



January 9, 2018

Jeff Ackerman
Wisconsin Department of Natural Resources
3911 Fish Hatchery Rd
Fitchburg, WI 54711

Re: Remediation Injection Request

Dear Mr. Ackerman:

EnviroForensics is proposing a subsurface injection utilizing a liquid activated carbon solution as a method of groundwater treatment at the former Robinson's Cleaners in Janesville, Wisconsin (Site). This injection request follows tracer and pilot testing activities performed during 2017. The overall plan for remediation at the Site is provided in the Remedial Action Design Report dated January 9, 2018. We are requesting review and approval of the attached injection request. Site information is provided below.

Site Details: Robinson's Cleaners - Former
1838 W. Court Street
Janesville, WI 53548
BRRTS# 02-54-221852

Site Owner: Creativity Circle, Inc.
200 N. LaSalle Street, Suite 2350
Chicago, IL 60601

Responsible Party: Raychris, Inc
5110 N. Connor Street
Janesville, WI 53545

Consultant: EnviroForensics, LLC
Brian Kappen, Project Manager; Wayne Fassbender, Sr. Project Manager
N16 W23390 Stone Ridge Drive, Suite G, Waukesha, WI 53188
262-290-4001
bkappen@enviroforensics.com
wfassbender@enviroforensics.com



WPDES Permit No. WI-0046566-6 for discharge of contaminated groundwater from remedial action operations was issued for the site prior to pilot test injection activities conducted in June 2017. Reference FIN# 52182 and 59530.

A technical assistance review fee of \$700 is enclosed with the copy of this letter sent to Ms. Weihemuller.

Sincerely,
EnviroForensics, LLC

A handwritten signature in blue ink that reads "Wayne P. Fassbender".

Wayne Fassbender, PG, PMP
Senior Project Manager

A handwritten signature in blue ink that reads "Brian Kappen".

Brian Kappen, PG
Project Manager

cc: Wendy Weihemuller, WDNR

enclosure



INJECTION REQUEST – BRRTS# 02-54-221852
FORMER ROBINSON'S CLEANERS – 1838 W. COURT ST, JANESVILLE

EnviroForensics is proposing to implement a full-scale injection of PlumeStop® Liquid Activated Carbon for in-situ treatment of tetrachloroethene (PCE) dissolved in groundwater at the Site. PlumeStop is an in-situ sorption and biodegradation product composed of very fine particles of activated carbon (1-2µm) suspended in water. It is highly dispersible, but once in the subsurface the material behaves as a colloidal biomatrix that binds to the aquifer matrix. It captures and concentrates dissolved-phase contaminants within its structure. Biodegradation processes then accomplish complete remediation at a rapid rate. PlumeStop is non-toxic and safe to handle, and it is designed to remain in the injection area (i.e., it does not move by groundwater advection). A technical description sheet prepared by the manufacturer is provided as **Attachment 1**.

General stratigraphy at the Site is unconsolidated deposits comprised of sand, silt and clay, followed by the fractured Platteville dolomite, which then transitions to St. Peter Sandstone at approximately 42 feet below ground surface (bgs). The unconsolidated deposits are approximately 8-18 feet thick in the vicinity of the Site. The dolomite is approximately 20 to 30 feet thick and pinches out to the south and west of the Site. Depth to the piezometric surface in the sandstone is approximately 48 feet bgs. The target compound for treatment is PCE, identified in groundwater at concentrations up to 5,000 µg/L in the vicinity of the treatment area.

Implementation Plan

A site-specific health and safety plan will be followed during implementation of the remedial injections. EnviroForensics will also communicate injection plans to the property owner prior to starting work.

A 24,000 square foot treatment area was established based on analysis of the dolomite and sandstone groundwater plumes. A network of 21 injection points was specified for the treatment area, each with an estimated radius of influence of 20 feet. The layout of the injection points is shown on **Figure 1**. The goal is to effectively create a horizontal barrier to contaminant movement that is laterally continuous over the primary area where contaminants leak from the dolomite into the sandstone. The barrier will not only intercept contaminants, but will also provide nutrients and create reducing conditions to support microbial reduction of the contaminant mass.

