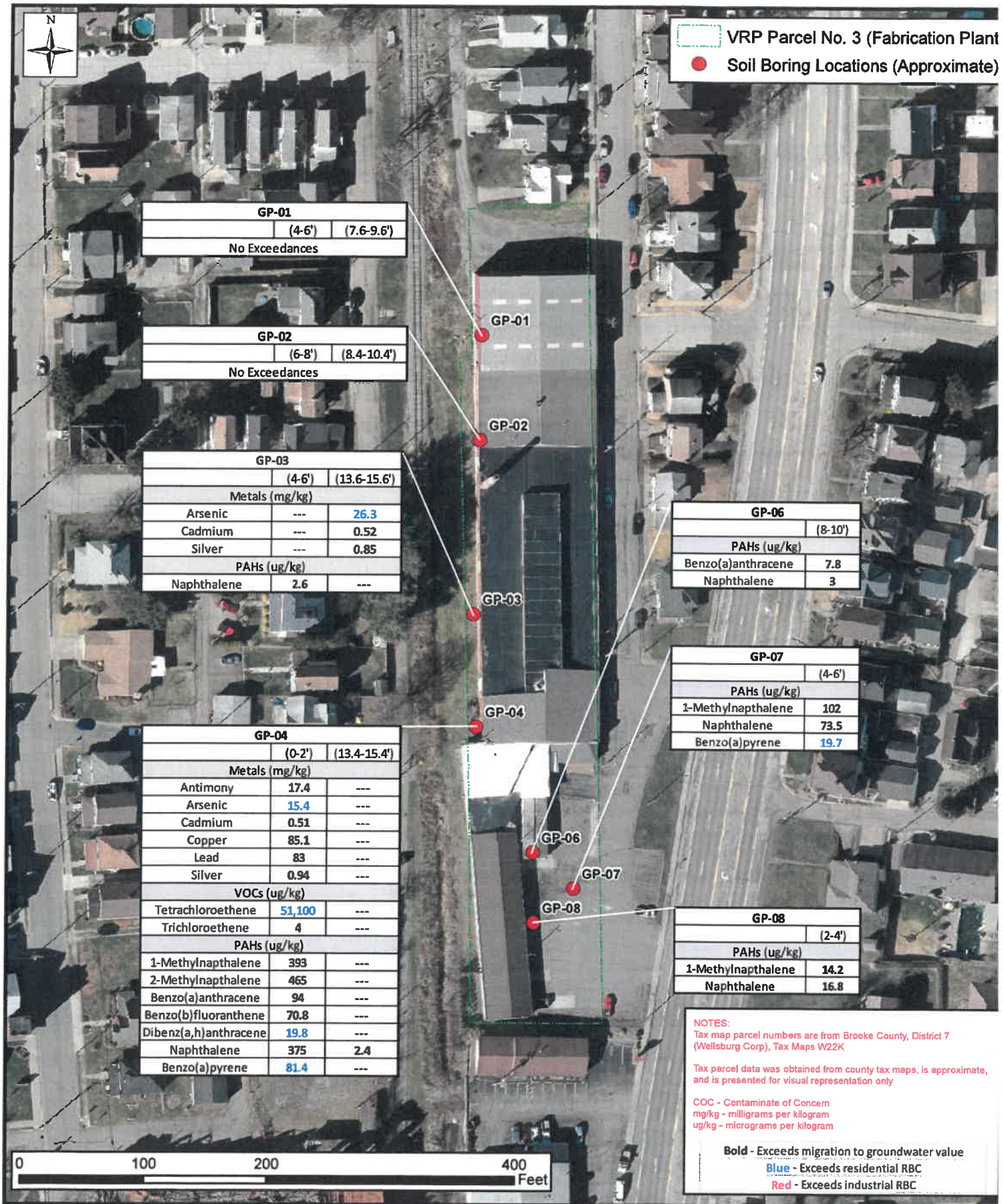
For Informational Purposes Only

POTESTA
ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Potesta & Associates, Inc.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Avenue, S.E.
Charleston, WV 25304
Office: (304) 342-1400 Fax: (304)-343-9031
E-mail: potesta@potesta.com

SCALE: 1" : 100'	DATE: 10/31/2018
PN: 18-0086	DRAWN: CHH

I:\Projects\2018\18_0086 Heritage_Holdings\Maps\10_17_2018\Heritage Holdings_GroundwaterSampleLocations_Drawing_3.mxd



GP-01		
	(4-6')	(7.6-9.6')
No Exceedances		

GP-02		
	(6-8')	(8.4-10.4')
No Exceedances		

GP-03		
	(4-6')	(13.6-15.6')
Metals (mg/kg)		
Arsenic	---	**26.3**
Cadmium	---	0.52
Silver	---	0.85
PAHs (ug/kg)		
Naphthalene	2.6	---

GP-04		
	(0-2')	(13.4-15.4')
Metals (mg/kg)		
Antimony	17.4	---
Arsenic	**15.4**	---
Cadmium	0.51	---
Copper	85.1	---
Lead	83	---
Silver	0.94	---
VOCs (ug/kg)		
Tetrachloroethene	**51,100**	---
Trichloroethene	4	---
PAHs (ug/kg)		
1-Methylnapthalene	393	---
2-Methylnapthalene	465	---
Benzo(a)anthracene	94	---
Benzo(b)fluoranthene	70.8	---
Dibenz(a,h)anthracene	**19.8**	---
Naphthalene	375	2.4
Benzo(a)pyrene	**81.4**	---

GP-06	
	(8-10')
PAHs (ug/kg)	
Benzo(a)anthracene	7.8
Naphthalene	3

GP-07	
	(4-6')
PAHs (ug/kg)	
1-Methylnapthalene	102
Naphthalene	73.5
Benzo(a)pyrene	**19.7**

GP-08	
	(2-4')
PAHs (ug/kg)	
1-Methylnapthalene	14.2
Naphthalene	16.8

NOTES:
Tax map parcel numbers are from Brooke County, District 7 (Wellsburg Corp), Tax Maps W22K

Tax parcel data was obtained from county tax maps, is approximate, and is presented for visual representation only

COC - Contaminate of Concern
mg/kg - milligrams per kilogram
ug/kg - micrograms per kilogram

Bold - Exceeds migration to groundwater value
Blue - Exceeds residential RBC
Red - Exceeds industrial RBC

Drawing 3

MAPPING FOR VISUAL REPRESENTATION ONLY

Soil Sample Locations and COC's
Fabrication Plant - VRP Parcel No. 3
Heritage Holdings, LLC
1901 Commerce Street
Wellsburg, Brooke County, West Virginia

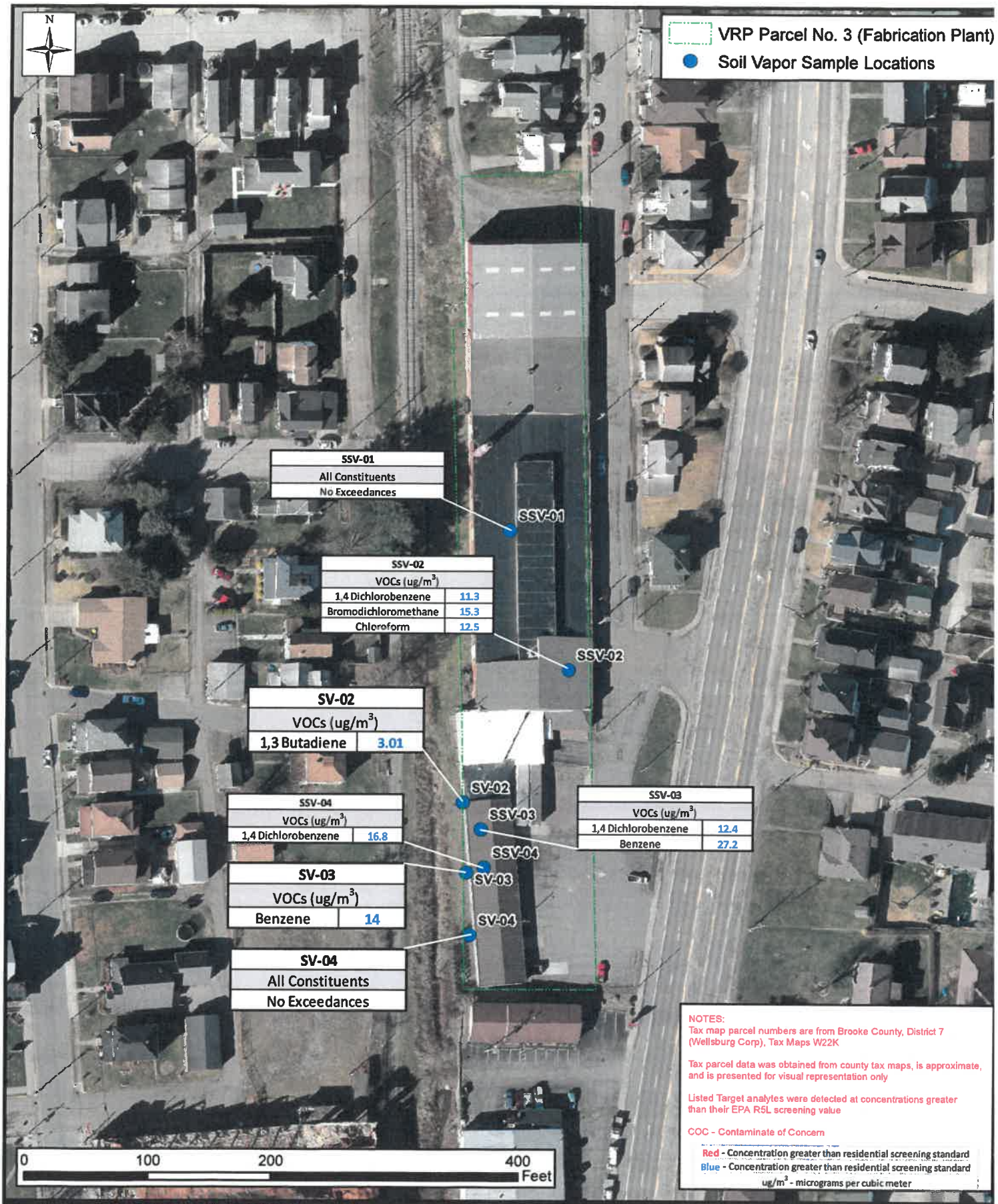
For Informational Purposes Only

POTESTA
ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Potesta & Associates, Inc.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Avenue, S.E.
Charleston, WV 25304
Office: (304) 342-1400 Fax: (304)-343-9031
E-mail: potesta@potesta.com

SCALE: 1" : 100' | DATE: 10/23/2018
PN: 18-0086 | DRAWN: CHH

I:\Projects\2018\18_0086_Heritage_Holdings\Maps\10_17_2018\HeritageHoldings_SoilSampleLocations_Drawing_2.mxd



Drawing 4

MAPPING FOR VISUAL REPRESENTATION ONLY

Soil Vapor Sample Locations and COC's
Fabrication Plant - VRP Parcel No. 3
Heritage Holdings, LLC
1901 Commerce Street
Wellsburg, Brooke County, West Virginia

For Informational Purposes Only

POTESTA
ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Potesta & Associates, Inc.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Avenue, S.E.
Charleston, WV 25304
Office: (304) 342-1400 Fax: (304)-343-9031
E-mail: potesta@potesta.com

SCALE: 1" : 100'	DATE: 10/23/2018
PN: 18-0086	DRAWN: CHH

I:\Projects\2018\18_0086_Heritage_Holdings\Maps\10_17_2018\HeritageHoldings_SoilVaporSampleLocations_Drawing_4.mxd

APPENDIX B

Table 1. Spring Water COPC Screening
Heritage Holdings, LLC
19th Street Fabrication Plant
Wellsburg, West Virginia

COPC[1]	Groundwater RBCs[2]	FP Spring Water
Date		Apr-18
Total Petroleum Hydrocarbons		
Not Analyzed		
Volatile Organic Compounds (µg/L[3])		
Tetrachloroethene	5	0.77
Semi-Volatile Organic Compounds (µg/L)		
None Detected		
Metals (µg/L)		
Barium	2000	70
Calcium	NE[4]	74800
Magnesium	NE	15300
Potassium	NE	41000
Sodium	NE	145000

Notes:

1. COPCs - Contaminants of Potential Concern listed were detected above laboratory detection limits.
2. RBCs - West Virginia Risk-Based Concentration obtained from Voluntary Remediation and Redevelopment Rule (VRRR), Table 60-3B, revised June 2017.
3. µg/L - micrograms per liter
4. Not Established

Red - Concentration greater than screening standard.

Table 2. Groundwater COPCs Screening Summary
Heritage Holdings, LLC
19th Street Fabrication Plant
Wellsburg, West Virginia

COPC[1]	Groundwater RBC[2]	GP-01	GP-02	GP-03	GP-04	GP-05	GP-07	GP-09*	GP-10	GP-11
Total Petroleum Hydrocarbons										
Diesel Range Organics (mg/L[3])	NE[4]	0.22	0.17	< 0.1[5]	0.063 J[6]	< 0.11	0.15	NA[7]	NA	NA
Gasoline Range Organics (µg/L[8])	NE	68.3 J	70.4 J	53.8 J	56.2 J	73.1 J	123 J	NA	NA	NA
Volatile Organic Compounds (µg/L)										
2-Butanone (MEK)	5600	< 10	< 10	< 10	< 10	< 10	< 10	3.4 J	244	148
2-Hexanone	NE	< 10	< 10	< 10	< 10	< 10	< 10	< 10	8.1 J J	7.9 J
Acetone	14000	6.9 J	8.5 J	< 10	< 10	< 10	38.6	20.1	90.2	67.5
Carbon disulfide	810	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
cis-1,2-Dichloroethene	70	< 1	< 1	< 1	2	< 1	65.7	< 1	< 1	< 1
Tetrachloroethene	5	< 1	< 1	< 1	< 1	< 1	0.46 J	< 1	< 1	< 1
Trichloroethene	5	< 1	< 1	< 1	< 1	< 1	34.9	< 1	< 1	< 1
Vinyl chloride	2	< 1	< 1	< 1	< 1	< 1	1.9	< 1	< 1	< 1
Semi-Volatile Organic Compounds (µg/L)										
Benzo(a)anthracene	0.012	< 0.1	< 0.1	< 0.1	< 0.1	0.073 J	< 0.1	NA	NA	NA
Benzo(a)pyrene	0.2	< 0.1	< 0.1	< 0.1	< 0.1	0.053 J	< 0.1	NA	NA	NA
Benzo(b)fluoranthene	0.034	< 0.1	< 0.1	< 0.1	< 0.1	0.082 J	< 0.1	NA	NA	NA
Benzo(g,h,i)perylene	600	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	NA	NA	NA
Benzo(k)fluoranthene	0.34	< 0.1	< 0.1	< 0.1	< 0.1	0.12	< 0.1	NA	NA	NA
Chrysene	3.4	< 0.5	< 0.5	< 0.5	< 0.5	0.11 J	< 0.5	NA	NA	NA
Dibenz(a,h)anthracene	0.0034	< 0.1	< 0.1	< 0.1	< 0.1	0.088 J	< 0.1	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.034	< 0.1	< 0.1	< 0.1	< 0.1	0.085 J	< 0.1	NA	NA	NA
Metals (µg/L)										
Arsenic	10	10.4	11.6	12.4	10.5	117	< 0.5	NA	NA	NA
Barium	2000	524	508	578	193	152	200	NA	NA	NA
Cadmium	5	< 3	< 3	< 3	0.4 J	0.42 J	< 3	NA	NA	NA
Chromium	22000	< 5	3.9 J	< 5	0.92 J	0.55 J	2.6 J	NA	NA	NA
Copper	800	< 5	< 5	< 5	< 5	< 5	5 J	NA	NA	NA
Nickel	390	< 10	< 10	< 10	1.1 J	1.7 J	3.5 J	NA	NA	NA
Zinc	6000	1.8 J	1.5 J	3 J	2.7 J	16.2	27.8	NA	NA	NA

Notes:
1. COPCs - Contaminants of Potential Concern listed were detected above laboratory detection limits.
2. RBCs - West Virginia Risk-Based Concentrations obtained from Voluntary Remediation and Redevelopment Rule (VRRR), Table 60-3B, revised June 2017.
3. mg/L - milligrams per liter
4. Not Established
5. < - COPC was not detected at a concentration greater than the reporting limit.
6. J - Estimated concentration above the method detection limit and below the reporting limit.
7. Not Analyzed
8. µg/L - micrograms per liter

* - Groundwater collected from depth of approximately 40 feet below ground surface.

Red - Concentration greater than screening standard.

