



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

**REMEDIAL ACTION INJECTION EXEMPTION REQUEST**

November 14, 2021

Mr. Binyoti Amungwafor  
Wisconsin Department of Natural Resources  
1027 W. St. Paul Avenue  
Milwaukee, Wisconsin 53233

VIA FEDEX

KPRG Project No. 10009

Re: Westbrook Shopping Center/Bask Inc.  
2136 E. Moreland Boulevard, Waukesha, WI  
FID# 268188800, BRRTS# 02-68-297669

Dear Mr. Amungwafor:

On behalf of Westbrook Delaware Limited Partnership, (Westbrook), KPRG and Associates, Inc. (KPRG) is submitting a NR 140.28(5) temporary exemption request to complete an enhanced reductive dechlorination injection (Anaerobic BioChem Plus, ABC<sup>+</sup>) for groundwater treatment in the area of residual tetrachloroethene (PCE) impacted groundwater. Pursuant to s. NR 140.28(5), a temporary exemption is required for the injection of a remedial material as part of a remedial action for groundwater. This letter is serving as our exemption request under NR 140.28(5) and addresses the requirements of NR 140.28(5)(b). This exemption request addresses the following NR140.28(5)(c) exemption prerequisites:

- The remedial action for restoring contaminated soil or groundwater, and any infiltrated or injected contaminated water and remedial material, shall achieve the applicable response objectives required by s. NR 140.24(2) or 140.26(2) within a reasonable period of time.
- The type, concentration and volume of substances or remedial material to be infiltrated or injected shall be minimized to the extent that is necessary for restoration of the contaminated soil or groundwater and be approved by the department prior to use.
- Any infiltration or injection of contaminated water or remedial material into soil or groundwater will not significantly increase the threat to public health or welfare.
- No uncontaminated or contaminated water, substance or remedial material will be infiltrated or injected into an area where a floating non-aqueous phase liquid is present in the contaminated soil or groundwater.

14665 West Lisbon Road, Suite 2B Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

- There will be no expansion of soil or groundwater contamination, or migration of any infiltrated or injected contaminated water or remedial material, beyond the edges of previously contaminated areas, except that infiltration or injection into previously uncontaminated areas may be allowed if the department determines that expansion into adjacent, previously uncontaminated areas is necessary for the restoration of the contaminated soil or groundwater, and the requirements of subd. 1 will be met.
- All necessary federal, state and local licenses, permits and other approvals are obtained and all applicable protection requirements will be complied with.

This exemption request also addresses the following requirements under NR 140(5)(d):

- The remedial action design, operation and soil and groundwater monitoring procedures to insure compliance with the requirements under par.(c) and applicable criteria under this paragraph.
- The level of pre-treatment for contaminated groundwater prior to re-infiltration or reinjection.
- The types and concentrations of substances or remedial material being proposed for infiltration or injection.
- The volume and rate of infiltration or injection of contaminated groundwater or remedial material.
- The location where the contaminated groundwater or remedial material will be infiltrated or injected.

In addition, a request for a WPDES general permit for groundwater remedial operation is being submitted as required since treatment material will be injected into impacted groundwater.

#### Site Investigation Summary

There have been several phases of site assessment and investigation work at this site starting in 2001 and with the most recent submittal, being a Status Report dated May 27, 2021. The various phases of site investigation have identified the primary constituent of concern to be PCE and its breakdown products. The residual groundwater impacts have been determined to be in the vicinity of, and upgradient of, monitoring well MW-6.

#### *Geology*

The geology beneath the site consists of primarily sand. There is a layer of fine grained material, consisting of silty fine sand, sandy clay, and sandy silt, at approximately 20 to 31 feet bgs that ranges in thickness from approximately three to six feet. Semi-confining geologic

layers were observed at 26 to 32 feet bgs. The fine grained semi-confining layer has created a zone of perched groundwater beneath the site. The layer of fine grained material is underlain by more sand and sand, silt, and gravel mixtures which are dry at deeper intervals of 50 to 60 feet bgs. The bedrock is anticipated to be 100 to 200 feet bgs in the vicinity of the site. Bedrock was not encountered during drilling that reached 60 feet bgs.