The 21 injection points were installed October 30 – November 3; and November 13 – 16, 2017. The boreholes were advanced by air and water rotary drilling methods. The points are constructed of 2-inch diameter PVC with a 10-foot, 0.020 slot screen set at 53-63 feet bgs. The screen depths were selected to allow homogeneous distribution of remedial fluids just below the transition from dolomite to sandstone. Filter pack sand was placed from the bottom of the borehole to two (2) feet above the screen, followed by two (2) feet of fine sand and three (3) feet



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of bentonite chips. The remainder of the annular space was filled with neat cement grout with 10% bentonite. This grout mixture is the recommended seal to prevent daylighting of remedial fluids during injection. A traffic-rated flush-mount vault set in a concrete pad was installed at the surface for protection and access. A threaded fitting was added to the top of the riser for future connection to injection hose.

EnviroForensics and Regensis Remediation Services developed an injection design based on groundwater CVOC concentrations and the hydrogeological properties of the sandstone aquifer. The design calls for 50,000 pounds of PlumeStop to be applied within the 10-foot thick target treatment zone immediately below the transition zone from dolomite to sandstone. Design parameters are presented in **Attachment 2**.

PlumeStop is shipped in concentrated form in 300 gallon totes. The concentrated PlumeStop will be mixed with water obtained from the City of Janesville to produce a solution. For each injection point, 285 gallons of PlumeStop will be mixed with 4,280 gallons of water to produce the appropriate solution for injection. A total of approximately 96,000 gallons of PlumeStop solution, or 4,565 gallons per injection point, will be added to the treatment zone.

Mixing will be performed in large, trailer-mounted, tanks with continuous agitation. The solution will then be pumped from the tanks, through a manifold to the injection points via hose. Pressure and flow rate will be monitored and recorded to confirm that injection design parameters are met.

Monitoring Plan

A remediation performance monitoring program has been developed for the first year following injections. It is designed to demonstrate that the remedial actions have changed the groundwater chemistry, begun to reduce the VOC mass, and inhibited further contributions to the downgradient plume. Monitoring in subsequent years will be recommended after evaluation of the initial data.

Monitoring wells near the treatment zone will be monitored on a quarterly basis for the contaminants of concern as well as geochemical parameters to allow for an evaluation of changes in aquifer conditions resulting from the introduction of PlumeStop. Monitoring wells further from the source area have been selected for sampling because they either define the plume boundary or could indicate potential changes in magnitude near the centerline of the plume. These wells will be sampled less frequently, either semi-annually or once in the first year of monitoring depending on location and historical concentration trends.



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The monitoring program is detailed in **Table 1**, and monitoring wells selected for sampling are depicted on **Figure 2**. Samples collected from six (6) monitoring wells near the treatment zone will be analyzed for VOCs as well as total and dissolved iron, sulfate, nitrate, nitrite, total organic carbon (TOC), and dehalococcoides bacteria. Groundwater purging and sample collection from these wells will be conducted using standard low-flow (minimal drawdown) methods. Field parameters including pH, specific conductivity, temperature, ORP, and DO will be measured during purging and recorded on the groundwater field sampling forms. The remaining 31 wells listed on **Table 1** will be sampled for VOCs only, using passive diffusion bags (PDBs). The PDBs will be deployed for a minimum of 30 days before samples are collected. Groundwater samples will be submitted to a state-certified laboratory for all analyses. Duplicate samples and equipment blanks will be collected at the rate specified in NR 716.13 for quality assurance/quality control (QA/QC) purposes.

Groundwater elevation measurements will be collected before, during, and after injections to evaluate the temporary effect of injection on potentiometric surfaces and flow direction. Measurements will be collected from wells within and near the treatment area, including MW-20D, MW-27D, MW-27DS, MW-29, MW-30D, MW-31D, and MW-36D. The depth to water in each well will be measured to the nearest 0.01 foot using an electronic water level indicator.

Investigation-derived media (IDM), including purge water and decontamination fluids, will be containerized in 55-gallon drums. A licensed contractor will be retained to remove drums following each monitoring event. The IDM will be managed under existing non-hazardous waste profiles.