Table 3. Soil COPCs Screening Summary Heritage Holdings, LLC
19th Street Fabrication Plant
Wellsburg, West Virginia

COPC[1]	Residential Soil RBCs[2]	Industrial Soil RBCs[2]	Migration to Groundwater[2]	Natural Background[3]	Number of Samples	Number of Detections	Percentage of Detections	Maximum Concentration	COC Designation
Total Petroleum Hydrocarbons (mg/kg[4])									
Diesel Range Organics	NE5	NE	NE	NE	11	3	27%	862	No
Volatile Organic Compounds (µg/kg[7])									
2-Butanone	28000000	28000000	1200	NE	11	7	64%	13.4	No
Acetone	61000000	110000000	2900	NE	11	11	100%	105	No
Carbon Disulfide	74000	740000	240	NE	11	3	27%	12.9	No
Tetrachloroethene	25000	170000	**2.3**	NE	11	1	9%	**51100**	Yes
Trichloroethene	500	20000	**1.8**	NE	11	1	9%	4	No
Semi-Volatile Organic Compounds (µg/kg)									
1-Methylnaphthalene	24000	390000	**6**	NE	11	4	36%	**393**	No
2-Methylnaphthalene	310000	9300000	**190**	NE	11	5	45%	**465**	No
Acenaphthene	4100000	70000000	2500	NE	11	1	9%	10.4	No
Acenaphthylene	4200000	80000000	3300	NE	11	2	18%	10.5	No
Anthracene	23000000	700000000	58000	NE	11	2	18%	43.6	No
Benzo(a)anthracene	210	88000	**4.2**	NE	11	7	64%	**94**	Yes
Benzo(a)pyrene	16	4300	230	NE	11	5	45%	81.4	Yes
Benzo(b)fluoranthene	160	43000	**41**	NE	11	7	64%	**70.8**	No
Benzo(g,h,i)perylene	1800000	33000000	2300000	NE	11	4	36%	40.2	No
Benzo(k)fluoranthene	1600	430000	400	NE	11	5	45%	65.9	No
Chrysene	16000	4300000	1200	NE	11	7	64%	154	No
Dibenz(a,h)anthracene	16	4300	**13**	NE	11	2	18%	**19.8**	Yes
Fluoranthene	2400000	44000000	89000	NE	11	7	64%	152	No
Fluorene	2900000	62000000	2700	NE	11	2	18%	17.7	No
Indeno(1,2,3-cd)pyrene	160	43000	130	NE	11	4	36%	44.4	No
Naphthalene	4100	180000	0.54	NE	11	6	55%	**375**	No
Phenanthrene	23000000	700000000	200000	NE	11	7	64%	212	No
Pyrene	2300000	66000000	8600	NE	11	8	73%	159	No
Metals (mg/kg)									
Antimony	31	930	**0.35**	8.8	11	1	9%	**17.4**	No
Arsenic	0.43	35	**0.29**	13	11	11	100%	**26.3**	Yes
Barium	15000	400000	82	500	11	11	100%	205	No
Beryllium	160	4500	3.2	2	11	11	100%	1.1	No
Cadmium	37	980	**0.38**	NE	11	11	100%	**0.52**	No
Chromium	120000	1000000	40000000	70	11	11	100%	19.9	No
Copper	3100	93000	**28**	30	11	11	100%	**85.1**	No
Lead	400	1000	**14**	20	11	11	100%	**83**	No
Mercury	3.1	3.1	0.1	0.44	11	11	100%	0.14	No
Nickel	1500	43000	26	30	11	11	100%	25.8	No
Selenium	390	12000	0.26	0.8	11	1	9%	0.49	No
Silver	390	12000	**0.8**	NE	11	11	100%	**0.94**	No
Zinc	23000	700000	370	98	11	11	100%	109	No

Notes:

1. COPCs - Contaminants of Potential Concern listed were detected above laboratory detection limits.
2. RBCs - West Virginia Risk-Based Concentrations obtained from Voluntary Remediation and Redevelopment Rule (VRRR), Table 60-3B, revised June 2017.
3. Natural background levels of inorganics in soil in West Virginia, Table 2-3; West Virginia Voluntary Remediation and Redevelopment Act Guidance Manual
4. mg/kg - milligrams per kilogram
5. Not Established
7. µg/kg - micrograms per kilogram

Bold - Exceeds Migration to Groundwater value
Blue - Exceeds Residential RBC
Red - Exceeds Industrial RBC

Table 4. Shallow Soil Vapor and Sub-Slab COPC Screening Summary
Heritage Holdings, LLC
19th Street Fabrication Plant
Wellsburg, West Virginia

COPC[1]	USEPA Residential VISLs[2]	Number of Samples	Number of Detections	Percentage of Detecetions	Maximum Concetrations	COC
Volatile Organic Compounds (µg/m3[3])						
1,1,1-Trichloroethane	170000	7	1	14%	4.77	No
1,1-Dichloroethane	59	7	1	14%	2.42	No
1,2,4-Trimethylbenzene	2100	7	6	86%	23.7	No
1,3,5-Trimethylbenzene	2100	7	1	14%	2.98	No
1,3-Butadiene	3.1	7	1	14%	3.01	No
1,4-Dichlorobenzene	8.5	7	4	57%	16.8	Yes
1,4-Dioxane	19	7	1	14%	5.62	No
2,2,4-Trimethylpentane	NE[4]	7	1	14%	20.6	No
2-Butanone	170000	7	7	100%	48.7	No
4-Ethyltoluene	NE	7	1	14%	2.91	No
Acetone	1100000	7	6	86%	375	No
Benzene	12	7	7	100%	27.2	Yes
Bromodichloromethane	2.5	7	1	14%	15.3	Yes
Bromoform	85	7	1	14%	12.8	No
Carbon disulfide	24000	7	5	71%	287	No
Chloroform	4.1	7	1	14%	12.5	Yes
cis-1,2-Dichloroethene	NE	7	3	43%	6.26	No
Cyclohexane	210000	7	7	100%	53.7	No
Dibromochloromethane	NE	7	1	14%	24.9	No
Ethyl Alcohol	NE	7	4	57%	52.2	No
Ethylbenzene	37	7	5	71%	16.9	No
Heptane	14000	7	7	100%	574	No
iso-Propyl Alcohol	NE	7	5	71%	57.5	No
n-Hexane	24000	7	7	100%	1850	No
o-Xylene	3500	7	6	86%	17.5	No
p/m-Xylene	3500	7	6	86%	42	No
Propylene	100000	7	5	71%	231	No
Tetrachloroethene	360	7	4	57%	936	Yes
Toluene	170000	7	7	100%	62.2	No
Trichloroethene	16	7	1	14%	7.58	No
Trichlorofluoromethane	NE	7	1	14%	12.8	No
Vinyl chloride	5.6	7	1	14%	5.11	No

Notes:

1. COPCs - Contaminants of Potential Concern listed were detected above laboratory detection limits.
2. Measured concentrations of detected constituents in sub-slab vapor have been compared to the United States Environmental Protection Agency (USEPA) Vapor Intrusion Screening Levels (VISLs) for a residential exposure scenario with a 1 x 10-6 excess cancer risk for soil vapor. May 2018
3. µg/m^3 - micrograms per cubic meter.
4. NE - Not Established

Blue - Concentration greater than Residential screening standard.

APPENDIX C

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
BW_{0-2} (mutagenic body weight) kg	15	0
BW_{2-6} (mutagenic body weight) kg	15	0
BW_{6-16} (mutagenic body weight) kg	80	0
BW_{16-26} (mutagenic body weight) kg	80	80
BW_{adult} (body weight - adult) kg	80	80
BW_{child} (body weight - child) kg	15	0
$DFW_{age-adj}$ (age-adjusted dermal factor) cm ^{2}-event/kg	2610650	29478
$DFWM_{mut-age-adj}$ (mutagenic age-adjusted dermal factor) cm ^{2}-event/kg	8191633	29478
ED_{res} (exposure duration - resident) years	26	1
ED_{0-2} (mutagenic exposure duration first phase) years	2	0
ED_{2-6} (mutagenic exposure duration second phase) years	4	0
ED_{6-16} (mutagenic exposure duration third phase) years	10	0
ED_{16-26} (mutagenic exposure duration fourth phase) years	10	1
ED_{adult} (exposure duration - adult) years	20	1
ED_{child} (exposure duration - child) years	6	0
EF_{res} (exposure frequency) days/year	350	120
EF_{0-2} (mutagenic exposure frequency first phase) days/year	350	0
EF_{2-6} (mutagenic exposure frequency second phase) days/year	350	0
EF_{6-16} (mutagenic exposure frequency third phase) days/year	350	0
EF_{16-26} (mutagenic exposure frequency fourth phase) days/year	350	120
EF_{adult} (exposure frequency - adult) days/year	350	120
EF_{child} (exposure frequency - child) days/year	350	0
ET_{res} (exposure time) hours/day	24	8
$ET_{age-adj}$ (age-adjusted exposure time) hours/event	0.67077	0.71
$ET_{mut-age-adj}$ (mutagenic age-adjusted exposure time) hours/event	0.67077	0.71
ET_{0-2} (mutagenic dermal exposure time first phase) hours/event	0.54	0
ET_{2-6} (mutagenic dermal exposure time second phase) hours/event	0.54	0
ET_{6-16} (mutagenic dermal exposure time third phase) hours/event	0.71	0
ET_{16-26} (mutagenic dermal exposure time fourth phase) hours/event	0.71	0.71

Output generated 20FEB2019:14:48:47

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
ET_{ma-a} (dermal exposure time - adult) hours/event	0.71	0.71
ET_{ma-c} (dermal exposure time - child) hours/event	0.54	0
ET_{a-2} (mutagenic inhalation exposure time first phase) hours/day	24	0
ET_{2-6} (mutagenic inhalation exposure time second phase) hours/day	24	0
ET_{6-16} (mutagenic inhalation exposure time third phase) hours/day	24	0
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hours/day	24	8
ET_{ma-a} (inhalation exposure time - adult) hours/day	24	8
ET_{ma-c} (inhalation exposure time - child) hours/day	24	0
EV_{a-2} (mutagenic events) per day	1	0
EV_{2-6} (mutagenic events) per day	1	0
EV_{6-16} (mutagenic events) per day	1	0
EV_{16-26} (mutagenic events) per day	1	1
EV_{ma-a} (events - adult) per day	1	1
EV_{ma-c} (events - child) per day	1	0
THQ (target hazard quotient) unitless	0.1	1
IFW_{ma-26} (adjusted intake factor) L/kg	327.95	3.75
$IFWM_{ma-16}$ (mutagenic adjusted intake factor) L/kg	1019.9	3.75
IRW_{a-2} (mutagenic water intake rate) L/day	0.78	0
IRW_{2-6} (mutagenic water intake rate) L/day	0.78	0
IRW_{6-16} (mutagenic water intake rate) L/day	2.5	0
IRW_{16-26} (mutagenic water intake rate) L/day	2.5	2.5
IRW_{ma-a} (water intake rate - adult) L/day	2.5	2.5
IRW_{ma-c} (water intake rate - child) L/day	0.78	0
K (volatilization factor of Andelman) L/m^3	0.5	0.5
LT (lifetime) years	70	70
SA_{a-2} (mutagenic skin surface area) cm^2	6365	0
SA_{2-6} (mutagenic skin surface area) cm^2	6365	0
SA_{6-16} (mutagenic skin surface area) cm^2	19652	0
SA_{16-26} (mutagenic skin surface area) cm^2	19652	19652

Output generated 20FEB2019:14:48:47

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
SA_{adult} (skin surface area - adult) cm^2	19652	19652
SA_{child} (skin surface area - child) cm^2	6365	0
l_{sc} (apparent thickness of stratum corneum) cm	0.001	0.001
TR (target risk) unitless	1.0E-06	1.0E-05

Output generated 20FEB2019:14:48:47

Site-specific
Resident Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #31); H = HEAST; F = See FAQ; W = see user guide Section 2.3.5; E = see user guide Section 2.3.6; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = Concentration may exceed ceiling limit (See User Guide); sat = Concentration may exceed Csat (See User Guide); U = User-provided

Chemical	CAS Number	Mutagen?	Volatile?	SF_o $(mg/kg\text{-}day)^{-1}$	SF_o Ref	IUR $(ug/m^3)^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)	MW
Arsenic, Inorganic	7440-38-2	No	No	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	1.00E-03	74.922
Benz[a]anthracene	56-55-3	Yes	Yes	1.00E-01	E	6.00E-05	E	-		-		1	5.52E-01	228.3
Benzo[b]fluoranthene	205-99-2	Yes	No	1.00E-01	E	6.00E-05	E	-		-		1	4.17E-01	252.32
Dibenz[a,h]anthracene	53-70-3	Yes	No	1.00E+00	E	6.00E-04	E	-		-		1	9.53E-01	278.36
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	1.00E-01	E	6.00E-05	E	-		-		1	1.24E+00	276.34
Trichloroethylene	79-01-6	Yes	Yes	4.60E-02	I	4.10E-06	I	5.00E-04	I	2.00E-03	I	1	1.16E-02	131.39

Chemical	B (unitless)	t* (hr)	τ_{event} (hr/event)	FA (unitless)	In EPD?	DA_{event}	DA_{event} (nc cSSL)**	DA_{event} (nc 20SSL)*	MCL (ug/L)	Ingestion SL TR=1E-05 (ug/L)	Dermal SL TR=1E-05 (ug/L)	Inhalation SL TR=1E-05 (ug/L)
Arsenic, Inorganic	3.33E-03	6.63E-01	2.76E-01	1	Yes	5.78E-03	-	3.71E-03	1.00E+01	4.54E+01	8.14E+03	-
Benz[a]anthracene	3.21E+00	8.48E+00	2.00E+00	1	No	-	-	-	-	6.81E+02	-	2.13E+02
Benzo[b]fluoranthene	2.55E+00	1.13E+01	2.72E+00	1	No	-	-	-	-	6.81E+02	-	-
Dibenz[a,h]anthracene	6.12E+00	1.69E+01	3.81E+00	0.6	No	-	-	-	-	6.81E+01	-	-
Indeno[1,2,3-cd]pyrene	7.93E+00	1.67E+01	3.71E+00	0.6	No	-	-	-	-	6.81E+02	-	-
Trichloroethylene	5.11E-02	1.37E+00	5.72E-01	1	Yes	1.87E-01	-	6.19E-03	5.00E+00	1.47E+03	9.16E+03	3.12E+03

Chemical	Carcinogenic SL TR=1E-05 (ug/L)	Ingestion SL Child THQ=1 (ug/L)	Dermal SL Child THQ=1 (ug/L)	Inhalation SL Child THQ=1 (ug/L)	Noncarcinogenic SL Child THI=1 (ug/L)	Ingestion SL Adult THQ=1 (ug/L)	Dermal SL Adult THQ=1 (ug/L)	Inhalation SL Adult THQ=1 (ug/L)	Noncarcinogenic SL Adult THI=1 (ug/L)	Screening Level (ug/L)
Arsenic, Inorganic	4.52E+01	-	-	-	-	2.92E+01	5.23E+03	-	2.90E+01	2.90E+01 nc
Benz[a]anthracene	1.62E+02	-	-	-	-	-	-	-	-	1.62E+02 ca
Benzo[b]fluoranthene	6.81E+02	-	-	-	-	-	-	-	-	6.81E+02 ca
Dibenz[a,h]anthracene	6.81E+01	-	-	-	-	-	-	-	-	6.81E+01 ca
Indeno[1,2,3-cd]pyrene	6.81E+02	-	-	-	-	-	-	-	-	6.81E+02 ca
Trichloroethylene	9.02E+02	-	-	-	-	4.87E+01	3.03E+02	3.65E+01	1.95E+01	1.95E+01 nc

Output generated 20FEB2019:14:48:47

Site-specific
Resident Risk for Tap Water

Chemical	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)	MW	B (unitless)	t* (hr)
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	1.00E-03	74.922	3.33E-03	6.63E-01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-		-		1	5.52E-01	228.3	3.21E+00	8.48E+00
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-		-		1	4.17E-01	252.32	2.55E+00	1.13E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-		-		1	9.53E-01	278.36	6.12E+00	1.69E+01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-		-		1	1.24E+00	276.34	7.93E+00	1.67E+01
Trichloroethylene	4.60E-02	I	4.10E-06	I	5.00E-04	I	2.00E-03	I	1	1.16E-02	131.39	5.11E-02	1.37E+00
*Total Risk/HI	-		-		-		-		-	-	-	-	-

Chemical	τ_{event} (hr/event)	FA (unitless)	In EPD?	DA_{event}	DA (inc abs)*	DA (inc abs)*	MCL (ug/L)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Inhalation Risk
Arsenic, Inorganic	2.76E-01	1	Yes	5.78E-03	-	3.71E-03	1.00E+01	1.17E+02	2.58E-05	1.44E-07	-
Benz[a]anthracene	2.00E+00	1	No	-	-	-	-	7.30E-02	1.07E-09	-	3.43E-09
Benzo[b]fluoranthene	2.72E+00	1	No	-	-	-	-	8.20E-02	1.20E-09	-	-
Dibenz[a,h]anthracene	3.81E+00	0.6	No	-	-	-	-	8.80E-02	1.29E-08	-	-
Indeno[1,2,3-cd]pyrene	3.71E+00	0.6	No	-	-	-	-	8.50E-02	1.25E-09	-	-
Trichloroethylene	5.72E-01	1	Yes	1.87E-01	-	6.19E-03	5.00E+00	3.49E+01	2.37E-07	3.81E-08	1.12E-07
*Total Risk/HI	-	-		-	-	-	-	-	2.60E-05	1.82E-07	1.15E-07

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Arsenic, Inorganic	2.59E-05	-	-	-	-	4.01E+00	2.24E-02	-	4.03E+00
Benz[a]anthracene	4.50E-09	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	1.20E-09	-	-	-	-	-	-	-	-
Dibenz[a,h]anthracene	1.29E-08	-	-	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.25E-09	-	-	-	-	-	-	-	-
Trichloroethylene	3.87E-07	-	-	-	-	7.17E-01	1.15E-01	9.56E-01	1.79E+00
*Total Risk/HI	2.63E-05	-	-	-	-	4.72E+00	1.38E-01	9.56E-01	5.82E+00

Output generated 20FEB2019:14:48:47

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
BW_{0-2} (mutagenic body weight) kg	15	0
BW_{2-6} (mutagenic body weight) kg	15	0
BW_{6-16} (mutagenic body weight) kg	80	0
BW_{16-26} (mutagenic body weight) kg	80	80
BW_{adult} (body weight - adult) kg	80	80
BW_{child} (body weight - child) kg	15	0
$DFW_{age-adj}$ (age-adjusted dermal factor) cm ^{2}-event/kg	2610650	2947.8
$DFWM_{mutagenic}$ (mutagenic age-adjusted dermal factor) cm ^{2}-event/kg	8191633	2947.8
ED_{res} (exposure duration - resident) years	26	1
ED_{0-2} (mutagenic exposure duration first phase) years	2	0
ED_{2-6} (mutagenic exposure duration second phase) years	4	0
ED_{6-16} (mutagenic exposure duration third phase) years	10	0
ED_{16-26} (mutagenic exposure duration fourth phase) years	10	1
ED_{adult} (exposure duration - adult) years	20	1
ED_{child} (exposure duration - child) years	6	0
EF_{res} (exposure frequency) days/year	350	12
EF_{0-2} (mutagenic exposure frequency first phase) days/year	350	0
EF_{2-6} (mutagenic exposure frequency second phase) days/year	350	0
EF_{6-16} (mutagenic exposure frequency third phase) days/year	350	0
EF_{16-26} (mutagenic exposure frequency fourth phase) days/year	350	12
EF_{adult} (exposure frequency - adult) days/year	350	12
EF_{child} (exposure frequency - child) days/year	350	0
ET_{res} (exposure time) hours/day	24	24
$ET_{event-adj}$ (age-adjusted exposure time) hours/event	0.67077	0.71
$ET_{event-mutagenic}$ (mutagenic age-adjusted exposure time) hours/event	0.67077	0.71
ET_{0-2} (mutagenic dermal exposure time first phase) hours/event	0.54	0
ET_{2-6} (mutagenic dermal exposure time second phase) hours/event	0.54	0
ET_{6-16} (mutagenic dermal exposure time third phase) hours/event	0.71	0
ET_{16-26} (mutagenic dermal exposure time fourth phase) hours/event	0.71	0.71

Output generated 20FEB2019:15:17:53

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
ET_{ma-a} (dermal exposure time - adult) hours/event	0.71	0.71
ET_{ma-c} (dermal exposure time - child) hours/event	0.54	0
ET_{0-7} (mutagenic inhalation exposure time first phase) hours/day	24	0
$ET_{7-2<}$ (mutagenic inhalation exposure time second phase) hours/day	24	0
ET_{2-16} (mutagenic inhalation exposure time third phase) hours/day	24	0
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hours/day	24	24
ET_{ma-a} (inhalation exposure time - adult) hours/day	24	24
ET_{ma-c} (inhalation exposure time - child) hours/day	24	0
EV_{0-7} (mutagenic events) per day	1	0
$EV_{7-2<}$ (mutagenic events) per day	1	0
EV_{2-16} (mutagenic events) per day	1	0
EV_{16-26} (mutagenic events) per day	1	1
EV_{ma-a} (events - adult) per day	1	1
EV_{ma-c} (events - child) per day	1	0
THQ (target hazard quotient) unitless	0.1	1
$IFW_{ma-a/c}$ (adjusted intake factor) L/kg	327.95	0.375
$IFWM_{ma-a/c}$ (mutagenic adjusted intake factor) L/kg	1019.9	0.375
IRW_{0-7} (mutagenic water intake rate) L/day	0.78	0
$IRW_{7-2<}$ (mutagenic water intake rate) L/day	0.78	0
IRW_{2-16} (mutagenic water intake rate) L/day	2.5	0
IRW_{16-26} (mutagenic water intake rate) L/day	2.5	2.5
IRW_{ma-a} (water intake rate - adult) L/day	2.5	2.5
IRW_{ma-c} (water intake rate - child) L/day	0.78	0
K (volatilization factor of Andelman) L/m ^{3}	0.5	0.5
LT (lifetime) years	70	70
SA_{0-7} (mutagenic skin surface area) cm ^{2}	6365	0
$SA_{7-2<}$ (mutagenic skin surface area) cm ^{2}	6365	0
SA_{2-16} (mutagenic skin surface area) cm ^{2}	19652	0
SA_{16-26} (mutagenic skin surface area) cm ^{2}	19652	19652