The regional geology consists of Quaternary glacial deposits overlying bedrock. The glacial deposits may exceed 150 feet in thickness. The bedrock consists of Silurian dolomite, up to 325 feet thick, on top of Maquoketa shale, up to 210 feet thick. The Maquoketa shale is underlain by the Galena Dolomite, between 210 to 290 feet thick. The Galena dolomite is underlain by the various Ordovician and Cambrian sandstone formations, thickness ranging from 500 to greater than 2000 feet.

#### *Hydrogeology*

Groundwater depth ranges from approximately 19 to 29 feet bgs in on-site monitoring wells and from approximately 7.5 to 15.5 feet bgs in off-site wells. The shallow horizontal groundwater flow is north to northeast. The horizontal gradient at the site ranges from approximately 0.005 feet per foot (ft/ft) beneath the former source building to 0.04 ft/ft off-site near Capella Court. The vertical hydraulic gradient was noted to be approximately 1.21 ft/ft downward at well nest MW-4/PZ-1. Slug testing was performed as part of the initial site investigation. The calculated hydraulic conductivities ranged from  $1.23 \times 10^{-3}$  centimeters per second (cm/s) to  $2.43 \times 10^{-2}$  cm/s.

The water table beneath this portion of Waukesha County is primarily recharged via precipitation. The shallow aquifer system consisting of unconsolidated Quaternary deposits near the surface typically flows toward nearby rivers, streams, and/or lakes. The underlying aquifer system consisting of water/bearing Silurian dolomites and sandstone flow towards Lake Michigan.

#### *Potential Receptors*

There are no water supply wells located within 1,000 feet of the subject site and the injection locations. The Westbrook facility and the surrounding neighborhoods are serviced by City of Waukesha's municipal water supply system. The depths of the injection is anticipated to not intersect existing utilities.

#### Injection Proposal Specifications

The enhanced reductive dechlorination injection will include the injection of 12% ABC<sup>+</sup> at 20 injection points for a total of approximately 2,800 gallons of injectate at the locations shown on Figure 1. Eight (8) injection points will occur near monitoring well MW-7 from 15 to 25 feet bgs with each point receiving an average of 200 gallons. The other 12 injection points will be in the vicinity of monitoring well MW-6 and will occur from 11 to 21 feet bgs with each point receiving an average of 100 gallons. Each injection point will be spaced out 10 feet apart on center and have an assumed radius of influence of five feet. The appropriate depth will be reached using direct push technology. One to three foot lift intervals will be used for each vertical treatment zone. Once an injection is completed at each specific injection point, the borehole will be filled with bentonite chips to prevent short-circuiting of any subsequent treatment.

The Injections will proceed from the north (near MW-6), downgradient, and then proceed to the south (near MW-7), upgradient. This will limit any potential to push higher impacts further downgradient. The total volume, pressure and rate of treatment chemistry injection will be monitored and amended according to field conditions to maximize effectiveness. The anticipated operating pressure for the injection is 20-60 pounds per square inch (psi) and the maximum operating pressure is 100 psi, which should not create secondary permeability within the subsurface. This area is where the predominant amount of PCE mass is located and focusing on this area will remove the greatest amount of PCE and allow for downgradient migration of the injectate.

The remediation will be accomplished using ABC<sup>+</sup>, which is a mixture of Zero Valent Iron and an ABC formula consisting of carbon substrates that include lactates, lactate esters, fatty acids, and a phosphate buffer to promote anaerobic biodegradation of halogenated solvents in groundwater. The above injectate material is identified as the preferred treatment chemistry for this site and has been shown to successfully breakdown PCE and its associated breakdown products in saturated soils. ABC<sup>+</sup> is a mixture that creates a reducing environment by acting as an electron donor, lasts up to 24 months in the subsurface environment allowing for long-term anaerobic biodegradation, and complete dechlorination which does not result in the formation of chlorinated daughter products, among other advantages.