Timeframe

Injection activities are scheduled to commence in March 2018. The anticipated duration of on-site work is 27 days for the injection event and two (2) to five (5) days for each of the performance monitoring events. EnviroForensics is requesting injection approval through the end of 2020 in case repeat injections are necessary.

Vapor Screening

Extensive vapor screening was previously conducted as part of the Site investigation. A sub-slab depressurization system was installed at Chase Bank (18 N. Arch Street) to mitigate vapor intrusion. Mitigation in the Site building was not needed. The majority of the treatment zone is distant from buildings and more than 50 feet bgs. Saturated dolomite is present above the treatment zone which will inhibit vertical movement of vapors. Based on the Site conditions and



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systems installed to prevent vapor impacts, the likelihood of vapor exposure resulting from remedial activities is extremely low.

Certifications

I, Andrew Horwath, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Manager, Technical Group, P.E. No. E-43831-6

Signature, title and P.E. number

P.E. stamp

I, Brian Kappen, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

 Project Manager
Signature and title

1/8/2018
Date

TABLE 1
REMEDIATION PERFORMANCE MONITORING PROGRAM

Former Robinson's Cleaners
Janesville, Wisconsin

| Parameter | VOCs | Total Fe | Dissolved Fe | Sulfate | Nitrate | Nitrite | TOC | Dehalococoides |
|-----------|------|----------|--------------|---------|---------|---------|-----|----------------|
| MW-12 | S | | | | | | | |
| MW-13 | S | | | | | | | |
| MW-20D | Q | Q | Q | Q | Q | Q | Q | S |
| PZ-25D2 | A | | | | | | | |
| MW-27D | Q | Q | Q | Q | Q | Q | Q | S |
| MW-27DS | Q | Q | Q | Q | Q | Q | Q | S |
| MW-29 | Q | Q | Q | Q | Q | Q | Q | S |
| MW-30D | Q | Q | Q | Q | Q | Q | Q | S |
| MW-31D | S | | | | | | | |
| MW-32 | S | | | | | | | |
| MW-35D | A | | | | | | | |
| MW-36D | Q | Q | Q | Q | Q | Q | Q | S |
| MW-39S | A | | | | | | | |
| PZ-42D1 | S | | | | | | | |
| PZ-42D2 | S | | | | | | | |
| PZ-42D3 | S | | | | | | | |
| PZ-43D1 | S | | | | | | | |
| MW-44S | A | | | | | | | |
| PZ-44D1 | S | | | | | | | |
| PZ-44D2 | S | | | | | | | |
| PZ-46D1 | A | | | | | | | |
| PZ-46D2 | A | | | | | | | |
| PZ-46D3 | A | | | | | | | |
| PZ-47D1 | S | | | | | | | |
| PZ-47D2 | S | | | | | | | |
| PZ-47D3 | S | | | | | | | |
| PZ-49D1 | S | | | | | | | |
| PZ-49D2 | S | | | | | | | |
| PZ-49D3 | S | | | | | | | |
| PZ-49D4 | S | | | | | | | |
| MW-51S | A | | | | | | | |
| PZ-52D1 | A | | | | | | | |
| PZ-52D2 | A | | | | | | | |
| PZ-52D3 | A | | | | | | | |
| PZ-53D1 | S | | | | | | | |
| PZ-53D2 | S | | | | | | | |
| PZ-53D3 | S | | | | | | | |

Notes:

This program applies to the first year (4 quarters) following injections only

A = Single sample collected approximately one year after injections

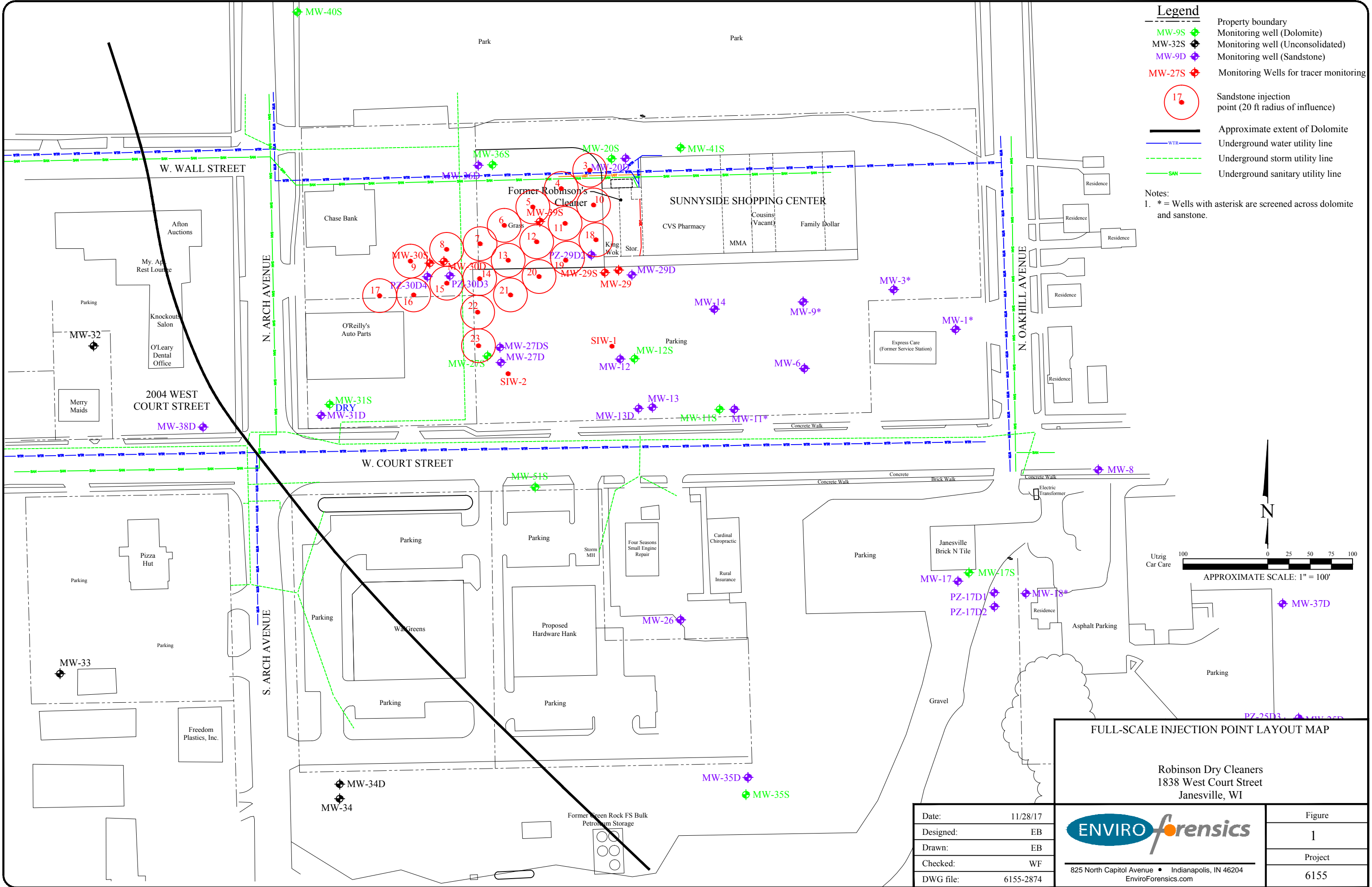
Q = Sample collected quarterly

S = Sample collected semi-annually

VOCs - Volatile Organic Compounds

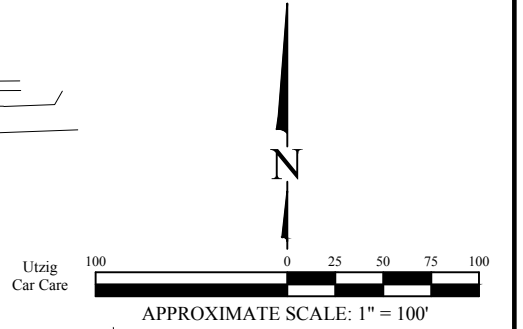
Fe = Iron

TOC = Total Organic Carbon



- Legend**
- MW-9S Monitoring well (Dolomite)
 - MW-32S Monitoring well (Unconsolidated)
 - MW-9D Monitoring well (Sandstone)
 - MW-27S Monitoring Wells for tracer monitoring
 - Sandstone injection point (20 ft radius of influence)
 - Approximate extent of Dolomite
 - WTR Underground water utility line
 - SW Underground storm utility line
 - SAN Underground sanitary utility line

Notes:
 1. * = Wells with asterisk are screened across dolomite and sanstone.