Output generated 20FEB2019:15:17:53

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
SA_{adult} (skin surface area - adult) cm^2	19652	19652
SA_{child} (skin surface area - child) cm^2	6365	0
l_{sc} (apparent thickness of stratum corneum) cm	0.001	0.001
TR (target risk) unitless	1.0E-06	1.0E-05

Output generated 20FEB2019:15:17:53

Site-specific
Resident Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #31); H = HEAST; F = See FAQ; W = see user guide Section 2.3.5; E = see user guide Section 2.3.6; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = Concentration may exceed ceiling limit (See User Guide); sat = Concentration may exceed Csat (See User Guide); U = User-provided

Chemical	CAS Number	Mutagen?	Volatile?	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)	MW
Arsenic, Inorganic	7440-38-2	No	No	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	1.00E-03	74.922
Benz[a]anthracene	56-55-3	Yes	Yes	1.00E-01	E	6.00E-05	E	-		-		1	5.52E-01	228.3
Benzo[b]fluoranthene	205-99-2	Yes	No	1.00E-01	E	6.00E-05	E	-		-		1	4.17E-01	252.32
Dibenz[a,h]anthracene	53-70-3	Yes	No	1.00E+00	E	6.00E-04	E	-		-		1	9.53E-01	278.36
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	1.00E-01	E	6.00E-05	E	-		-		1	1.24E+00	276.34
Trichlorofluoromethane	75-69-4	No	Yes	-		-		3.00E-01	I	-		1	1.27E-02	137.37

Chemical	B (unitless)	t^* (hr)	τ_{event} (hr/event)	FA (unitless)	In EPD?	$DA_{event,ca}$	$DA_{event,nc}$	$DA_{ing,ca}$	MCL (ug/L)	Ingestion SL TR=1E-05 (ug/L)	Dermal SL TR=1E-05 (ug/L)	Inhalation SL TR=1E-05 (ug/L)
Arsenic, Inorganic	3.33E-03	6.63E-01	2.76E-01	1	Yes	5.78E-02	-	3.71E-02	1.00E+01	4.54E+02	8.14E+04	-
Benz[a]anthracene	3.21E+00	8.48E+00	2.00E+00	1	No	-	-	-	-	6.81E+03	-	7.10E+02
Benzo[b]fluoranthene	2.55E+00	1.13E+01	2.72E+00	1	No	-	-	-	-	6.81E+03	-	-
Dibenz[a,h]anthracene	6.12E+00	1.69E+01	3.81E+00	0.6	No	-	-	-	-	6.81E+02	-	-
Indeno[1,2,3-cd]pyrene	7.93E+00	1.67E+01	3.71E+00	0.6	No	-	-	-	-	6.81E+03	-	-
Trichlorofluoromethane	5.73E-02	1.48E+00	6.18E-01	1	Yes	-	-	3.71E+01	-	-	-	-

Chemical	Carcinogenic SL TR=1E-05 (ug/L)	Ingestion SL Child THQ=1 (ug/L)	Dermal SL Child THQ=1 (ug/L)	Inhalation SL Child THQ=1 (ug/L)	Noncarcinogenic SL Child THI=1 (ug/L)	Ingestion SL Adult THQ=1 (ug/L)	Dermal SL Adult THQ=1 (ug/L)	Inhalation SL Adult THQ=1 (ug/L)	Noncarcinogenic SL Adult THI=1 (ug/L)	Screening Level (ug/L)
Arsenic, Inorganic	4.52E+02	-	-	-	-	2.92E+02	5.23E+04	-	2.90E+02	2.90E+02 nc
Benz[a]anthracene	6.43E+02	-	-	-	-	-	-	-	-	6.43E+02 ca
Benzo[b]fluoranthene	6.81E+03	-	-	-	-	-	-	-	-	6.81E+03 ca
Dibenz[a,h]anthracene	6.81E+02	-	-	-	-	-	-	-	-	6.81E+02 ca
Indeno[1,2,3-cd]pyrene	6.81E+03	-	-	-	-	-	-	-	-	6.81E+03 ca
Trichlorofluoromethane	-	-	-	-	-	2.92E+05	1.60E+06	-	2.47E+05	2.47E+05 nc

Output generated 20FEB2019:15:17:53

Site-specific
Resident Risk for Tap Water

Chemical	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)	MW	B (unitless)	t^* (hr)
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	1.00E-03	74.922	3.33E-03	6.63E-01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-		-		1	5.52E-01	228.3	3.21E+00	8.48E+00
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-		-		1	4.17E-01	252.32	2.55E+00	1.13E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-		-		1	9.53E-01	278.36	6.12E+00	1.69E+01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-		-		1	1.24E+00	276.34	7.93E+00	1.67E+01
Trichlorofluoromethane	-		-		3.00E-01	I	-		1	1.27E-02	137.37	5.73E-02	1.48E+00
*Total Risk/HI	-		-		-		-		-	-	-	-	-

Chemical	τ_{event} (hr/event)	FA (unitless)	In EPD?	$DA_{event\ (c\text{-}s)}$	DA_{event} (nc child)*	DA_{event} (nc adult)*	MCL (ug/L)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Inhalation Risk
Arsenic, Inorganic	2.76E-01	1	Yes	5.78E-02	-	3.71E-02	1.00E+01	1.17E+02	2.58E-06	1.44E-08	-
Benz[a]anthracene	2.00E+00	1	No	-	-	-	-	7.30E-02	1.07E-10	-	1.03E-09
Benzo[b]fluoranthene	2.72E+00	1	No	-	-	-	-	8.20E-02	1.20E-10	-	-
Dibenz[a,h]anthracene	3.81E+00	0.6	No	-	-	-	-	8.80E-02	1.29E-09	-	-
Indeno[1,2,3-cd]pyrene	3.71E+00	0.6	No	-	-	-	-	8.50E-02	1.25E-10	-	-
Trichlorofluoromethane	6.18E-01	1	Yes	-	-	3.71E+01	-	3.49E+01	-	-	-
*Total Risk/HI	-	-		-	-	-	-	-	2.58E-06	1.44E-08	1.03E-09

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Arsenic, Inorganic	2.59E-06	-	-	-	-	4.01E-01	2.24E-03	-	4.03E-01
Benz[a]anthracene	1.14E-09	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	1.20E-10	-	-	-	-	-	-	-	-
Dibenz[a,h]anthracene	1.29E-09	-	-	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.25E-10	-	-	-	-	-	-	-	-
Trichlorofluoromethane	-	-	-	-	-	1.20E-04	2.18E-05	-	1.41E-04
*Total Risk/HI	2.59E-06	-	-	-	-	4.01E-01	2.26E-03	-	4.03E-01

Output generated 20FEB2019:15:17:53

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
BW_{a-7} (mutagenic body weight) kg	15	0
BW_{7-16} (mutagenic body weight) kg	15	0
BW_{16-26} (mutagenic body weight) kg	80	0
BW_{16-26} (mutagenic body weight) kg	80	80
BW_{a-a} (body weight - adult) kg	80	80
BW_{a-c} (body weight - child) kg	15	0
DFW_{a-16} (age-adjusted dermal factor) cm ^{2}-event/kg	2610650	9826
$DFWM_{a-16}$ (mutagenic age-adjusted dermal factor) cm ^{2}-event/kg	8191633	9826
ED_{a-a} (exposure duration - resident) years	26	10
ED_{a-7} (mutagenic exposure duration first phase) years	2	0
ED_{7-16} (mutagenic exposure duration second phase) years	4	0
ED_{16-26} (mutagenic exposure duration third phase) years	10	0
ED_{16-26} (mutagenic exposure duration fourth phase) years	10	10
ED_{a-a} (exposure duration - adult) years	20	10
ED_{a-c} (exposure duration - child) years	6	0
EF_{a-a} (exposure frequency) days/year	350	4
EF_{a-7} (mutagenic exposure frequency first phase) days/year	350	0
EF_{7-16} (mutagenic exposure frequency second phase) days/year	350	0
EF_{16-26} (mutagenic exposure frequency third phase) days/year	350	0
EF_{16-26} (mutagenic exposure frequency fourth phase) days/year	350	4
EF_{a-a} (exposure frequency - adult) days/year	350	4
EF_{a-c} (exposure frequency - child) days/year	350	0
ET_{a-a} (exposure time) hours/day	24	8
ET_{a-16} (age-adjusted exposure time) hours/event	0.67077	0.71
ET_{a-16} (mutagenic age-adjusted exposure time) hours/event	0.67077	0.71
ET_{a-7} (mutagenic dermal exposure time first phase) hours/event	0.54	0
ET_{7-16} (mutagenic dermal exposure time second phase) hours/event	0.54	0
ET_{16-26} (mutagenic dermal exposure time third phase) hours/event	0.71	0
ET_{16-26} (mutagenic dermal exposure time fourth phase) hours/event	0.71	0.71

Output generated 20FEB2019:16:42:36

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
ET_{ma-a} (dermal exposure time - adult) hours/event	0.71	0.71
ET_{ma-c} (dermal exposure time - child) hours/event	0.54	0
ET_{0-2} (mutagenic inhalation exposure time first phase) hours/day	24	0
ET_{2-6} (mutagenic inhalation exposure time second phase) hours/day	24	0
ET_{6-16} (mutagenic inhalation exposure time third phase) hours/day	24	0
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hours/day	24	8
ET_{ia-a} (inhalation exposure time - adult) hours/day	24	8
ET_{ia-c} (inhalation exposure time - child) hours/day	24	0
EV_{0-2} (mutagenic events) per day	1	0
EV_{2-6} (mutagenic events) per day	1	0
EV_{6-16} (mutagenic events) per day	1	0
EV_{16-26} (mutagenic events) per day	1	1
EV_{ea-a} (events - adult) per day	1	1
EV_{ea-c} (events - child) per day	1	0
THQ (target hazard quotient) unitless	0.1	1
IFW_{ma-adj} (adjusted intake factor) L/kg	327.95	1.25
$IFWM_{ma-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9	1.25
IRW_{0-2} (mutagenic water intake rate) L/day	0.78	0
IRW_{2-6} (mutagenic water intake rate) L/day	0.78	0
IRW_{6-16} (mutagenic water intake rate) L/day	2.5	0
IRW_{16-26} (mutagenic water intake rate) L/day	2.5	2.5
IRW_{wa-a} (water intake rate - adult) L/day	2.5	2.5
IRW_{wa-c} (water intake rate - child) L/day	0.78	0
K (volatilization factor of Andelman) L/m ^{3}	0.5	0.5
LT (lifetime) years	70	70
SA_{0-2} (mutagenic skin surface area) cm ^{2}	6365	0
SA_{2-6} (mutagenic skin surface area) cm ^{2}	6365	0
SA_{6-16} (mutagenic skin surface area) cm ^{2}	19652	0
SA_{16-26} (mutagenic skin surface area) cm ^{2}	19652	19652

Output generated 20FEB2019:16:42:36

Site-specific
Resident Equation Inputs for Tap Water

*** Inputted values different from Resident defaults are highlighted.**

Variable	Resident Tap Water Default Value	Form-input Value
SA_{adult} (skin surface area - adult) cm^2	19652	19652
SA_{child} (skin surface area - child) cm^2	6365	0
l_{sc} (apparent thickness of stratum corneum) cm	0.001	0.001
TR (target risk) unitless	1.0E-06	1.0E-05

Output generated 20FEB2019:16:42:36

Site-specific
Resident Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #31); H = HEAST; F = See FAQ; W = see user guide Section 2.3.5; E = see user guide Section 2.3.6; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = Concentration may exceed ceiling limit (See User Guide); sat = Concentration may exceed Csat (See User Guide); U = User-provided

Chemical	CAS Number	Mutagen?	Volatile?	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)	MW	B (unitless)
Arsenic, Inorganic	7440-38-2	No	No	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	1.00E-03	74.922	3.33E-03
Benz[a]anthracene	56-55-3	Yes	Yes	1.00E-01	E	6.00E-05	E	-		-		1	5.52E-01	228.3	3.21E+00
Benzo[b]fluoranthene	205-99-2	Yes	No	1.00E-01	E	6.00E-05	E	-		-		1	4.17E-01	252.32	2.55E+00
Dibenz[a,h]anthracene	53-70-3	Yes	No	1.00E+00	E	6.00E-04	E	-		-		1	9.53E-01	278.36	6.12E+00
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	1.00E-01	E	6.00E-05	E	-		-		1	1.24E+00	276.34	7.93E+00
Trichloroethylene	79-01-6	Yes	Yes	4.60E-02	I	4.10E-06	I	5.00E-04	I	2.00E-03	I	1	1.16E-02	131.39	5.11E-02

Chemical	t^* (hr)	τ_{event} (hr/event)	FA (unitless)	In EPD?	DA_{event} (ug/cm^2-event)	DA_{event} (nc cSSL)*	DA_{event} (nc adSSL)*	MCL (ug/L)	Ingestion SL TR=1E-05 (ug/L)	Dermal SL TR=1E-05 (ug/L)	Inhalation SL TR=1E-05 (ug/L)	Carcinogenic SL TR=1E-05 (ug/L)
Arsenic, Inorganic	6.63E-01	2.76E-01	1	Yes	1.73E-02	-	1.11E-01	1.00E+01	1.36E+02	2.44E+04	-	1.36E+02
Benz[a]anthracene	8.48E+00	2.00E+00	1	No	-	-	-	-	2.04E+03	-	6.39E+02	4.87E+02
Benzo[b]fluoranthene	1.13E+01	2.72E+00	1	No	-	-	-	-	2.04E+03	-	-	2.04E+03
Dibenz[a,h]anthracene	1.69E+01	3.81E+00	0.6	No	-	-	-	-	2.04E+02	-	-	2.04E+02
Indeno[1,2,3-cd]pyrene	1.67E+01	3.71E+00	0.6	No	-	-	-	-	2.04E+03	-	-	2.04E+03
Trichloroethylene	1.37E+00	5.72E-01	1	Yes	5.62E-01	-	1.86E-01	5.00E+00	4.42E+03	2.75E+04	9.35E+03	2.70E+03

Chemical	Ingestion SL Child THQ=1 (ug/L)	Dermal SL Child THQ=1 (ug/L)	Inhalation SL Child THQ=1 (ug/L)	Noncarcinogenic SL Child THI=1 (ug/L)	Ingestion SL Adult THQ=1 (ug/L)	Dermal SL Adult THQ=1 (ug/L)	Inhalation SL Adult THQ=1 (ug/L)	Noncarcinogenic SL Adult THI=1 (ug/L)	Screening Level (ug/L)
Arsenic, Inorganic	-	-	-	-	8.76E+02	1.57E+05	-	8.71E+02	1.36E+02 ca**
Benz[a]anthracene	-	-	-	-	-	-	-	-	4.87E+02 ca
Benzo[b]fluoranthene	-	-	-	-	-	-	-	-	2.04E+03 ca
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-	2.04E+02 ca
Indeno[1,2,3-cd]pyrene	-	-	-	-	-	-	-	-	2.04E+03 ca
Trichloroethylene	-	-	-	-	1.46E+03	9.09E+03	1.10E+03	5.85E+02	5.85E+02 nc

Output generated 20FEB2019:16:42:36

Site-specific
Resident Risk for Tap Water

Chemical	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)	MW	B (unitless)	t^* (hr)
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	1.00E-03	74.922	3.33E-03	6.63E-01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-		-		1	5.52E-01	228.3	3.21E+00	8.48E+00
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-		-		1	4.17E-01	252.32	2.55E+00	1.13E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-		-		1	9.53E-01	278.36	6.12E+00	1.69E+01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-		-		1	1.24E+00	276.34	7.93E+00	1.67E+01
Trichloroethylene	4.60E-02	I	4.10E-06	I	5.00E-04	I	2.00E-03	I	1	1.16E-02	131.39	5.11E-02	1.37E+00
*Total Risk/HI	-		-		-		-		-	-	-	-	-

Chemical	τ_{event} (hr/event)	FA (unitless)	In EPD?	DA_{event} (ug/cm^2-event)	DA_{event} (mg/cm^2-event)*	DA_{event} (ug/cm^2-event)*	MCL (ug/L)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Inhalation Risk
Arsenic, Inorganic	2.76E-01	1	Yes	1.73E-02	-	1.11E-01	1.00E+01	1.17E+02	8.59E-06	4.79E-08	-
Benz[a]anthracene	2.00E+00	1	No	-	-	-	-	7.30E-02	3.57E-10	-	1.14E-09
Benzo[b]fluoranthene	2.72E+00	1	No	-	-	-	-	8.20E-02	4.01E-10	-	-
Dibenz[a,h]anthracene	3.81E+00	0.6	No	-	-	-	-	8.80E-02	4.31E-09	-	-
Indeno[1,2,3-cd]pyrene	3.71E+00	0.6	No	-	-	-	-	8.50E-02	4.16E-10	-	-
Trichloroethylene	5.72E-01	1	Yes	5.62E-01	-	1.86E-01	5.00E+00	3.49E+01	7.90E-08	1.27E-08	3.73E-08
*Total Risk/HI	-	-		-	-	-	-	-	8.67E-06	6.06E-08	3.85E-08

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Arsenic, Inorganic	8.63E-06	-	-	-	-	1.34E-01	7.45E-04	-	1.34E-01
Benz[a]anthracene	1.50E-09	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	4.01E-10	-	-	-	-	-	-	-	-
Dibenz[a,h]anthracene	4.31E-09	-	-	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	4.16E-10	-	-	-	-	-	-	-	-
Trichloroethylene	1.29E-07	-	-	-	-	2.39E-02	3.84E-03	3.19E-02	5.96E-02
*Total Risk/HI	8.77E-06	-	-	-	-	1.57E-01	4.59E-03	3.19E-02	1.94E-01

Output generated 20FEB2019:16:42:36

APPENDIX D

Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 07MAY2019:10:02:57

Variable	Commercial Air Default Value	Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_{w} (averaging time - composite worker)	365	365
ED_{w} (exposure duration - composite worker) yr	25	25
EF_{w} (exposure frequency - composite worker) day/yr	250	250
ET_{w} (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-05

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN; H = HEAST; W = see RSL user guide Section 2.3.5; E = see RSL user guide Section 2.3.6; S = see RSL user's guide Section 5.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp} > C_{La}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc} > C_{La}$,Target?)	Target Indoor Air Concentration (TCR=1E-05 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Acetone	67-64-1	Yes	Yes	Yes	Yes	1.35E+05	NC
Carbon Disulfide	75-15-0	Yes	Yes	Yes	Yes	3.07E+03	NC
Dichloroethylene, 1,2-cis-	156-59-2	Yes	No	No Inhal. Tox. Info	No Inhal. Tox. Info		
Hexanone, 2-	591-78-6	Yes	Yes	Yes	Yes	1.31E+02	NC
Methyl Ethyl Ketone (2-Butanone)	78-93-3	Yes	Yes	Yes	Yes	2.19E+04	NC
Tetrachloroethylene	127-18-4	Yes	Yes	Yes	Yes	1.75E+02	NC
Trichloroethylene	79-01-6	Yes	Yes	Yes	Yes	8.76E+00	NC
Vinyl Chloride	75-01-4	Yes	Yes	Yes	Yes	2.79E+01	CA

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN; H = HEAST; W = see RSL user guide Section 2.3.5; E = see RSL user guide Section 2.3.6; S = see RSL user's guide Section 5.