The appropriate chemistry and associated dosing requirements are based upon the target remediation goal for groundwater that is set by the promulgated Enforcement Standards (ESs) for each specific compound. Based upon preliminary estimates, an average of up to 200 gallons of 12% ABC<sup>+</sup> will be injected into each injection location. The previously mentioned injection parameters may be altered based upon field conditions; however only the minimum amount of injectate will be used that is necessary to achieve the response objectives as required by s. NR 140.26(2) and subsequently s. NR 140.24(2).

#### Remedial Action Monitoring

To monitor groundwater quality conditions after the proposed injections, a total of six rounds of subsequent groundwater sampling at well locations MW-4 through MW-16 will occur. See Figure 1 for locations of the wells. This will include a quarterly sampling the first year after injection and a semi-annual sampling during the following year. Each sampling event will include a duplicate sample for quality control purposes. All samples will be analyzed for chlorinated volatile organic compounds and a sampling summary will be provided to WDNR after each round of sampling. The samples will be sent to Eurofins Test America for analysis under a completed chain-of-custody.

The injection for treatment of PCE is not expected to create a vapor concern since the injections will take place below surface areas capped by asphalt, where the asphalt acts as a vapor barrier. The existing homes within the area of the injection have sub-slab depressurization systems that have eliminated the vapor concerns associated with PCE impacts in groundwater.

Field activities will be logged and documented during the injections.

#### Inventory of Injection Wells

The Inventory of Injection Wells form, 3300-253, is enclosed in Attachment 1

Underground Injection Approval Checklist

The Underground Injection Approval Request Checklist Summary is in Attachment 2.

If you have any questions, please call us at 262-781-0475.

Sincerely,  
KPRG and Associates, Inc.



Richard R. Gnat, P.G.  
Principal



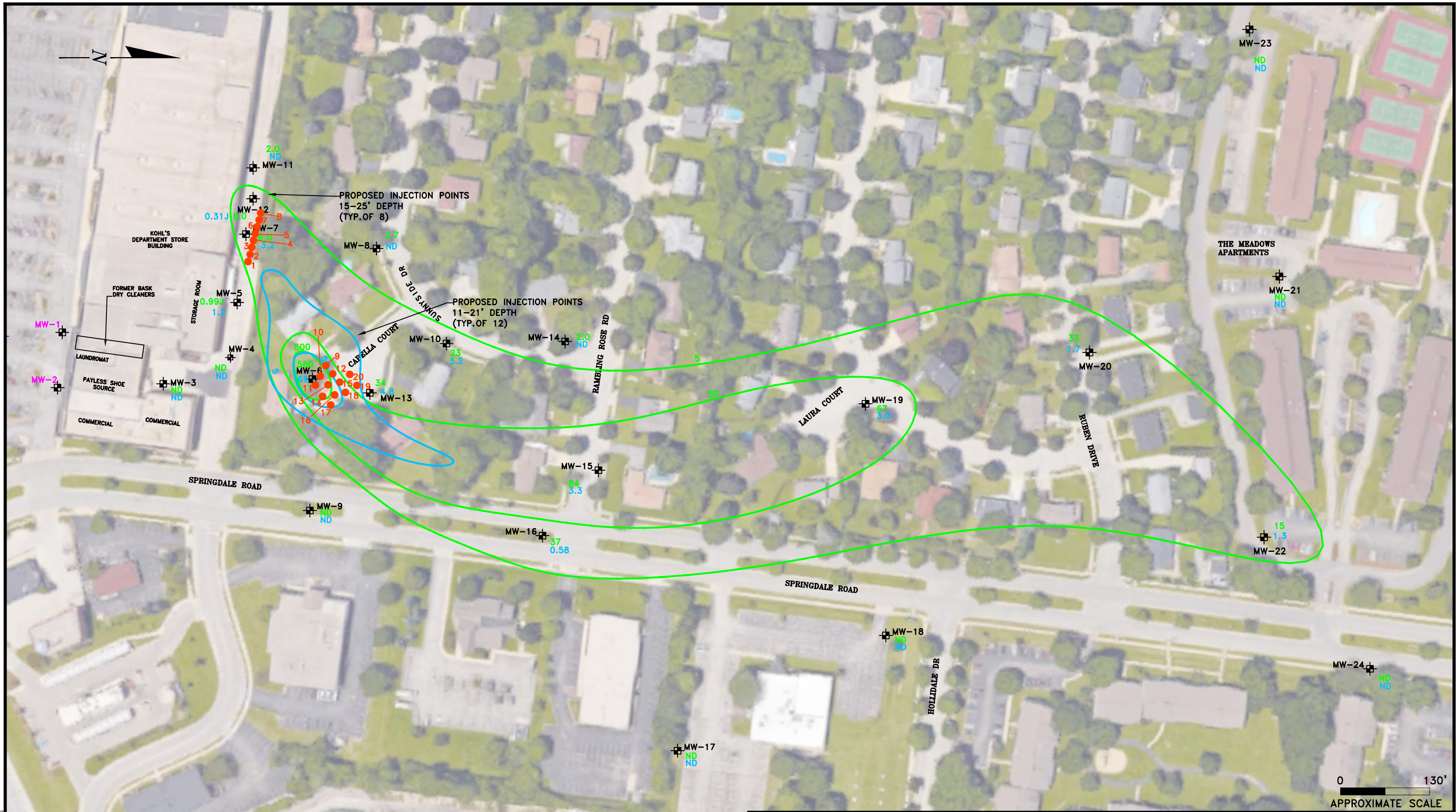
Joshua D. Davenport, P.E.  
Project Engineer