FULL-SCALE INJECTION POINT LAYOUT MAP

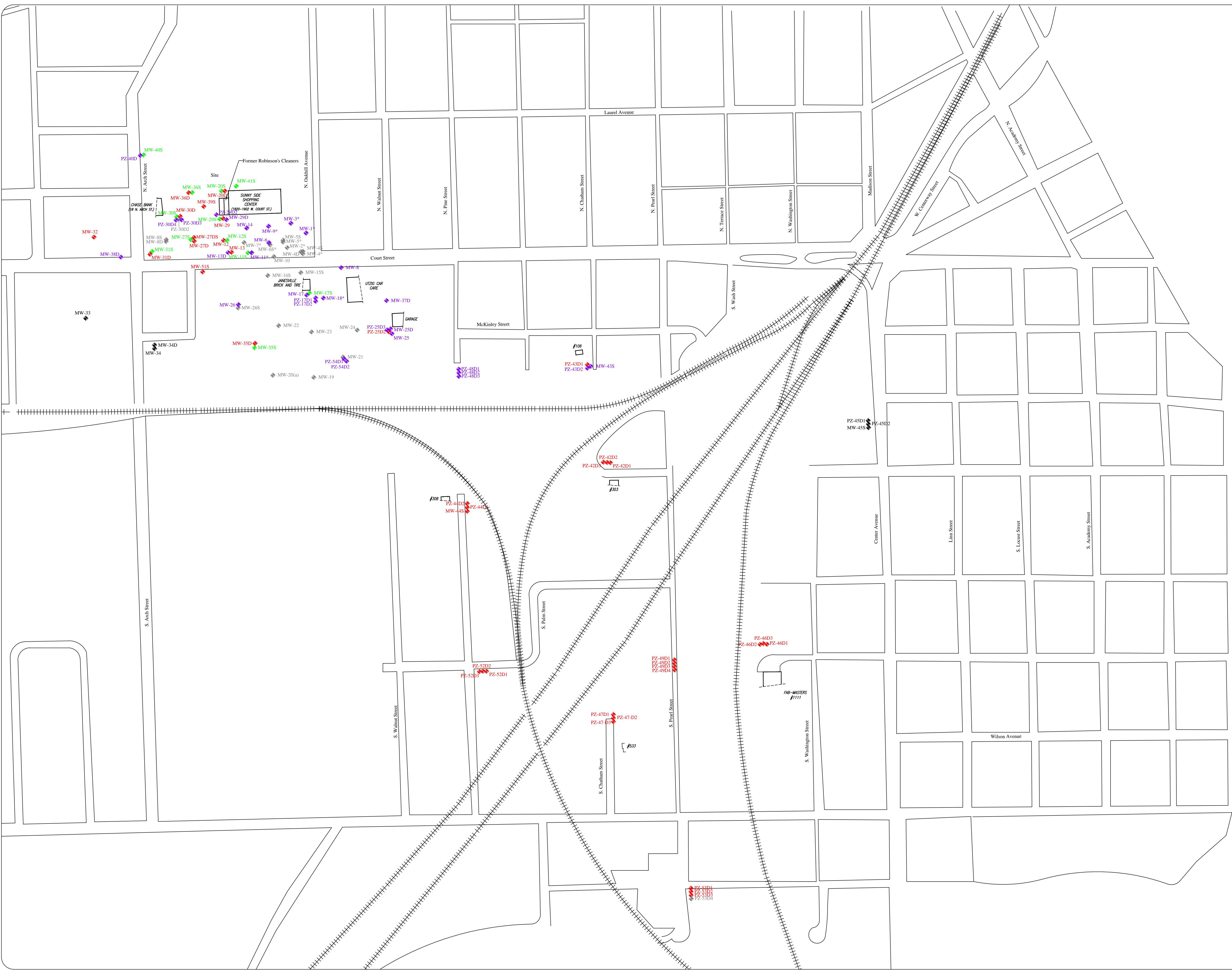
Robinson Dry Cleaners
 1838 West Court Street
 Janesville, WI