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-05 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-05 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (11 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)
Acetone	4.51E+06	1.69E+08	--	7.23E+08	8.02E+08	11
Carbon Disulfide	1.02E+05	8.65E+03	--	1.47E+09	7.66E+08	11
Dichloroethylene, 1,2-cis-				1.04E+09	5.87E+08	11
Hexanone, 2-	4.38E+03	7.87E+04	--	6.25E+07	2.87E+07	11
Methyl Ethyl Ketone (2-Butanone)	7.30E+05	1.81E+07	--	3.51E+08	2.70E+08	11
Tetrachloroethylene	5.84E+03	5.10E+02	No (5)	1.65E+08	7.07E+07	11
Trichloroethylene	2.92E+02	4.16E+01	No (5)	4.88E+08	2.70E+08	11
Vinyl Chloride	9.29E+02	3.46E+01	No (2)	1.00E+10	7.09E+09	11

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN; H = HEAST; W = see RSL user guide Section 2.3.5; E = see RSL user guide Section 2.3.6; S = see RSL user's guide Section 5.

Chemical	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR $(ug/m^3)^{-1}$	IUR Ref	RfC (mg/m^3)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-05 $C_{ia,c}$ ($\mu g/m^3$)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ ($\mu g/m^3$)
Acetone	2.50	CRC89			3.09E+01	A	No		1.35E+05
Carbon Disulfide	1.30	CRC89			7.00E-01	I	No		3.07E+03
Dichloroethylene, 1,2-cis-	3.00	CRC89					No		
Hexanone, 2-	1.00	CRC89			3.00E-02	I	No		1.31E+02
Methyl Ethyl Ketone (2-Butanone)	1.40	CRC89			5.00E+00	I	No		2.19E+04
Tetrachloroethylene			2.60E-07	I	4.00E-02	I	No	4.72E+02	1.75E+02
Trichloroethylene	8.00	CRC89	4.10E-06	I	2.00E-03	I	Mut	2.99E+01	8.76E+00
Vinyl Chloride	3.60	CRC89	4.40E-06	I	1.00E-01	I	Mut	2.79E+01	4.38E+02

Commercial Vapor Intrusion Risk
Output generated 07MAY2019:10:02:57

Chemical	CAS Number	Site Groundwater Concentration C_{gw} \ (µg/L)	Site Indoor Air Concentration $C_{t,a}$ \ (µg/m³)	VI Carcinogenic Risk CR	VI Hazard HQ
Acetone	67-64-1	90.2	7.23E-02		5.35E-07
Carbon Disulfide	75-15-0	2	7.09E-01		2.31E-04
Dichloroethylene, 1,2-cis-	156-59-2	65.7			
Hexanone, 2-	591-78-6	8.1	1.35E-02		1.03E-04
Methyl Ethyl Ketone (2-Butanone)	78-93-3	244	2.96E-01		1.35E-05
Tetrachloroethylene	127-18-4	0.46	1.58E-01	3.35E-09	9.01E-04
Trichloroethylene	79-01-6	34.9	7.35E+00	2.46E-06	8.40E-01
Vinyl Chloride	75-01-4	1.9	1.53E+00	5.49E-07	3.50E-03
*Sum				*3.01E-06*	*8.44E-01*

Chemical	IUR (ug/m³)⁻¹	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (°C)\ for Groundwater Vapor Concentration	Mutagen?
Acetone			3.09E+01	ATSDR	11	No
Carbon Disulfide			7.00E-01	IRIS	11	No
Dichloroethylene, 1,2-cis-					11	No
Hexanone, 2-			3.00E-02	IRIS	11	No
Methyl Ethyl Ketone (2-Butanone)			5.00E+00	IRIS	11	No
Tetrachloroethylene	2.60E-07	I	4.00E-02	IRIS	11	No
Trichloroethylene	4.10E-06	I	2.00E-03	IRIS	11	Mut
Vinyl Chloride	4.40E-06	I	1.00E-01	IRIS	11	Mut
*Sum						

Chemical Properties
Output generated 07MAY2019:10:02:57

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref
Acetone	67-64-1	Yes	Yes	58.08	PHYSPROP	2.32E+02	PHYSPROP	1.00E+06	PHYSPROP
Carbon Disulfide	75-15-0	Yes	Yes	76.14	PHYSPROP	3.59E+02	PHYSPROP	2.16E+03	PHYSPROP
Dichloroethylene, 1,2-cis-	156-59-2	Yes	No	96.94	PHYSPROP	2.00E+02	PHYSPROP	6.41E+03	PHYSPROP
Hexanone, 2-	591-78-6	Yes	Yes	100.16	PHYSPROP	1.16E+01	PHYSPROP	1.72E+04	PHYSPROP
Methyl Ethyl Ketone (2-Butanone)	78-93-3	Yes	Yes	72.11	PHYSPROP	9.06E+01	PHYSPROP	2.23E+05	PHYSPROP
Tetrachloroethylene	127-18-4	Yes	Yes	165.83	PHYSPROP	1.85E+01	PHYSPROP	2.06E+02	PHYSPROP
Trichloroethylene	79-01-6	Yes	Yes	131.39	PHYSPROP	6.90E+01	PHYSPROP	1.28E+03	PHYSPROP
Vinyl Chloride	75-01-4	Yes	Yes	62.50	PHYSPROP	2.98E+03	EPI	8.80E+03	PHYSPROP

Chemical Properties
Output generated 07MAY2019:10:02:57

Chemical	MCL (ug/L)	HLC (atm-m³/mole)	Henry's Law Constant (unitless)	Henry's Law Constant (11 °C)	Henry's Law Constant Used in Calcs (unitless)	H` and HLC Ref	Enthalpy of vaporization @ groundwater temperature $\Delta H_{v,gw}$ \ (cal/mol)	Exponent for $\Delta H_{v,gw}$
Acetone		3.50E-05	1.43E-03	8.02E-04	8.02E-04	PHYSPROP	7545.73	0.36
Carbon Disulfide		1.44E-02	5.89E-01	3.55E-01	3.55E-01	PHYSPROP	6676.28	0.31
Dichloroethylene, 1,2-cis-	70	4.08E-03	1.67E-01	9.16E-02	9.16E-02	PHYSPROP	7777.97	0.34
Hexanone, 2-		9.32E-05	3.81E-03	1.67E-03	1.67E-03	EPI	10501.36	0.39
Methyl Ethyl Ketone (2-Butanone)		5.69E-05	2.33E-03	1.21E-03	1.21E-03	PHYSPROP	8408.50	0.37
Tetrachloroethylene	5	1.77E-02	7.24E-01	3.43E-01	3.43E-01	PHYSPROP	9545.41	0.35
Trichloroethylene	5	9.85E-03	4.03E-01	2.11E-01	2.11E-01	PHYSPROP	8364.08	0.35
Vinyl Chloride	2	2.78E-02	1.14E+00	8.06E-01	8.06E-01	PHYSPROP	4712.12	0.34

Chemical Properties
Output generated 07MAY2019:10:02:57

Chemical	Vapor Concentration (11 °C)\ (ug/m³)	D_{ia} \ (cm²/s)	D_{ia} \ (11 °C)\ (cm²/s)	D_{ia} \ Used in Calcs (cm²/s)	D_{ia} \ Ref	D_{iw} \ (cm²/s)	D_{iw} \ (11 °C)\ (cm²/s)	D_{iw} \ Used in Calcs (cm²/s)	D_{iw} \ Ref
Acetone	4.05E+08	1.06E-01	0.0985443	0.0985443	WATER9 (U.S. EPA, 2001)	1.15E-05	0.0000109	0.0000109	WATER9 (U.S. EPA, 2001)
Carbon Disulfide	8.85E+08	1.06E-01	0.0990242	0.0990242	WATER9 (U.S. EPA, 2001)	1.30E-05	0.0000124	0.0000124	WATER9 (U.S. EPA, 2001)
Dichloroethylene, 1,2-cis-	5.73E+08	8.84E-02	0.0822484	0.0822484	WATER9 (U.S. EPA, 2001)	1.13E-05	0.0000108	0.0000108	WATER9 (U.S. EPA, 2001)
Hexanone, 2-	2.74E+07	7.04E-02	0.0654562	0.0654562	WATER9 (U.S. EPA, 2001)	8.44E-06	8.0438E-6	8.0438E-6	WATER9 (U.S. EPA, 2001)
Methyl Ethyl Ketone (2-Butanone)	1.83E+08	9.14E-02	0.0850772	0.0850772	WATER9 (U.S. EPA, 2001)	1.02E-05	9.7141E-6	9.7141E-6	WATER9 (U.S. EPA, 2001)
Tetrachloroethylene	7.83E+07	5.05E-02	0.0469515	0.0469515	WATER9 (U.S. EPA, 2001)	9.46E-06	9.0108E-6	9.0108E-6	WATER9 (U.S. EPA, 2001)
Trichloroethylene	2.55E+08	6.87E-02	0.0638797	0.0638797	WATER9 (U.S. EPA, 2001)	1.02E-05	9.7408E-6	9.7408E-6	WATER9 (U.S. EPA, 2001)
Vinyl Chloride	7.10E+09	1.07E-01	0.0996595	0.0996595	WATER9 (U.S. EPA, 2001)	1.20E-05	0.0000114	0.0000114	WATER9 (U.S. EPA, 2001)

Chemical Properties
Output generated 07MAY2019:10:02:57

Chemical	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$ \ (cal/mol)	$\Delta H_{v,b}$ \ Ref	K_{oc} \ (cm^3/g)	K_{oc} \ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Acetone	329.15	PHYSPROP	5.08E+02	CRC89	6955.07	CRC89	2.364	EPI	2.50	CRC89
Carbon Disulfide	319.15	PHYSPROP	5.52E+02	CRC89	6391.01	CRC89	21.73	EPI	1.30	CRC89
Dichloroethylene, 1,2-cis-	333.25	PHYSPROP	5.36E+02	CRC89	7217.97	CRC89	39.6	EPI	3.00	CRC89
Hexanone, 2-	400.75	PHYSPROP	5.87E+02	CRC89	8687.86	CRC89	14.98	EPI	1.00	CRC89
Methyl Ethyl Ketone (2-Butanone)	352.65	PHYSPROP	5.37E+02	CRC89	7480.88	CRC89	4.51	EPI	1.40	CRC89
Tetrachloroethylene	394.45	PHYSPROP	6.20E+02	YAWS	8288.00	Weast	94.94	EPI		
Trichloroethylene	360.35	PHYSPROP	5.71E+02	YAWS	7505.00	Weast	60.7	EPI	8.00	CRC89
Vinyl Chloride	259.85	PHYSPROP	4.25E+02	CRC89	4971.32	CRC89	21.73	EPI	3.60	CRC89

Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 20FEB2019:10:41:28

Variable	Commercial Air Default Value	Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_w (averaging time - composite worker)	365	365
ED_w (exposure duration - composite worker) yr	25	25
EF_w (exposure frequency - composite worker) day/yr	250	250
ET_w (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-05

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN; H = HEAST; W = see RSL user guide Section 2.3.5; E = see RSL user guide Section 2.3.6; S = see RSL user's guide Section 5.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp} > C_{La}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc} > C_{La}$,Target?)	Target Indoor Air Concentration (TCR=1E-05 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Acetone	67-64-1	Yes	Yes	Yes	Yes	1.35E+05	NC
Benzene	71-43-2	Yes	Yes	Yes	Yes	1.57E+01	CA
Bromodichloromethane	75-27-4	Yes	Yes	Yes	Yes	3.31E+00	CA
Bromoform	75-25-2	Yes	Yes	Yes	Yes	1.11E+02	CA
Butadiene, 1,3-	106-99-0	Yes	Yes	Yes	Yes	4.09E+00	CA
Carbon Disulfide	75-15-0	Yes	Yes	Yes	Yes	3.07E+03	NC
Chloroform	67-66-3	Yes	Yes	Yes	Yes	5.33E+00	CA
Cyclohexene	110-83-8	Yes	Yes	Yes	Yes	4.38E+03	NC
Dibromochloromethane	124-48-1	Yes	No	No Inhal. Tox. Info	No Inhal. Tox. Info		
Dichlorobenzene, 1,4-	106-46-7	Yes	Yes	Yes	Yes	1.11E+01	CA
Dichloroethane, 1,1-	75-34-3	Yes	Yes	Yes	Yes	7.67E+01	CA
Dichloroethylene, 1,2-cis-	156-59-2	Yes	No	No Inhal. Tox. Info	No Inhal. Tox. Info		
Dioxane, 1,4-	123-91-1	Yes	Yes	Yes	Yes	2.45E+01	CA
Ethylbenzene	100-41-4	Yes	Yes	Yes	Yes	4.91E+01	CA
Heptane, N-	142-82-5	Yes	Yes	Yes	Yes	1.75E+03	NC
Hexane, N-	110-54-3	Yes	Yes	Yes	Yes	3.07E+03	NC
Methyl Ethyl Ketone (2-Butanone)	78-93-3	Yes	Yes	Yes	Yes	2.19E+04	NC
Propylene	115-07-1	Yes	Yes	Yes	Yes	1.31E+04	NC
Tetrachloroethylene	127-18-4	Yes	Yes	Yes	Yes	1.75E+02	NC
Toluene	108-88-3	Yes	Yes	Yes	Yes	2.19E+04	NC
Trichloroethane, 1,1,1-	71-55-6	Yes	Yes	Yes	Yes	2.19E+04	NC
Trichloroethylene	79-01-6	Yes	Yes	Yes	Yes	8.76E+00	NC
Trichlorofluoromethane	75-69-4	Yes	No	No Inhal. Tox. Info	No Inhal. Tox. Info		
Trimethylbenzene, 1,2,4-	95-63-6	Yes	Yes	Yes	Yes	2.63E+02	NC
Trimethylbenzene, 1,3,5-	108-67-8	Yes	Yes	Yes	Yes	2.63E+02	NC
Trimethylpentane, 2,2,4-	540-84-1	Yes	No	No Inhal. Tox. Info	No Inhal. Tox. Info		
Vinyl Chloride	75-01-4	Yes	Yes	Yes	Yes	2.79E+01	CA
Xylene, P-	106-42-3	Yes	Yes	Yes	Yes	4.38E+02	NC
Xylene, m-	108-38-3	Yes	Yes	Yes	Yes	4.38E+02	NC
Xylene, o-	95-47-6	Yes	Yes	Yes	Yes	4.38E+02	NC

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN; H = HEAST; W = see RSL user guide Section 2.3.5; E = see RSL user guide Section 2.3.6; S = see RSL user's guide Section 5.

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-05 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-05 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (11 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)
Acetone	4.51E+06	1.69E+08	--	7.23E+08	8.02E+08	11
Benzene	5.24E+02	1.30E+02	No (5)	3.98E+08	2.17E+08	11
Bromodichloromethane	1.10E+02	7.49E+01	Yes (80)	4.41E+08	1.34E+08	11
Bromoform	3.72E+03	1.21E+04	No (80)	7.34E+07	2.86E+07	11
Butadiene, 1,3-	1.36E+02	1.99E+00	--	6.13E+09	1.51E+09	11
Carbon Disulfide	1.02E+05	8.65E+03	--	1.47E+09	7.66E+08	11
Chloroform	1.78E+02	6.34E+01	Yes (80)	1.26E+09	6.68E+08	11
Cyclohexene	1.46E+05	4.40E+03	--	3.93E+08	2.12E+08	11
Dibromochloromethane				6.21E+07	5.27E+07	11
Dichlorobenzene, 1,4-	3.72E+02	2.79E+02	No (75)	1.38E+07	3.25E+06	11
Dichloroethane, 1,1-	2.56E+03	5.90E+02	--	1.21E+09	6.55E+08	11
Dichloroethylene, 1,2-cis-				1.04E+09	5.87E+08	11
Dioxane, 1,4-	8.18E+02	2.57E+05	--	1.80E+08	9.53E+07	11
Ethylbenzene	1.64E+03	3.37E+02	Yes (700)	5.48E+07	2.46E+07	11
Heptane, N-	5.84E+04	4.30E+01	--	2.48E+08	1.39E+08	11
Hexane, N-	1.02E+05	7.55E+01	--	7.01E+08	3.86E+08	11
Methyl Ethyl Ketone (2-Butanone)	7.30E+05	1.81E+07	--	3.51E+08	2.70E+08	11
Propylene	4.38E+05	2.12E+03	--	1.97E+10	1.24E+09	11
Tetrachloroethylene	5.84E+03	5.10E+02	No (5)	1.65E+08	7.07E+07	11
Toluene	7.30E+05	1.64E+05	No (1000)	1.41E+08	7.00E+07	11
Trichloroethane, 1,1,1-	7.30E+05	5.71E+04	No (200)	8.90E+08	4.95E+08	11
Trichloroethylene	2.92E+02	4.16E+01	No (5)	4.88E+08	2.70E+08	11
Trichlorofluoromethane				5.93E+09	2.74E+09	11
Trimethylbenzene, 1,2,4-	8.76E+03	2.63E+03	--	1.36E+07	5.70E+06	11
Trimethylbenzene, 1,3,5-	8.76E+03	1.84E+03	--	1.60E+07	6.87E+06	11
Trimethylpentane, 2,2,4-				3.03E+08	1.54E+08	11
Vinyl Chloride	9.29E+02	3.46E+01	No (2)	1.00E+10	7.09E+09	11
Xylene, P-	1.46E+04	3.47E+03	--	5.05E+07	2.05E+07	11
Xylene, m-	1.46E+04	3.33E+03	--	4.73E+07	2.12E+07	11
Xylene, o-	1.46E+04	4.68E+03	--	3.77E+07	1.67E+07	11

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN; H = HEAST; W = see RSL user guide Section 2.3.5; E = see RSL user guide Section 2.3.6; S = see RSL user's guide Section 5.