cc: Mr. Mark Drews, WDNR  
Mr. Greg Butts, Westbrook  
Mr. Donald Gallo, Axley Brynelson

*Attachments*

**FIGURE**





**LEGEND**

- MW-12 EXISTING MONITORING WELL, PIEZOMETER LOCATION
- MW-2 ABANDONED MONITORING WELL LOCATION

- 5 TCE CONCENTRATION CONTOUR
- 5 PCE CONCENTRATION CONTOUR

TCE ENFORCEMENT STANDARD = 5 µg/L  
 PCE ENFORCEMENT STANDARD = 5 µg/L

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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

EXTENT OF GROUNDWATER IMPACTS APRIL 2021 – PROPOSED INJECTION POINTS

WESTBROOK SHOPPING CENTER  
 WAUKESHA, WISCONSIN

Scale: 1" = 130' Date: September 21, 2021

KPRG Project No. 10009 FIGURE 1

\projects\westbrook shopping center\final content of figures



**ATTACHMENT 1**



This information is collected under the authority of the Safe Drinking Water Act.

**Notice:** Code of Federal Regulations (40 CFR 144.26 Inventory Requirements): owners or operators of all injection wells authorized by rule shall submit inventory information to an approved State Underground Injection Control Program. Personal information collected on this form will be used for inventory purposes. Information will be made accessible to requesters under Wisconsin's Open Records laws (s. 19.32 to 19.39, Wis. Stats.) and requirements.

Date Prepared (Year, Month, Day) 2021, November 12	Facility ID Number 268188800	Transaction Type (Please check one of the following) <input type="checkbox"/> Deletion <input type="checkbox"/> Entry Change <input checked="" type="checkbox"/> First Time Entry <input type="checkbox"/> Replacement
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Facility Name and Location										
Last Name Westbrook Shopping Center		First		MI	Latitude: DEG MIN SEC N			Longitude: DEG MIN SEC W		
Street Address / Route Number 2136 E. Moreland Blvd.					Township 7 N		Range 19 E		Section 36	¼ Section NE
City / Town Waukesha			State WI	ZIP Code 53186		County Waukesha		Tribal Land <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

Legal Contact						
Type <input checked="" type="checkbox"/> Owner <input type="checkbox"/> Operator		Last Name Butts		First Greg	MI	Telephone Number (incl. area code) (414) 281-6000
Organization Westbrook Delaware Limited Partnership				Ownership <input checked="" type="checkbox"/> Private <input type="checkbox"/> County / Local Government <input type="checkbox"/> State <input type="checkbox"/> Federal <input type="checkbox"/> Specify Other _____		
Street / P.O. Box 4811 S. 76th Street						
City / Town Greenfield		State WI	ZIP Code 53220			