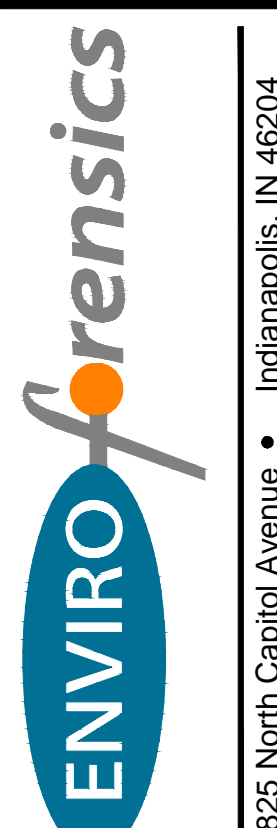
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|-----------|-----------|--|---------|
| Date: | 11/28/17 | | Figure |
| Designed: | EB | | 1 |
| Drawn: | EB | | Project |
| Checked: | WF | | 6155 |
| DWG file: | 6155-2874 | | |

825 North Capitol Avenue • Indianapolis, IN 46204
 EnviroForensics.com

Legend

- MW-32  Monitoring well (Unconsolidated)
- MW-95  Monitoring well (Dolomite)
- MW-98  Monitoring well (Sandstone)
- MW-9  Monitoring well (Abandoned)
- MW-32  Monitoring well designated for sampling by PDB methods



| | | | |
|--|-----------|-----------|----------|
| Figure | 2 | Project | 6155 |
| SITE MAP SHOWING MONITORING WELLS DESIGNATED FOR SAMPLING Robinsons Dry Cleaners 1838 West Court Street Janesville, WI | | | |
| Date: | 12/14/17 | Designed: | EB |
| Drawn: | EB | Checked: | WF |
| DWG file: | 6155-2343 | | |
|  | | | |
| 825 North Capitol Avenue • Indianapolis, IN 46204 EnviroForensics.com | | | |
| No. | Date | Revision | Approved |
| | | | |

PlumeStop® Liquid Activated Carbon™ Technical Description

PlumeStop Liquid Activated Carbon is an innovative groundwater remediation technology designed to rapidly remove and permanently degrade groundwater contaminants. PlumeStop is composed of very fine particles of activated carbon (1-2µm) suspended in water through the use of unique organic polymer dispersion chemistry. Once in the subsurface, the material behaves as a colloidal biomatrix, binding to the aquifer matrix, rapidly removing contaminants from groundwater, and expediting permanent contaminant biodegradation.

This unique remediation technology accomplishes treatment with the use of highly dispersible, fast-acting, sorption-based technology, capturing and concentrating dissolved-phase contaminants within its matrix-like structure. Once contaminants are sorbed onto the regenerative matrix, biodegradation processes achieve complete remediation at an accelerated rate.



Distribution of PlumeStop in water

To see a list of treatable contaminants with the use of PlumeStop, view the [Range of Treatable Contaminants Guide](#).

Chemical Composition

- Water - CAS# 7732-18-5
- Colloidal Activated Carbon ≤2.5 - CAS# µm 7440-44-0
- Proprietary Additives

Properties

- Physical state: Liquid
- Form: Aqueous suspension
- Color: Black
- Odor: Odorless
- pH: 8 - 10

Storage and Handling Guidelines

Storage

- Store in original tightly closed container
- Store away from incompatible materials
- Protect from freezing

Handling

- Avoid contact with skin and eyes
- Avoid prolonged exposure
- Observe good industrial hygiene practices
- Wash thoroughly after handling
- Wear appropriate personal protective equipment

PlumeStop® Liquid Activated Carbon™ Technical Description

Applications

PlumeStop is easily applied into the subsurface through gravity-feed or low-pressure injection.

Health and Safety

Wash hands after handling. Dispose of waste and residues in accordance with local authority requirements. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: [PlumeStop SDS](#).



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