Chemical	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfC (mg/m^3)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-05 $C_{ia,c}$ ($\mu g/m^3$)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ ($\mu g/m^3$)
Acetone	2.50	CRC89			3.09E+01	A	No		1.35E+05
Benzene	1.20	CRC89	7.80E-06	I	3.00E-02	I	No	1.57E+01	1.31E+02
Bromodichloromethane			3.70E-05	C			No	3.31E+00	
Bromoform			1.10E-06	I			No	1.11E+02	
Butadiene, 1,3-	2.00	CRC89	3.00E-05	I	2.00E-03	I	No	4.09E+00	8.76E+00
Carbon Disulfide	1.30	CRC89			7.00E-01	I	No		3.07E+03
Chloroform			2.30E-05	I	9.77E-02	A	No	5.33E+00	4.28E+02
Cyclohexene	1.20	CRC89			1.00E+00	X	No		4.38E+03
Dibromochloromethane							No		
Dichlorobenzene, 1,4-	1.80	YAWS	1.10E-05	C	8.00E-01	I	No	1.11E+01	3.50E+03
Dichloroethane, 1,1-	5.40	CRC89	1.60E-06	C			No	7.67E+01	
Dichloroethylene, 1,2-cis-	3.00	CRC89					No		
Dioxane, 1,4-	2.00	CRC89	5.00E-06	I	3.00E-02	I	No	2.45E+01	1.31E+02
Ethylbenzene	0.80	CRC89	2.50E-06	C	1.00E+00	I	No	4.91E+01	4.38E+03
Heptane, N-	1.05	CRC89			4.00E-01	P	No		1.75E+03
Hexane, N-	1.10	CRC89			7.00E-01	I	No		3.07E+03
Methyl Ethyl Ketone (2-Butanone)	1.40	CRC89			5.00E+00	I	No		2.19E+04
Propylene	2.00	CRC89			3.00E+00	C	No		1.31E+04
Tetrachloroethylene			2.60E-07	I	4.00E-02	I	No	4.72E+02	1.75E+02
Toluene	1.10	CRC89			5.00E+00	I	No		2.19E+04
Trichloroethane, 1,1,1-	8.00	CRC89			5.00E+00	I	No		2.19E+04
Trichloroethylene	8.00	CRC89	4.10E-06	I	2.00E-03	I	Mut	2.99E+01	8.76E+00
Trichlorofluoromethane							No		
Trimethylbenzene, 1,2,4-	0.90	CRC89			6.00E-02	I	No		2.63E+02
Trimethylbenzene, 1,3,5-	1.00	CRC89			6.00E-02	I	No		2.63E+02
Trimethylpentane, 2,2,4-	0.90	YAWS					No		
Vinyl Chloride	3.60	CRC89	4.40E-06	I	1.00E-01	I	Mut	2.79E+01	4.38E+02
Xylene, P-	1.10	CRC89			1.00E-01	S	No		4.38E+02
Xylene, m-	1.10	CRC89			1.00E-01	S	No		4.38E+02
Xylene, o-	0.90	CRC89			1.00E-01	S	No		4.38E+02

Commercial Vapor Intrusion Risk
Output generated 20FEB2019:10:41:28

Chemical	CAS Number	Site Sub-Slab and Exterior Soil Gas Concentration C_{sg} \ (µg/m³)	Site Indoor Air Concentration C_{ia} \ (µg/m³)	VI Carcinogenic Risk CR	VI Hazard HQ
Acetone	67-64-1	375	1.13E+01		8.32E-05
Benzene	71-43-2	27.2	8.16E-01	5.19E-07	6.21E-03
Bromodichloromethane	75-27-4	15.3	4.59E-01	1.38E-06	
Bromoform	75-25-2	12.8	3.84E-01	3.44E-08	
Butadiene, 1,3-	106-99-0	3.01	9.03E-02	2.21E-07	1.03E-02
Carbon Disulfide	75-15-0	287	8.61E+00		2.81E-03
Chloroform	67-66-3	12.5	3.75E-01	7.03E-07	8.77E-04
Cyclohexene	110-83-8	53.7	1.61E+00		3.68E-04
Dibromochloromethane	124-48-1	24.9			
Dichlorobenzene, 1,4-	106-46-7	16.8	5.04E-01	4.52E-07	1.44E-04
Dichloroethane, 1,1-	75-34-3	2.42	7.26E-02	9.47E-09	
Dichloroethylene, 1,2-cis-	156-59-2	3.88			
Dioxane, 1,4-	123-91-1	5.62	1.69E-01	6.87E-08	1.28E-03
Ethylbenzene	100-41-4	16.9	5.07E-01	1.03E-07	1.16E-04
Heptane, N-	142-82-5	574	1.72E+01		9.83E-03
Hexane, N-	110-54-3	1850	5.55E+01		1.81E-02
Methyl Ethyl Ketone (2-Butanone)	78-93-3	48.7	1.46E+00		6.67E-05
Propylene	115-07-1	231	6.93E+00		5.27E-04
Tetrachloroethylene	127-18-4	936	2.81E+01	5.95E-07	1.60E-01
Toluene	108-88-3	62.2	1.87E+00		8.52E-05
Trichloroethane, 1,1,1-	71-55-6	4.77	1.43E-01		6.53E-06
Trichloroethylene	79-01-6	7.58	2.27E-01	7.60E-08	2.60E-02
Trichlorofluoromethane	75-69-4	12.8			
Trimethylbenzene, 1,2,4-	95-63-6	23.7	7.11E-01		2.71E-03
Trimethylbenzene, 1,3,5-	108-67-8	2.98	8.94E-02		3.40E-04
Trimethylpentane, 2,2,4-	540-84-1	20.6			
Vinyl Chloride	75-01-4	5.11	1.53E-01	5.50E-08	3.50E-04
Xylene, P-	106-42-3	42	1.26E+00		2.88E-03
Xylene, m-	108-38-3	42	1.26E+00		2.88E-03
Xylene, o-	95-47-6	17.5	5.25E-01		1.20E-03
**Sum*				*4.22E-06*	*2.47E-01*

Commercial Vapor Intrusion Risk
Output generated 20FEB2019:10:41:28

Chemical	IUR $(ug/m^3)^{-1}$	IUR Ref	Chronic RfC (mg/m^3)	RfC Ref	Temperature (°C)\ for Groundwater Vapor Concentration	Mutagen?
Acetone			3.09E+01	ATSDR	11	No
Benzene	7.80E-06	I	3.00E-02	IRIS	11	No
Bromodichloromethane	3.70E-05	C			11	No
Bromoform	1.10E-06	I			11	No
Butadiene, 1,3-	3.00E-05	I	2.00E-03	IRIS	11	No
Carbon Disulfide			7.00E-01	IRIS	11	No
Chloroform	2.30E-05	I	9.77E-02	ATSDR	11	No
Cyclohexene			1.00E+00	SCREEN	11	No
Dibromochloromethane					11	No
Dichlorobenzene, 1,4-	1.10E-05	C	8.00E-01	IRIS	11	No
Dichloroethane, 1,1-	1.60E-06	C			11	No
Dichloroethylene, 1,2-cis-					11	No
Dioxane, 1,4-	5.00E-06	I	3.00E-02	IRIS	11	No
Ethylbenzene	2.50E-06	C	1.00E+00	IRIS	11	No
Heptane, N-			4.00E-01	PPRTV	11	No
Hexane, N-			7.00E-01	IRIS	11	No
Methyl Ethyl Ketone (2-Butanone)			5.00E+00	IRIS	11	No
Propylene			3.00E+00	CALEPA	11	No
Tetrachloroethylene	2.60E-07	I	4.00E-02	IRIS	11	No
Toluene			5.00E+00	IRIS	11	No
Trichloroethane, 1,1,1-			5.00E+00	IRIS	11	No
Trichloroethylene	4.10E-06	I	2.00E-03	IRIS	11	Mut
Trichlorofluoromethane					11	No
Trimethylbenzene, 1,2,4-			6.00E-02	IRIS	11	No
Trimethylbenzene, 1,3,5-			6.00E-02	IRIS	11	No
Trimethylpentane, 2,2,4-					11	No
Vinyl Chloride	4.40E-06	I	1.00E-01	IRIS	11	Mut
Xylene, P-			1.00E-01	SURROGATE	11	No
Xylene, m-			1.00E-01	SURROGATE	11	No
Xylene, o-			1.00E-01	SURROGATE	11	No
*Sum						

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref
Acetone	67-64-1	Yes	Yes	58.08	PHYSPROP	2.32E+02	PHYSPROP	1.00E+06	PHYSPROP
Benzene	71-43-2	Yes	Yes	78.12	PHYSPROP	9.48E+01	PHYSPROP	1.79E+03	PHYSPROP
Bromodichloromethane	75-27-4	Yes	Yes	163.83	PHYSPROP	5.00E+01	PHYSPROP	3.03E+03	PHYSPROP
Bromoform	75-25-2	Yes	Yes	252.73	PHYSPROP	5.40E+00	EPI	3.10E+03	PHYSPROP
Butadiene, 1,3-	106-99-0	Yes	Yes	54.09	PHYSPROP	2.11E+03	PHYSPROP	7.35E+02	PHYSPROP
Carbon Disulfide	75-15-0	Yes	Yes	76.14	PHYSPROP	3.59E+02	PHYSPROP	2.16E+03	PHYSPROP
Chloroform	67-66-3	Yes	Yes	119.38	PHYSPROP	1.97E+02	PHYSPROP	7.95E+03	PHYSPROP
Cyclohexene	110-83-8	Yes	Yes	82.15	PHYSPROP	8.90E+01	PHYSPROP	2.13E+02	PHYSPROP
Dibromochloromethane	124-48-1	Yes	No	208.28	PHYSPROP	5.54E+00	PHYSPROP	2.70E+03	PHYSPROP
Dichlorobenzene, 1,4-	106-46-7	Yes	Yes	147.00	PHYSPROP	1.74E+00	PHYSPROP	8.13E+01	PHYSPROP
Dichloroethane, 1,1-	75-34-3	Yes	Yes	98.96	PHYSPROP	2.27E+02	PHYSPROP	5.04E+03	PHYSPROP
Dichloroethylene, 1,2-cis-	156-59-2	Yes	No	96.94	PHYSPROP	2.00E+02	PHYSPROP	6.41E+03	PHYSPROP
Dioxane, 1,4-	123-91-1	Yes	Yes	88.11	PHYSPROP	3.81E+01	PHYSPROP	1.00E+06	PHYSPROP
Ethylbenzene	100-41-4	Yes	Yes	106.17	PHYSPROP	9.60E+00	PHYSPROP	1.69E+02	PHYSPROP
Heptane, N-	142-82-5	Yes	Yes	100.21	PHYSPROP	4.60E+01	PHYSPROP	3.40E+00	PHYSPROP
Hexane, N-	110-54-3	Yes	Yes	86.18	PHYSPROP	1.51E+02	PHYSPROP	9.50E+00	PHYSPROP
Methyl Ethyl Ketone (2-Butanone)	78-93-3	Yes	Yes	72.11	PHYSPROP	9.06E+01	PHYSPROP	2.23E+05	PHYSPROP
Propylene	115-07-1	Yes	Yes	42.08	PHYSPROP	8.69E+03	PHYSPROP	2.00E+02	PHYSPROP
Tetrachloroethylene	127-18-4	Yes	Yes	165.83	PHYSPROP	1.85E+01	PHYSPROP	2.06E+02	PHYSPROP
Toluene	108-88-3	Yes	Yes	92.14	PHYSPROP	2.84E+01	PHYSPROP	5.26E+02	PHYSPROP
Trichloroethane, 1,1,1-	71-55-6	Yes	Yes	133.41	PHYSPROP	1.24E+02	PHYSPROP	1.29E+03	PHYSPROP
Trichloroethylene	79-01-6	Yes	Yes	131.39	PHYSPROP	6.90E+01	PHYSPROP	1.28E+03	PHYSPROP

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	MCL (ug/L)	HLC (atm-m³/mole)	Henry's Law Constant (unitless)	Henry's Law Constant (11 °C)	Henry's Law Constant Used in Calcs (unitless)	H` and HLC Ref	Enthalpy of vaporization @ groundwater temperature $\Delta H_{v,gw}$\ (cal/mol)	Exponent for $\Delta H_{v,gw}$	Vapor Pressure VP (11 °C)\ (mm Hg)
Acetone		3.50E-05	1.43E-03	8.02E-04	8.02E-04	PHYSPROP	7545.73	0.36	4.05E+08
Benzene	5	5.55E-03	2.27E-01	1.21E-01	1.21E-01	PHYSPROP	8111.43	0.35	2.13E+08
Bromodichloromethane	80	2.12E-03	8.67E-02	4.43E-02	4.43E-02	PHYSPROP	8655.29	0.34	2.25E+08
Bromoform	80	5.35E-04	2.19E-02	9.22E-03	9.22E-03	PHYSPROP	10960.40	0.34	3.10E+07
Butadiene, 1,3-		7.36E-02	3.01E+00	2.05E+00	2.05E+00	EPI	5177.88	0.35	4.18E+09
Carbon Disulfide		1.44E-02	5.89E-01	3.55E-01	3.55E-01	PHYSPROP	6676.28	0.31	8.85E+08
Chloroform	80	3.67E-03	1.50E-01	8.41E-02	8.41E-02	PHYSPROP	7544.51	0.35	7.09E+08
Cyclohexene		4.55E-02	1.86E+00	9.95E-01	9.95E-01	PHYSPROP	8100.13	0.35	2.10E+08
Dibromochloromethane	80	7.83E-04	3.20E-02	1.95E-02	1.95E-02	PHYSPROP	6529.29	0.31	3.78E+07
Dichlorobenzene, 1,4-	75	2.41E-03	9.85E-02	4.00E-02	4.00E-02	PHYSPROP	11420.96	0.38	5.58E+06
Dichloroethane, 1,1-		5.62E-03	2.30E-01	1.30E-01	1.30E-01	PHYSPROP	7437.91	0.35	6.84E+08
Dichloroethylene, 1,2-cis-	70	4.08E-03	1.67E-01	9.16E-02	9.16E-02	PHYSPROP	7777.97	0.34	5.73E+08
Dioxane, 1,4-		4.80E-06	1.96E-04	9.53E-05	9.53E-05	PHYSPROP	9263.11	0.36	8.76E+07
Ethylbenzene	700	7.88E-03	3.22E-01	1.45E-01	1.45E-01	PHYSPROP	10143.27	0.37	2.47E+07
Heptane, N-		2.00E+00	8.18E+01	4.08E+01	4.08E+01	EPI	8950.85	0.39	1.24E+08
Hexane, N-		1.80E+00	7.36E+01	4.06E+01	4.06E+01	EPI	7730.28	0.38	3.87E+08
Methyl Ethyl Ketone (2-Butanone)		5.69E-05	2.33E-03	1.21E-03	1.21E-03	PHYSPROP	8408.50	0.37	1.83E+08
Propylene		1.96E-01	8.01E+00	6.20E+00	6.20E+00	PHYSPROP	3652.23	0.34	1.52E+10
Tetrachloroethylene	5	1.77E-02	7.24E-01	3.43E-01	3.43E-01	PHYSPROP	9545.41	0.35	7.83E+07
Toluene	1000	6.64E-03	2.71E-01	1.33E-01	1.33E-01	PHYSPROP	9142.16	0.36	6.90E+07
Trichloroethane, 1,1,1-	200	1.72E-02	7.03E-01	3.83E-01	3.83E-01	PHYSPROP	7872.59	0.36	4.85E+08
Trichloroethylene	5	9.85E-03	4.03E-01	2.11E-01	2.11E-01	PHYSPROP	8364.08	0.35	2.55E+08

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	D_{ia} \ (cm^2/s)	D_{ia} \ (11 °C)\ (cm^2/s)	D_{ia} \ Used in Calcs (cm^2/s)	D_{ia} \ Ref	D_{iw} \ (cm^2/s)	D_{iw} \ (11 °C)\ (cm^2/s)	D_{iw} \ Used in Calcs (cm^2/s)	D_{iw} \ Ref	Norma Boiling Point BP (K)
Acetone	1.06E-01	0.0985443	0.0985443	WATER9 (U.S. EPA, 2001)	1.15E-05	0.0000109	0.0000109	WATER9 (U.S. EPA, 2001)	329.15
Benzene	8.95E-02	0.0832982	0.0832982	WATER9 (U.S. EPA, 2001)	1.03E-05	9.7809E-6	9.7809E-6	WATER9 (U.S. EPA, 2001)	353.15
Bromodichloromethane	5.63E-02	0.0523443	0.0523443	WATER9 (U.S. EPA, 2001)	1.07E-05	0.0000102	0.0000102	WATER9 (U.S. EPA, 2001)	363.15
Bromoform	3.57E-02	0.0332437	0.0332437	WATER9 (U.S. EPA, 2001)	1.04E-05	9.8697E-6	9.8697E-6	WATER9 (U.S. EPA, 2001)	422.25
Butadiene, 1,3-	1.00E-01	0.0933597	0.0933597	WATER9 (U.S. EPA, 2001)	1.03E-05	9.8576E-6	9.8576E-6	WATER9 (U.S. EPA, 2001)	268.75
Carbon Disulfide	1.06E-01	0.0990242	0.0990242	WATER9 (U.S. EPA, 2001)	1.30E-05	0.0000124	0.0000124	WATER9 (U.S. EPA, 2001)	319.15
Chloroform	7.69E-02	0.0715624	0.0715624	WATER9 (U.S. EPA, 2001)	1.09E-05	0.0000104	0.0000104	WATER9 (U.S. EPA, 2001)	334.25
Cyclohexene	8.32E-02	0.0773937	0.0773937	WATER9 (U.S. EPA, 2001)	9.50E-06	9.0512E-6	9.0512E-6	WATER9 (U.S. EPA, 2001)	356.05
Dibromochloromethane	3.66E-02	0.034084	0.034084	WATER9 (U.S. EPA, 2001)	1.06E-05	0.0000101	0.0000101	WATER9 (U.S. EPA, 2001)	393.15
Dichlorobenzene, 1,4-	5.50E-02	0.0512093	0.0512093	WATER9 (U.S. EPA, 2001)	8.68E-06	8.2719E-6	8.2719E-6	WATER9 (U.S. EPA, 2001)	447.15
Dichloroethane, 1,1-	8.36E-02	0.077819	0.077819	WATER9 (U.S. EPA, 2001)	1.06E-05	0.0000101	0.0000101	WATER9 (U.S. EPA, 2001)	330.55
Dichloroethylene, 1,2-cis-	8.84E-02	0.0822484	0.0822484	WATER9 (U.S. EPA, 2001)	1.13E-05	0.0000108	0.0000108	WATER9 (U.S. EPA, 2001)	333.25
Dioxane, 1,4-	8.74E-02	0.0812885	0.0812885	WATER9 (U.S. EPA, 2001)	1.05E-05	0.00001	0.00001	WATER9 (U.S. EPA, 2001)	374.65
Ethylbenzene	6.85E-02	0.0636968	0.0636968	WATER9 (U.S. EPA, 2001)	8.46E-06	8.0585E-6	8.0585E-6	WATER9 (U.S. EPA, 2001)	409.25
Heptane, N-	6.49E-02	0.0603996	0.0603996	WATER9 (U.S. EPA, 2001)	7.59E-06	7.23E-6	7.23E-6	WATER9 (U.S. EPA, 2001)	371.65
Hexane, N-	7.31E-02	0.068016	0.068016	WATER9 (U.S. EPA, 2001)	8.17E-06	7.7821E-6	7.7821E-6	WATER9 (U.S. EPA, 2001)	341.85
Methyl Ethyl Ketone (2-Butanone)	9.14E-02	0.0850772	0.0850772	WATER9 (U.S. EPA, 2001)	1.02E-05	9.7141E-6	9.7141E-6	WATER9 (U.S. EPA, 2001)	352.65
Propylene	1.10E-01	0.1020566	0.1020566	WATER9 (U.S. EPA, 2001)	1.07E-05	0.0000102	0.0000102	WATER9 (U.S. EPA, 2001)	225.15
Tetrachloroethylene	5.05E-02	0.0469515	0.0469515	WATER9 (U.S. EPA, 2001)	9.46E-06	9.0108E-6	9.0108E-6	WATER9 (U.S. EPA, 2001)	394.45
Toluene	7.78E-02	0.072385	0.072385	WATER9 (U.S. EPA, 2001)	9.20E-06	8.7718E-6	8.7718E-6	WATER9 (U.S. EPA, 2001)	383.75
Trichloroethane, 1,1,1-	6.48E-02	0.060303	0.060303	WATER9 (U.S. EPA, 2001)	9.60E-06	9.148E-6	9.148E-6	WATER9 (U.S. EPA, 2001)	347.15
Trichloroethylene	6.87E-02	0.0638797	0.0638797	WATER9 (U.S. EPA, 2001)	1.02E-05	9.7408E-6	9.7408E-6	WATER9 (U.S. EPA, 2001)	360.35