Well Information								
WELL CLASS	WELL TYPE	TOTAL NUMBER OF WELLS	WELL OPERATION STATUS					KEY:
			UC	AC	TA	PA	AN	
	Injection Well	20	X					<b>KEY:</b> DEG = Degree MIN = Minute SEC = Seconds SECT = Section ¼ SECT = Quarter Section AC = Active UC = Under Construction PA = Permanently Abandoned and Approved by State AN = Permanently Abandoned and Not Approved by State TA = Temporarily Abandoned and Not Approved by State

Comments (Optional):

**ATTACHMENT 2**

## UNDERGROUND INJECTION APPROVAL REQUEST CHECKLIST SUMMARY

- 1) Have required fees been paid? *YES.*
- 2) Has Water Program been notified regarding project? *YES.*
- 3) Site Investigation Report complete and accurate? *The site investigation is complete and has been approved by the WDNR.*
  - a) List contaminants present at the site. *Based on the site investigation work, the primary contaminants are tetrachloroethene (PCE) and its related breakdown products.*
  - b) Is measurable free product present? *No.*
  - c) Soil types? *Primarily sand with a layer of fine grained silty sand, sandy clay, and sandy silt at approximately 20 to 31 feet below ground surface that is 3 to 6 feet thick. Please see attached Remedial Action Exemption Request dated November 14, 2021, Page 2, Geology.*
  - d) Depth to groundwater? *The depth of groundwater ranges from 7.5 to 15.5 feet bgs. Please see attached Remedial Action Exemption Request dated November 14, 2021, Page 3, Hydrogeology.*
  - e) Depth to bedrock? *Please see attached Remedial Action Exemption Request dated November 14, 2021, Page 3, Geology. Depth to bedrock is anticipated to be 100 to 200 feet bgs at the site. Bedrock was not encountered during drilling activities which were up to 60 feet bgs.*
  - f) Potential receptors:
    - a. Supply wells within 100 feet? *No*
    - b. Supply wells within 1,000 feet? *No*
    - c. Other receptors? *No**Please see attached Remedial Action Exemption Request dated November 14, 2021, Page 3, Potential Receptors.*
- 4) Injection proposal specifications  
*Please refer to the Remedial Action Exemption Request dated November 14, 2021.*
  - a) Depth of injectors? *15 to 25 feet near MW-7 and 11 to 21 feet bgs near MW-6.*

- b) Injection array? *Please see Figure 1 provided as part of the Remedial Action Exemption Request dated November 14, 2021. Construction materials? The injections will be done via direct push technology.*
- c) Rate of injection? *This will depend on how the formation will take the injection. Based on work at other sites, a rate of injection between 1 and 3 gallons per minute is anticipated. The injection wells at MW-6 will each receive 100 gallons. The injection wells at MW-7 will each receive 200 gallons.*
- d) Operating pressure? *This is also formation specific. Based on work at other sites injection pressures are expected to range from 20 to 60 pounds per square inch (psi).*
- e) Calculation of maximum injection pressure possible without creating secondary permeability. *The maximum operating pressure for injection based on the contractor equipment is 100 psi, which should not result in potential secondary permeability issues.*
- f) List and concentration of injected materials. *12% ABC+.*
- g) Source of make-up water. *City of Waukesha.*
- h) Total volume to be injected.  
*An estimated total of 2,800 gallons of 12% ABC+ will be injected into the 20 injection points.*
- 5) Monitoring proposal specifications
  - a) Adequate vapor and groundwater monitoring well network?  
*Yes, groundwater monitoring will be performed using the existing well network as outlined in the Remedial Action Exemption Request dated November 14, 2021, Page 4, Remedial Action Monitoring.*
  - b) Adequate vapor monitoring plan?  
*This is not applicable because the impacts are capped by an asphalt parking lot. Please see the Remedial Action Exemption Request dated September 9, 2019, Page 4, Remedial Action Monitoring.*
  - c) Adequate groundwater monitoring plan?  
*Yes, an adequate groundwater monitoring plan is being executed. Please see the Remedial Action Exemption Request dated November 14, 2021, Page 4, Remedial Action Monitoring.*
- 6) Inventory of Injection Well form submitted? *Yes, please see Attachment 2 of the Remedial Action Exemption Request dated November 14, 2021.*