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$ \ (cal/mol)	$\Delta H_{v,b}$ \ Ref	K_{oc} \ (cm^3/g)	K_{oc} \ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Acetone	PHYSPROP	5.08E+02	CRC89	6955.07	CRC89	2.364	EPI	2.50	CRC89
Benzene	PHYSPROP	5.62E+02	CRC89	7342.26	CRC89	145.8	EPI	1.20	CRC89
Bromodichloromethane	PHYSPROP	5.86E+02	Weast	7800.00	Weast	31.82	EPI		
Bromoform	PHYSPROP	6.82E+02	CRC89	9472.63	TOXNET (converted)	31.82	EPI		
Butadiene, 1,3-	PHYSPROP	4.25E+02	CRC89	5370.46	CRC89	39.6	EPI	2.00	CRC89
Carbon Disulfide	PHYSPROP	5.52E+02	CRC89	6391.01	CRC89	21.73	EPI	1.30	CRC89
Chloroform	PHYSPROP	5.36E+02	CRC89	6988.00	Weast	31.82	EPI		
Cyclohexene	PHYSPROP	5.60E+02	CRC89	7280.11	CRC89	145.8	EPI	1.20	CRC89
Dibromochloromethane	PHYSPROP	6.78E+02	Weast	5900.00	Weast	31.82	EPI		
Dichlorobenzene, 1,4-	PHYSPROP	6.69E+02	CRC89	9271.03	CRC89	375.3	EPI	1.80	YAWS
Dichloroethane, 1,1-	PHYSPROP	5.23E+02	CRC89	6895.31	CRC89	31.82	EPI	5.40	CRC89
Dichloroethylene, 1,2-cis-	PHYSPROP	5.36E+02	CRC89	7217.97	CRC89	39.6	EPI	3.00	CRC89
Dioxane, 1,4-	PHYSPROP	5.87E+02	CRC89	8164.43	CRC89	2.633	EPI	2.00	CRC89
Ethylbenzene	PHYSPROP	6.17E+02	CRC89	8501.43	CRC89	446.1	EPI	0.80	CRC89
Heptane, N-	PHYSPROP	5.40E+02	CRC89	7593.21	CRC89	239.7	EPI	1.05	CRC89
Hexane, N-	PHYSPROP	5.08E+02	CRC89	6895.31	CRC89	131.5	EPI	1.10	CRC89
Methyl Ethyl Ketone (2-Butanone)	PHYSPROP	5.37E+02	CRC89	7480.88	CRC89	4.51	EPI	1.40	CRC89
Propylene	PHYSPROP	3.65E+02	CRC89	4402.41	TOXNET (converted)	21.73	EPI	2.00	CRC89
Tetrachloroethylene	PHYSPROP	6.20E+02	YAWS	8288.00	Weast	94.94	EPI		
Toluene	PHYSPROP	5.92E+02	CRC89	7930.00	Weast	233.9	EPI	1.10	CRC89
Trichloroethane, 1,1,1-	PHYSPROP	5.45E+02	YAWS	7136.00	Weast	43.89	EPI	8.00	CRC89
Trichloroethylene	PHYSPROP	5.71E+02	YAWS	7505.00	Weast	60.7	EPI	8.00	CRC89

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref
Trichlorofluoromethane	75-69-4	Yes	No	137.37	PHYSPROP	8.03E+02	PHYSPROP	1.10E+03	PHYSPROP
Trimethylbenzene, 1,2,4-	95-63-6	Yes	Yes	120.20	PHYSPROP	2.10E+00	PHYSPROP	5.70E+01	PHYSPROP
Trimethylbenzene, 1,3,5-	108-67-8	Yes	Yes	120.20	PHYSPROP	2.48E+00	PHYSPROP	4.82E+01	PHYSPROP
Trimethylpentane, 2,2,4-	540-84-1	Yes	No	114.23	PHYSPROP	4.93E+01	PHYSPROP	2.44E+00	PHYSPROP
Vinyl Chloride	75-01-4	Yes	Yes	62.50	PHYSPROP	2.98E+03	EPI	8.80E+03	PHYSPROP
Xylene, P-	106-42-3	Yes	Yes	106.17	PHYSPROP	8.84E+00	PHYSPROP	1.62E+02	PHYSPROP
Xylene, m-	108-38-3	Yes	Yes	106.17	PHYSPROP	8.29E+00	PHYSPROP	1.61E+02	PHYSPROP
Xylene, o-	95-47-6	Yes	Yes	106.17	PHYSPROP	6.61E+00	PHYSPROP	1.78E+02	PHYSPROP

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	MCL (ug/L)	HLC (atm-m³/mole)	Henry's Law Constant (unitless)	Henry's Law Constant (11 °C)	Henry's Law Constant Used in Calcs (unitless)	H` and HLC Ref	Enthalpy of vaporization @ groundwater temperature $\Delta H_{v,gw}$\ (cal/mol)	Exponent for $\Delta H_{v,gw}$	Vapor Pressure VP (11 °C)\ (mm Hg)
Trichlorofluoromethane		9.70E-02	3.97E+00	2.50E+00	2.50E+00	PHYSPROP	6148.57	0.35	3.73E+09
Trimethylbenzene, 1,2,4-		6.16E-03	2.52E-01	1.00E-01	1.00E-01	PHYSPROP	11684.78	0.39	5.39E+06
Trimethylbenzene, 1,3,5-		8.77E-03	3.59E-01	1.43E-01	1.43E-01	PHYSPROP	11663.35	0.39	6.38E+06
Trimethylpentane, 2,2,4-		3.04E+00	1.24E+02	6.32E+01	6.32E+01	EPI	8718.11	0.39	1.54E+08
Vinyl Chloride	2	2.78E-02	1.14E+00	8.06E-01	8.06E-01	PHYSPROP	4712.12	0.34	7.10E+09
Xylene, P-		6.90E-03	2.82E-01	1.26E-01	1.26E-01	PHYSPROP	10233.66	0.38	2.26E+07
Xylene, m-		7.18E-03	2.94E-01	1.31E-01	1.31E-01	PHYSPROP	10244.69	0.38	2.12E+07
Xylene, o-		5.18E-03	2.12E-01	9.36E-02	9.36E-02	PHYSPROP	10394.32	0.37	1.67E+07

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	D_{ia} \ (cm^2/s)	D_{ia} \ (11 °C)\ (cm^2/s)	D_{ia} \ Used in Calcs (cm^2/s)	D_{ia} \ Ref	D_{iw} \ (cm^2/s)	D_{iw} \ (11 °C)\ (cm^2/s)	D_{iw} \ Used in Calcs (cm^2/s)	D_{iw} \ Ref	Norma Boiling Point BP (K)
Trichlorofluoromethane	6.54E-02	0.0608041	0.0608041	WATER9 (U.S. EPA, 2001)	1.00E-05	9.5759E-6	9.5759E-6	WATER9 (U.S. EPA, 2001)	296.85
Trimethylbenzene, 1,2,4-	6.07E-02	0.0564495	0.0564495	WATER9 (U.S. EPA, 2001)	7.92E-06	7.5487E-6	7.5487E-6	WATER9 (U.S. EPA, 2001)	442.45
Trimethylbenzene, 1,3,5-	6.02E-02	0.0560309	0.0560309	WATER9 (U.S. EPA, 2001)	7.84E-06	7.4745E-6	7.4745E-6	WATER9 (U.S. EPA, 2001)	437.85
Trimethylpentane, 2,2,4-	5.74E-02	0.0534039	0.0534039	WATER9 (U.S. EPA, 2001)	7.06E-06	6.7325E-6	6.7325E-6	WATER9 (U.S. EPA, 2001)	372.35
Vinyl Chloride	1.07E-01	0.0996595	0.0996595	WATER9 (U.S. EPA, 2001)	1.20E-05	0.0000114	0.0000114	WATER9 (U.S. EPA, 2001)	259.85
Xylene, P-	6.82E-02	0.0634952	0.0634952	WATER9 (U.S. EPA, 2001)	8.42E-06	8.0243E-6	8.0243E-6	WATER9 (U.S. EPA, 2001)	411.38
Xylene, m-	6.84E-02	0.0636044	0.0636044	WATER9 (U.S. EPA, 2001)	8.44E-06	8.0428E-6	8.0428E-6	WATER9 (U.S. EPA, 2001)	412.25
Xylene, o-	6.89E-02	0.0641199	0.0641199	WATER9 (U.S. EPA, 2001)	8.53E-06	8.1306E-6	8.1306E-6	WATER9 (U.S. EPA, 2001)	417.65

Chemical Properties
Output generated 20FEB2019:10:41:28

Chemical	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$ \ (cal/mol)	$\Delta H_{v,b}$ \ Ref	K_{oc} \ (cm^3/g)	K_{oc} \ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Trichlorofluoromethane	PHYSPROP	4.71E+02	CRC89	5998.90	TOXNET	43.89	EPI		
Trimethylbenzene, 1,2,4-	PHYSPROP	6.49E+02	CRC89	9368.80	TOXNET	614.3	EPI	0.90	CRC89
Trimethylbenzene, 1,3,5-	PHYSPROP	6.37E+02	CRC89	9321.00	TOXNET	602.1	EPI	1.00	CRC89
Trimethylpentane, 2,2,4-	PHYSPROP	5.44E+02	CRC89	7413.96	YAWS	240.3	EPI	0.90	YAWS
Vinyl Chloride	PHYSPROP	4.25E+02	CRC89	4971.32	CRC89	21.73	EPI	3.60	CRC89
Xylene, P-	PHYSPROP	6.16E+02	CRC89	8525.00	Weast	375.3	EPI	1.10	CRC89
Xylene, m-	PHYSPROP	6.17E+02	CRC89	8523.00	Weast	375.3	EPI	1.10	CRC89
Xylene, o-	PHYSPROP	6.30E+02	CRC89	8661.00	Weast	382.9	EPI	0.90	CRC89

APPENDIX E

1901 Commerce St

1901 Commerce St

Wellsburg, WV 26070

Inquiry Number: 4916970.3

April 25, 2017

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

04/25/17

Site Name:

1901 Commerce St
1901 Commerce St
Wellsburg, WV 26070
EDR Inquiry # 4916970.3

Client Name:

Ramboll Environ
5747 Perimeter Drive
Dublin, OH 43017
Contact: Austin Hounshell

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Ramboll Environ were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 1A2E-4253-91B7

PO # NA

Project NA

Maps Provided:

1960
1946
1929
1923
1913
1907

Sanborn® Library search results

Certification #: 1A2E-4253-91B7

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✓ Library of Congress
- ✓ University Publications of America
- ✓ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

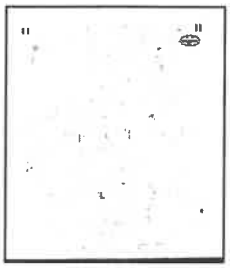
Ramboll Environ (the client) is permitted to make up to FIVE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Sanborn Sheet Key

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1960 Source Sheets

Volume 1, Sheet 10
1960

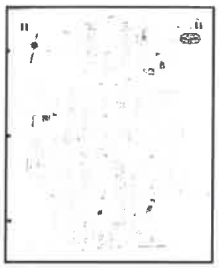


Volume 1, Sheet 11
1960

Volume 1, Sheet 12
1960

1946 Source Sheets

Volume 1, Sheet 10
1946



Volume 1, Sheet 11
1946

Volume 1, Sheet 12
1946

1929 Source Sheets

Volume 1, Sheet 11
1929

Volume 1, Sheet 12
1929

Volume 1, Sheet 10
1929

1923 Source Sheets

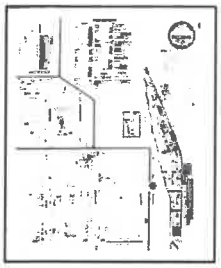
Volume 1, Sheet 10
1923

Volume 1, Sheet 11
1923

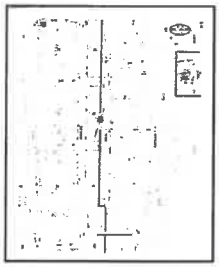
Sanborn Sheet Key

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

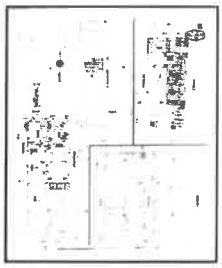
1913 Source Sheets



Volume 1, Sheet Keymap/Sheet
1913

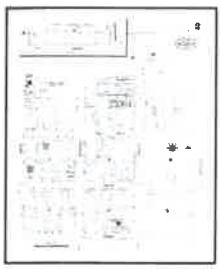


Volume 1, Sheet 7
1913

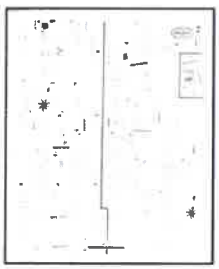


Volume 1, Sheet 8
1913

1907 Source Sheets

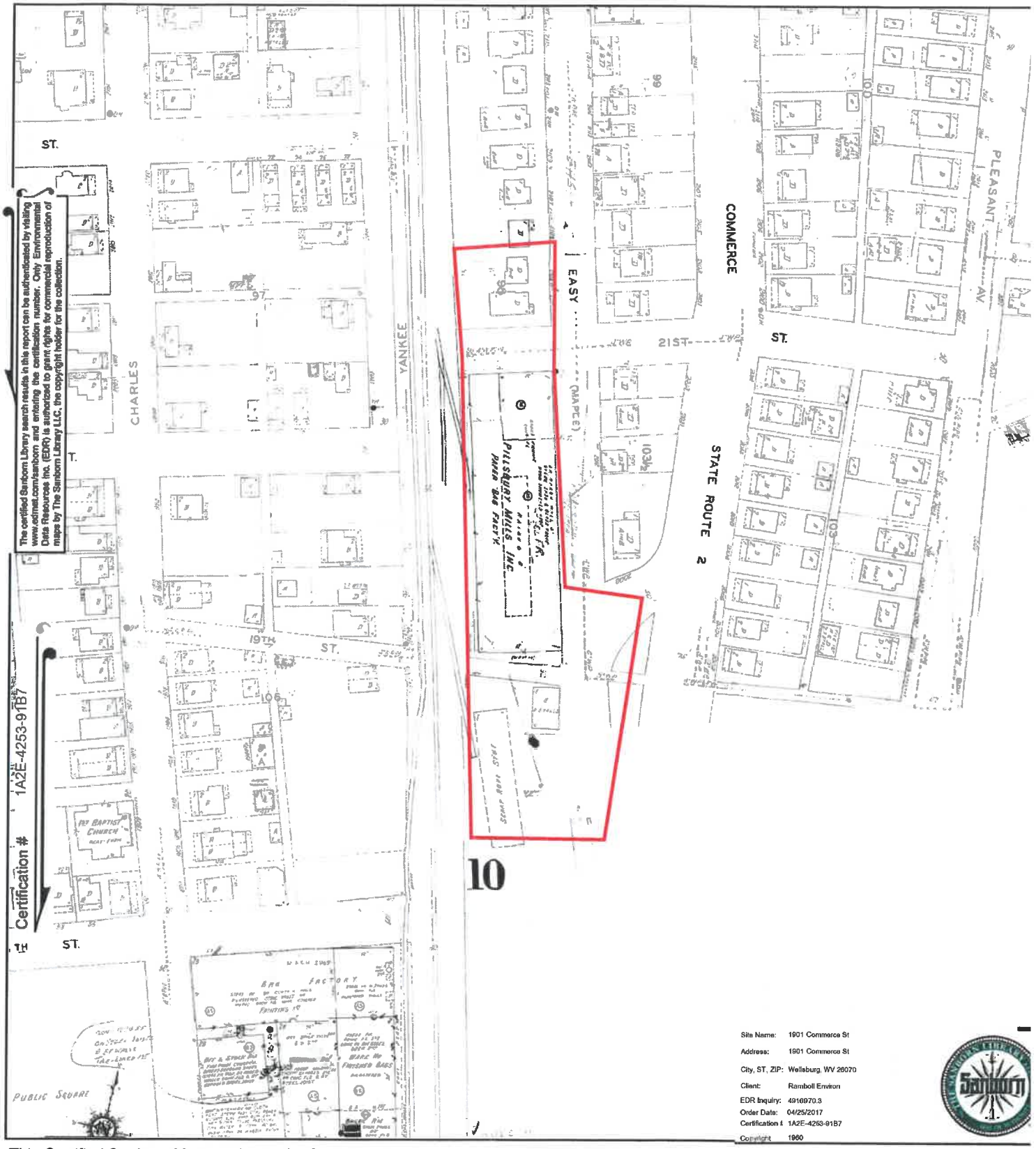


Volume 1, Sheet 2
1907



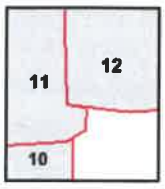
Volume 1, Sheet 7
1907

Certified Sanborn® Map



Site Name:	1901 Commerce St
Address:	1901 Commerce St
City, ST, ZIP:	Wellsburg, WV 26070
Client:	Ramboll Environ
EDR Inquiry:	4916970.3
Order Date:	04/25/2017
Certification #	1A2E-4253-91B7
Copyright	1960

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

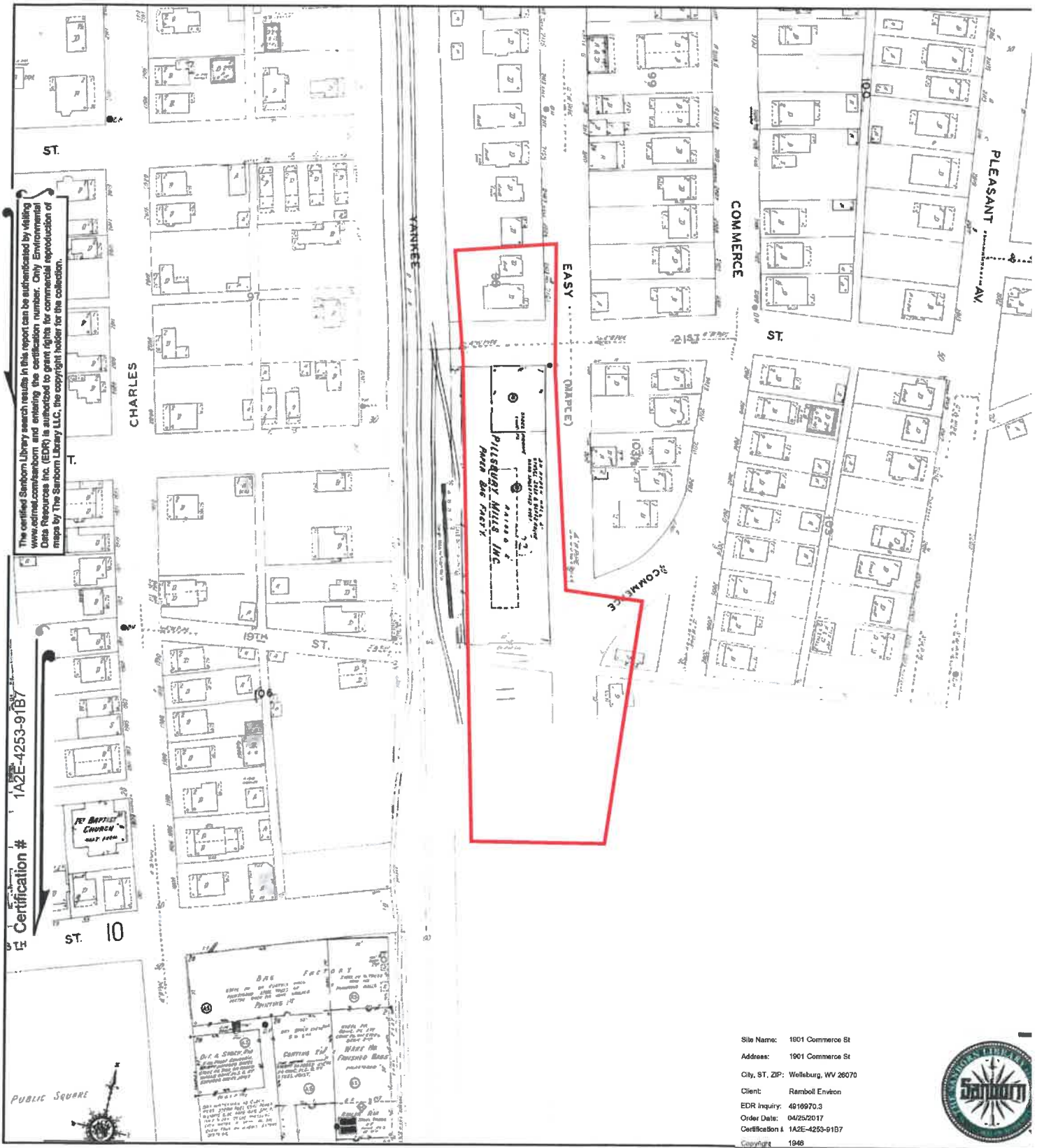


Volume 1, Sheet 12
Volume 1, Sheet 11
Volume 1, Sheet 10

0 Feet 150 300 60

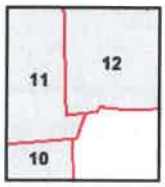
N

Certified Sanborn® Map



Site Name:	1901 Commerce St
Address:	1901 Commerce St
City, ST, ZIP:	Wellsburg, WV 26070
Client:	Ramboll Environ
EDR Inquiry:	4916970.3
Order Date:	04/25/2017
Certification #	1A2E-4253-91B7
Copyright	1946

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

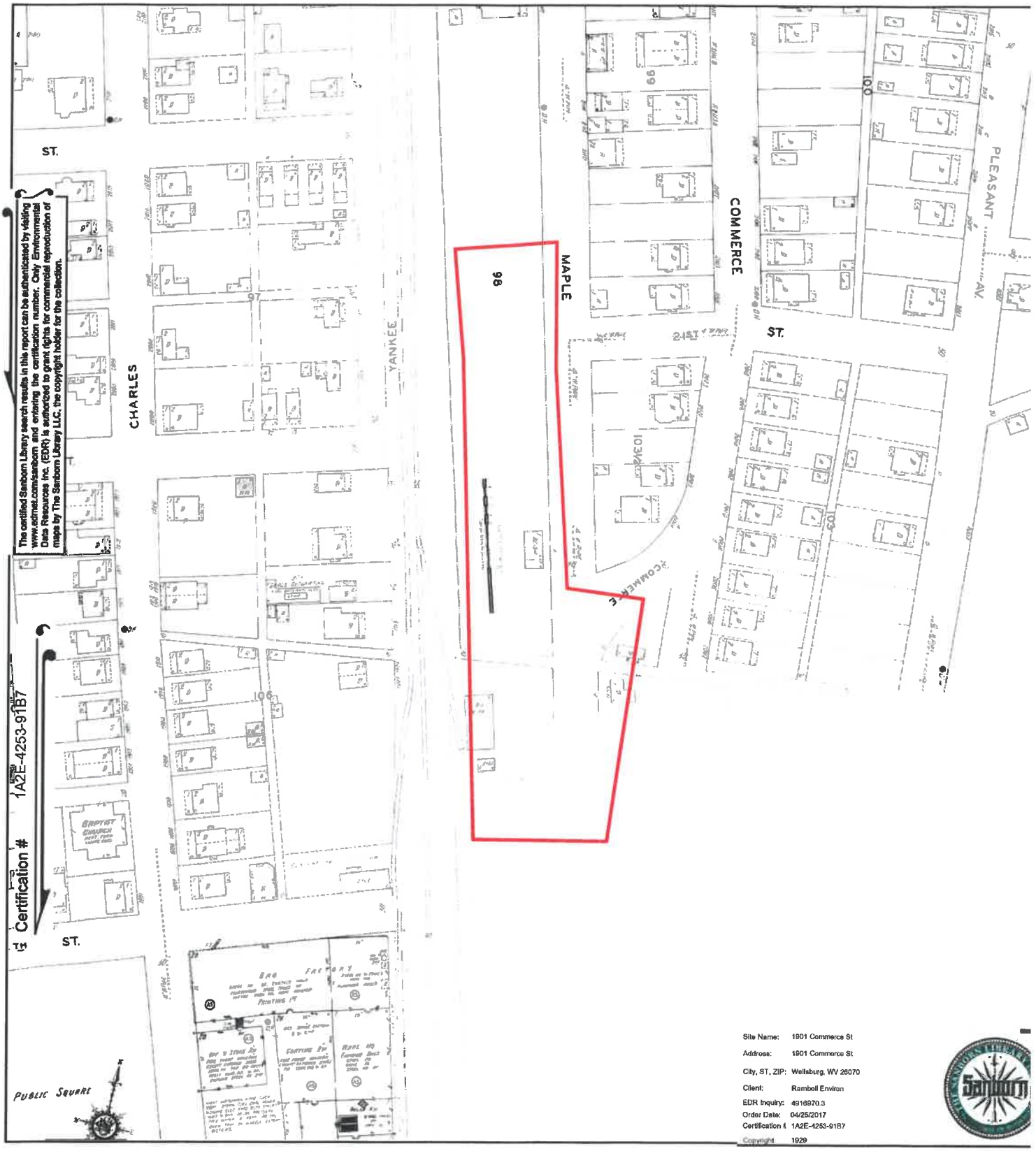


Volume 1, Sheet 12
Volume 1, Sheet 11
Volume 1, Sheet 10

0 Feet 150 300 60

N

Certified Sanborn® Map

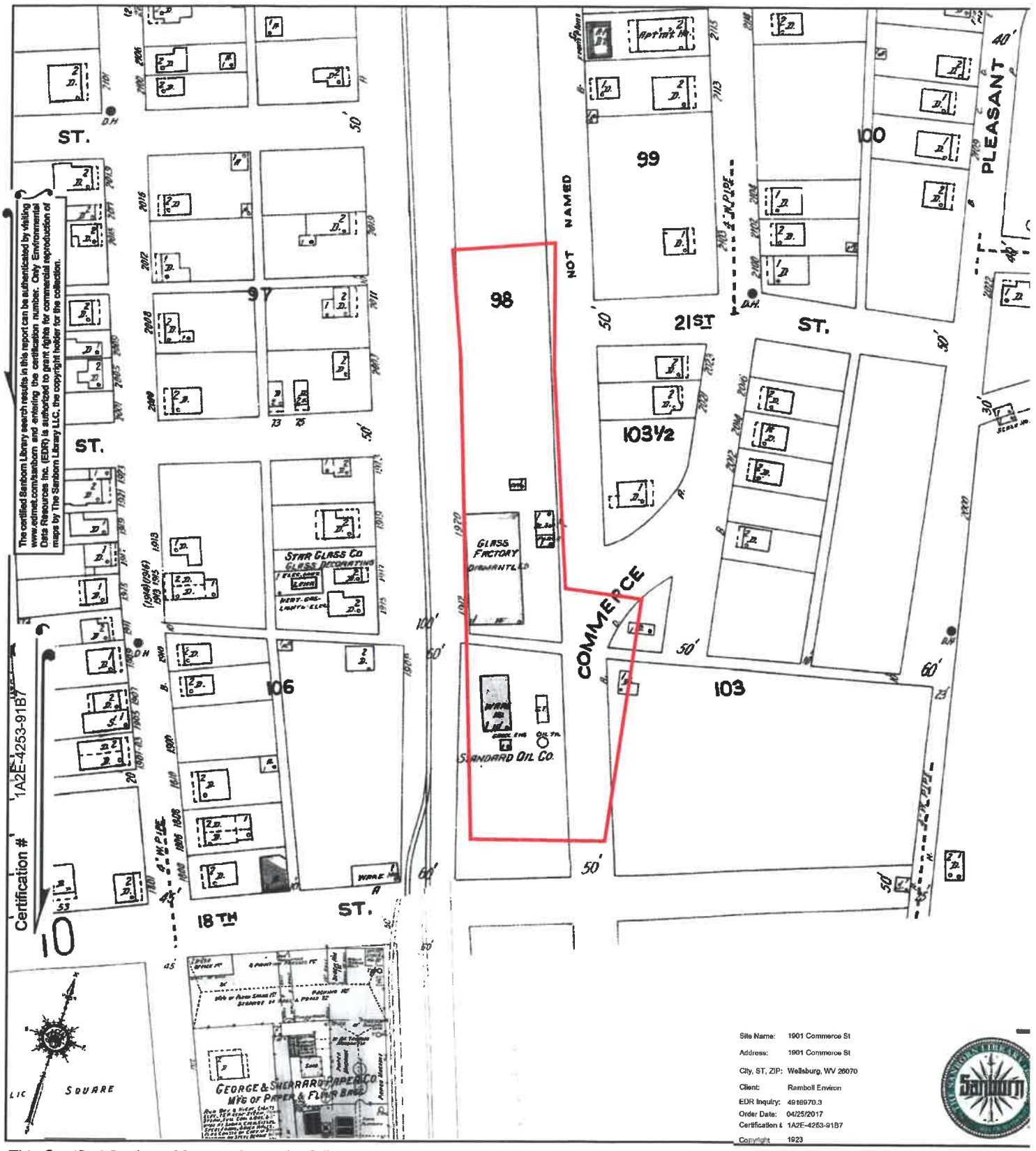


This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

Volume 1, Sheet 10
Volume 1, Sheet 12
Volume 1, Sheet 11

0 Feet 150 300 6(

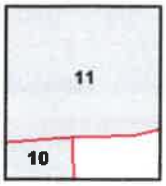
N



Site Name: 1901 Commerce St
Address: 1901 Commerce St
City, ST, ZIP: Wellsburg, WV 26070
Client: Ramboll Environ
EDR Inquiry: 4916970.3
Order Date: 04/25/2017
Certification #: 1A2E-4253-91B7
Copyright: 1923

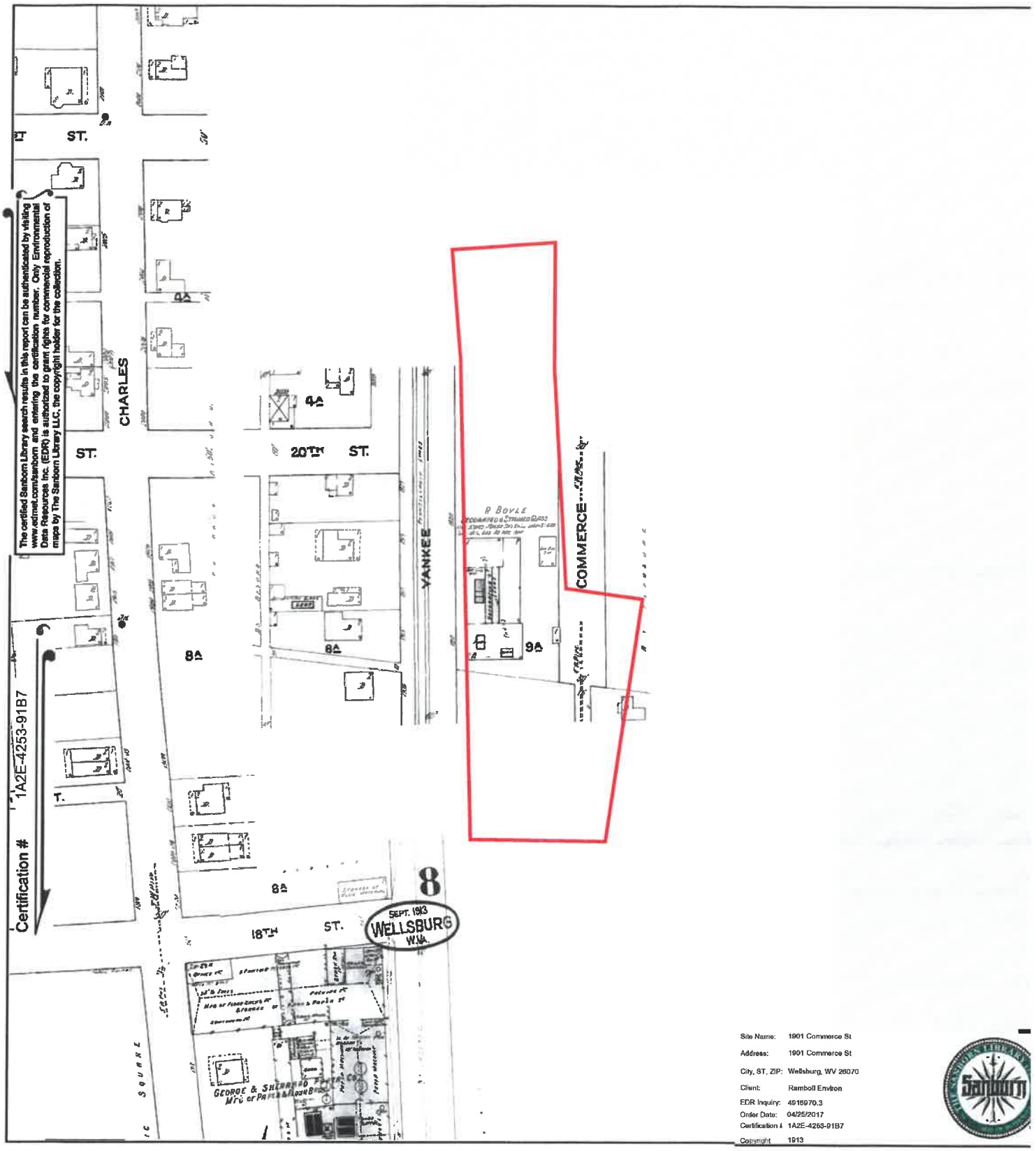
This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

0 Feet 150 300 60



Volume 1, Sheet 11
Volume 1, Sheet 10

N



Site Name: 1901 Commerce St
Address: 1901 Commerce St
City, ST, ZIP: Wellsburg, WV 26070
Client: Ramboll Environ
EDR Inquiry: 4916970.3
Order Date: 04/25/2017
Certification #: 1A2E-4263-91B7
Copyright: 1913

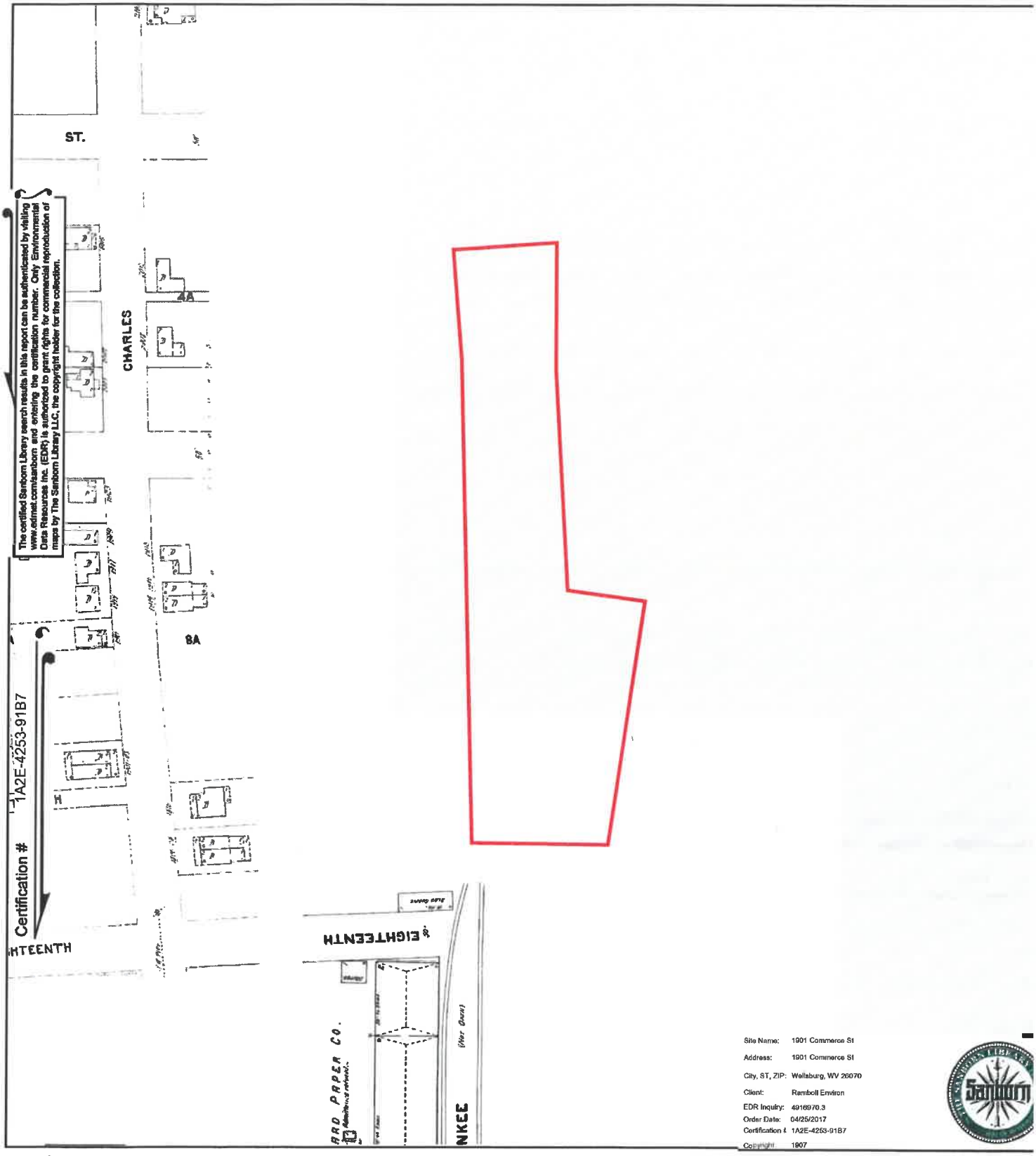
This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

Volume 1, Sheet 8
Volume 1, Sheet 7
Volume 1, Sheet Keymap/Sheet1

0 Feet 150 300 60

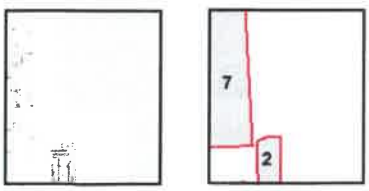
N

Certified Sanborn® Map



Site Name: 1901 Commerce St
Address: 1901 Commerce St
City, ST, ZIP: Wellsburg, WV 26070
Client: Ramboll Environ
EDR Inquiry: 4916970.3
Order Date: 04/25/2017
Certification #: 1A2E-4253-91B7
Copyright: 1907

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 1, Sheet 7
Volume 1, Sheet 2

0 Feet 150 300 6

N

APPENDIX F

APPENDIX C-2: CHECKLIST TO DETERMINE THE APPLICABLE ECOLOGICAL STANDARD

This checklist is cross-referenced to 60CSR3, the Voluntary Remediation and Redevelopment Rule (the Rule). This checklist is based on Section 9.5 – Ecological – De Minimis Screening Evaluation (cited as 60-3-9.5). The specific references are to subsections of this section of the Rule.

Step 1. Determine Whether a De Minimis Ecological Screening Evaluation is Appropriate for Your Site

See 60-3.9.5.a.1. Check "yes" or "no" to each of the following questions:

1.1 Has there been a release to the environment at or from the site?

_X_ yes ___ no ___ unknown

If the answer to 1.1 is "no", then no further ecological evaluation is required. File this completed form with the Final Report for the site. If the answer to 1.1 is "yes" or "unknown", proceed to Step 1.2.

1.2 Has the entire site been developed (e.g., predominantly covered by buildings, pavement, etc.)?

_X_ yes __ no

If "yes", go to 1.6. If "no", go to 1.3.

1.3 Are there any undeveloped areas on or adjacent to the site (e.g., areas that are not under intensive landscape or agricultural control)?

___ yes ___ no

If the answer to 1.3 is "no" then no further ecological evaluation of terrestrial habitat is required. Continue with Step 1.4.

1.4 Are there any potential wetlands (including vernal pools) on or adjacent to the site?

___ yes ____ no

If the answer to 1.4 is "no", then no further ecological evaluation of wetland habitats is required. Continue with Step 1.5.

1.5 Are there any surface water bodies (i.e., lotic or lentic habitat) on or adjacent to the site?

___ yes ___ no

If the answer to 1.5 is "no", then no further ecological evaluation of lotic and lentic aquatic habitat is required. Continue with Step. 1.6.

1.6 Are there any terrestrial, wetland, or aquatic habitats off-site, but situated downstream, downwind, or downgradient from the site that may be affected by site-related stressors?

___ yes _X_ no

1.7 Are there any project land uses for the site that would result in undeveloped areas, wetland habitat, lotic habitat, or lentic habitat?

___ yes _X_ no

If the answers to 1.3 through 1.7 are "no", then no further ecological evaluation is required. File this completed form with the Final Report of the site. If a question was answered "yes", then go to Step 2 because a complete exposure pathway may exist for potential ecological receptors of concern.

Step 2. Identify any Readily Apparent Harm or Exceedances of Surface Water Quality Standards.

See 60-3-2-2.44 and 60-3-9.5.a.5

2.1 Have there been any incidents where harm to wildlife attributable to contaminants originating from the site has been readily apparent?

___ yes ___ no

If the answer to 2.1 is "yes", go to 2.2; if "no", go to Step 2.3.

2.2 Has the cause of such harm been eliminated?

___ yes ___ no

If the answer to 2.2 is "yes", briefly describe the action taken and continue with this checklist.

If "no", the applicant can proceed directly to the remedy evaluation or alternately proceed with a determination of a Uniform or Site Specific Ecological Standard, as described in the guidance manual prior to implementation of the remedy.

2.3 Is the site contributing to exceedances of Surface Water Quality Standards established for the protection of aquatic life (see 46 CSR1)?

___ yes ___ no

If the answer to 2.3 is "yes", the applicant can proceed directly to the remedy evaluation or, alternately, proceed with a determination of a Uniform or Site Specific Ecological Standard, as described in the guidance manual prior to implementation of the remedy.

If "no", go to Step 3.

Step 3. Identification of Contamination Associated with Ecological Habitats

See 60-3-9.5.a.2 and 60-3-9.5.a.3

3.1 Have the environmental media (e.g., soil, surface water, sediment, biota) associated with the ecological habitat(s) identified in 1.3 through 1.6 been sampled and analyzed with regard to potential site-related contaminants of concern?

___ yes ___ no

If the answer to 3.1 is "yes", proceed to 3.2; if "no", proceed to Step 4.

3.2 Have any site-related contaminants been detected above natural background concentrations in environmental media collected from terrestrial habitat?

___ yes ___ no ___ not applicable (no terrestrial)

3.3 Have any site-related contaminants been detected above natural background concentrations in environmental media collected from wetland or aquatic habitats (lotic or lentic habitats)?

___ yes ___ no ___ not sampled

If the answer to 3.3 is "yes", go to 3.4. If the answer is "no", go to 3.6.

3.4 Are site related contaminants presenting an ecological risk over and above "local" condition?

___ yes ___ no

If the answer to 3.4 is "yes", go to Step 4. If the answer is "no", go to 3.5.

3.5 Have site-related releases of contaminants been stopped?

___ yes ___ no

If the answer to 3.5 is "yes", go to 3.6. If the answer is "no", go to Step 4.

3.6 Are site-related contaminants currently migrating to aquatic habitat (e.g., lotic, lentic, or wetland habitat)?

___ yes ___ no ___ not applicable (no aquatic habitat)

If the answers to 3.2, 3.3, and 3.6 are "no" or "not applicable", no further ecological evaluation is required. File this completed form with the Final Report for the site. If the answers to 3.2, 3.3, or 3.6 are "yes", proceed to Step 4 because a complete exposure pathway may exist.

No further ecological assessment is necessary.

Step 4. Characterize the Potential Ecological Habitat

See 60-3-9.5.a.4

4.1 Describe the general land use in the immediate vicinity of the site.

___ Urban
___ Rural / Agricultural
___ Residential
___ Industrial / Commercial
___ Rural / Undeveloped
___ Other (Describe)

4.2 For all affected areas that fulfill the descriptions in Questions 1.3 through 1.6, answer the following and provide a site map identifying the potential ecological habitat.

4.2.1 Outline the following characteristics for potential terrestrial habitats.

Location:

Contiguous area:

General topography:

Predominant vegetation species:

Primary soil type:

4.2.2 Outline the following characteristics for potential wetland habitats (e.g., vernal pools, marshes, etc.

Location:

Contiguous area:

General topography:

Predominant vegetation species:

Primary soil type:

4.2.3 Outline the following characteristics for potential lotic habitats (e.g., flowing water habitat such as rivers and streams).

Location:

Typical width and depth:

Typical flow rate:

Typical gradient (m/km):

Type of river / creek bottom:

Types of aquatic vegetation present:

Topography of the riparian zone:

Predominant riparian vegetation:

Human utilization of the river / creek and riparian zone:

Local conditions:

4.2.4 Outline the following characteristics for potential lentic habitats (e.g., standing water habitats such as lakes and ponds).

Location:

Is the pond / lake natural or man-made:

Area of the pond / lake:

Typical and maximum depth:

Brief description of sources and drainage:

Predominant aquatic vegetation:

Topography of the littoral zone:

Predominant vegetation in littoral zone:

Human utilization of the pond / lake and shoreline:

Local conditions:

4.3 Indicate if the site contains or is adjacent to any of the following types of valued terrestrial habitats:

___ Area designated as a National Preserve
___ Federal land designated for protection of natural ecosystems
___ National or State wildlife refuge
___ Designated Federal wilderness area or administratively proposed wilderness area
___ Federal or State land designated for wildlife or game management
___ National or State park
___ National or State forest
___ State designated natural area
___ Climax community (e.g., old growth forest)
___ Area utilized for breeding by large or dense aggregations of wildlife
___ Area important to the maintenance of unique biotic communities (e.g., area with a high proportion of endemic species

___ Critical habitat for federally designated threatened or endangered species
___ Habitat known to be used or potentially used by Federal or State designated threatened or endangered species
___ Habitat needed for feeding, breeding, nesting, cover, or wintering habitat for migratory birds

4.4 Indicate if the site contains or is adjacent to any of the following types of valued wetlands:

___ Area important to the maintenance of unique biotic communities (e.g., area with a high proportion of endemic species)
___ Area utilized for breeding by large or dense aggregations of wildlife
___ Feeding, breeding, nesting, cover, or wintering habitat for migratory waterfowl or other aquatic birds
___ Spawning or nursery areas critical to the maintenance of fish / shellfish species
___ Critical habitat for Federal-designated threatened or endangered species
___ Habitat known to be used or potentially used by Federal or State designated threatened or endangered species.

4.5 Indicate if the site is within or adjacent to any of the following valued aquatic habitats:

___ Area important to the maintenance of unique biotic communities (e.g., area with a high proportion of endemic species
___ Critical areas identified under the Clean Lakes Program
___ National river reach designated as recreational
___ Federal or State designated scenic or wild river
___ Federal or State fish hatchery
___ Trout-stocked streams or wild trout streams with verified trout production
___ Habitat needed for feeding, breeding, nesting, cover, or wintering habitat for migratory waterfowl or other aquatic birds
___ Spawning or nursery areas critical to the maintenance of fish / shellfish species
___ Critical habitat for Federal designated threatened or endangered species
___ Habitat known to be used or potentially used by Federal or State designated threatened or endangered species

4.6 Have valued terrestrial, wetland, or aquatic habitats been identified within or adjacent to the site?

___ yes ___ no

(A list of agencies that can provide information that should assist in making a determination of whether the site is located within or adjacent to the areas listed in 4.3, 4.4, and 4.5 is provided at end of Section C2)

After completing 4.6, proceed to Step 5.

Step 5. Identify any Potential Ecological Receptors of Concern

See 60-3-2.2.14 and 60-3-9.5.a.4

5.1 Threatened and Endangered Species

Were any potential habitats within or adjacent to the site identified as critical habitat for Federally designated threatened or endangered species listed in 50 CFS 17.95 or 17.96, or areas known to be used by Federal or State designated threatened or endangered species?

___ yes ___ no

If "yes", indicate which species:

Mammals:
___ Gray bat *(Myotis grisescens)*
___ Indiana bat *(Myotis sodalis)*
___ Virginia big-eared bat *(Corynorhinus towsendii virginianus)*
___ Virginia northern flying squirrel *(Glaucomys sabrinus fuscus)*
___ Eastern cougar *(Felis concolor couguar)*

Birds:
___ Bald eagle *(Haliaeetus leucocephalus)*

Amphibians:
___ Cheat Mountain salamander *(Plethodon nettingi)*

Snails:
___ Flat-spired three-toothed land snail *(Triodopsis platysayoides)*

Clams:
___ Pink mucket pearly mussel *(Lampsilis abrupta)*
___ Tuberculed blossom pearly mussel *(Epioblasma torulosa torulosa)*
___ James spiny mussel *(Pleurobema collina)*
___ Fanshell *(Cyprogenia stegaria)*

___ Clubshell *(Pleurobema clava)*
___ Northern riffleshell *(Epioblasma torulosa rangiana)*

Flowering Plants:
___ Shale barren rock cress *(Arabis perstellata)*
___ Harperella *(Ptilimnium nodosum)*
___ Northeastern bulrush *(Scirpus ancistrochaetus)*
___ Virginia spiraea *(Spiraea virginiana)*
___ Running buffalo clover *(Trifolium stoloniferum)*
___ Small whorled pogonia *(Isotria medeoloides)*

(The above list contains those federally designated threatened and endangered species that are indigenous to West Virginia. They will be revised as necessary to reflect changes to a species federal designation (e.g., addition or removal of a species from the list of federally designated species). The West Virginia Division of Natural Resources, Wildlife Resources Section should be consulted to ensure the above list is current. Note that West Virginia has not established a list of State designated threatened or endangered species. If such a list is established, the Federal designated species list will be revised to include State designated threatened and endangered species.)

5.2 Local populations that provide important natural or economic resources, functions, and values

Were any valued terrestrial, wetland or aquatic habitats listed in 4.3, 4.4, or 4.5 identified within or adjacent to the site?

___ yes ___ no

(The valued terrestrial, wetland, and aquatic habitats listed in 4.3, 4.4, and 4.5 may potentially contain local populations that provide important natural or economic resources, functions, and values)

If 5.1 and 5.2 are answered "no" and surface water bodies are shown to be in compliance with Appendix J. the ecological evaluation is complete and the site has passed the De Minimis Ecological Screening Evaluation. File this completed form with the Final Report for the site.

If either 5.1 or 5.2 are answered "yes", the site does not pass the De Minimis ecological risk screening since a complete exposure pathway may exist for potential ecological receptors of concern. Further evaluation of the site is required using either the Uniform Ecological Standard or the Site-specific Ecological Standard. See Guidance Manual, Section 4.

AGENCIES

West Virginia Division of Natural Resources
Main Office
State Capitol Complex, Building 3
1900 Kanawha Boulevard
Charleston, West Virginia 25305
(304) 558-2754
http://www.dnr.state.wv.us/default.htm

West Virginia Division of Natural Resources
Wildlife Resources Section
PO Box 67
Elkins, West Virginia 26241
(304) 637-0245
http://www.dnr.state.wv.us/wvwildlife/default.htm

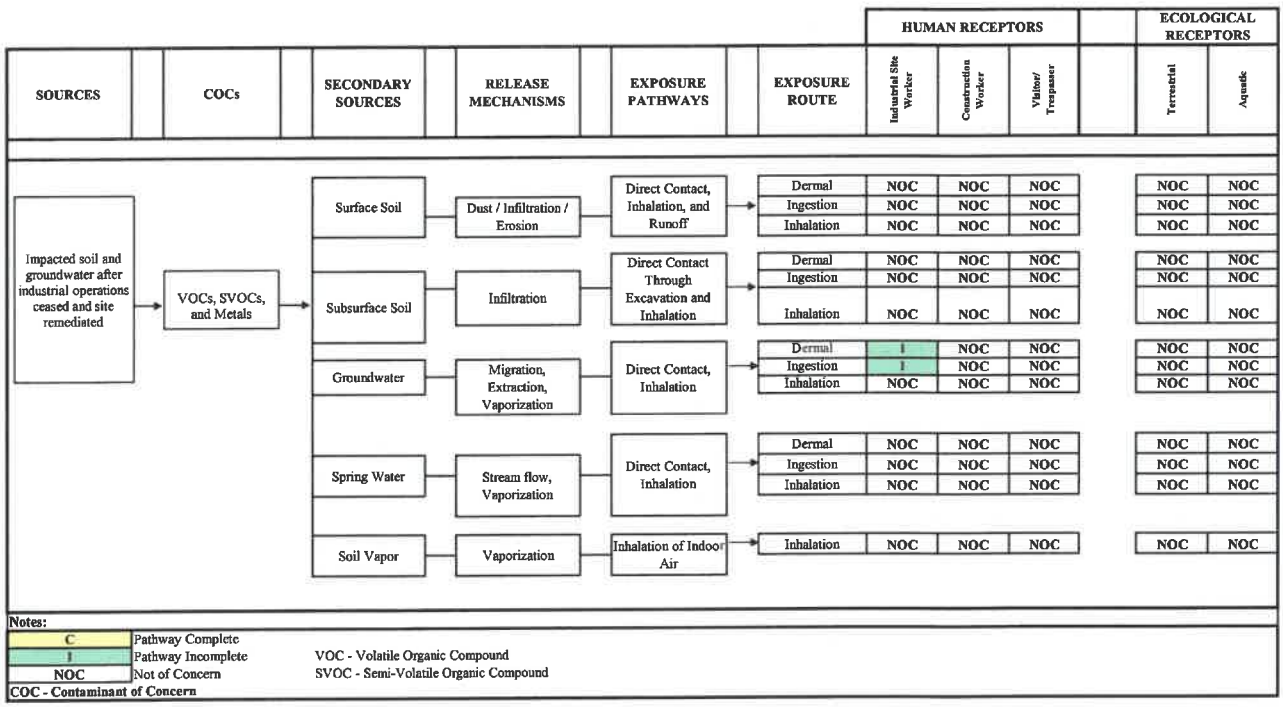
West Virginia Division of Forestry
1900 Kanawha Boulevard East
Charleston, West Virginia 25303
(304) 558-2788

US Fish and Wildlife Service
West Virginia Ecological Services Field Office
Elkins Shopping Plaza
PO Box 1278
Elkins, West Virginia 26241
(304) 636-6586
http://northeast.fws.gov/wv.htm

US Department of Agriculture
Natural Resource and Conservation Service
75 Night Street -- Room 301
Morgantown, WV 26505
(304) 291-4153

APPENDIX G

Conceptual Site Model Diagram - Residual Risk
Heritage Holdings, LLC Fabrication Plant
12th St and Main St
Wellsburg, West Virginia



SOURCES	COCs	SECONDARY SOURCES	RELEASE MECHANISMS	EXPOSURE PATHWAYS	EXPOSURE ROUTE	HUMAN RECEPTORS: Industrial Site Worker	HUMAN RECEPTORS: Construction Worker	HUMAN RECEPTORS: Visitor/ Trespasser	ECOLOGICAL RECEPTORS: Terrestrial	ECOLOGICAL RECEPTORS: Aquatic
Impacted soil and groundwater after industrial operations ceased and site remediated	VOCs, SVOCs, and Metals	Surface Soil	Dust / Infiltration / Erosion	Direct Contact, Inhalation, and Runoff	Dermal	NOC	NOC	NOC	NOC	NOC
					Ingestion	NOC	NOC	NOC	NOC	NOC
					Inhalation	NOC	NOC	NOC	NOC	NOC
		Subsurface Soil	Infiltration	Direct Contact Through Excavation and Inhalation	Dermal	NOC	NOC	NOC	NOC	NOC
					Ingestion	NOC	NOC	NOC	NOC	NOC
					Inhalation	NOC	NOC	NOC	NOC	NOC
		Groundwater	Migration, Extraction, Vaporization	Direct Contact, Inhalation	Dermal	I	NOC	NOC	NOC	NOC
					Ingestion	I	NOC	NOC	NOC	NOC
					Inhalation	NOC	NOC	NOC	NOC	NOC
		Spring Water	Stream flow, Vaporization	Direct Contact, Inhalation	Dermal	NOC	NOC	NOC	NOC	NOC
					Ingestion	NOC	NOC	NOC	NOC	NOC
					Inhalation	NOC	NOC	NOC	NOC	NOC
		Soil Vapor	Vaporization	Inhalation of Indoor Air	Inhalation	NOC	NOC	NOC	NOC	NOC

Notes:

C	Pathway Complete
I	Pathway Incomplete
NOC	Not of Concern

VOC - Volatile Organic Compound
SVOC - Semi-Volatile Organic Compound
COC - Contaminant of Concern