

**From:** [Sager, John E - DNR](#)  
**To:** [Hall, Lynn M](#)  
**Cc:** [hansen.scott@epa.gov](mailto:hansen.scott@epa.gov); [Snowbank, Sheri A - DNR](#)  
**Subject:** RE: 2024 Ashland MGP Site Injection Request  
**Date:** Wednesday, April 24, 2024 4:00:00 PM  
**Attachments:** [20210428\\_99\\_Injection\\_Determination.pdf](#)

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Lynn,

The attached WDNR Injection Determination was approved for 5 years. Therefore you have approval for injection, following the attached determination, until October 29, 2025. The WDNR is aware the 2024 injection will occur within the 2021 and 2022 injection areas and will occur at the locations depicted on Figure 1 of the request. The WDNR also understands the injection volumes will be as specified in the Scope of Services section of the request. Please contact me if you have any questions.

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John Sager

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**From:** Hall, Lynn M <[Lynn.M.Hall@xcelenergy.com](mailto:Lynn.M.Hall@xcelenergy.com)>  
**Sent:** Tuesday, April 9, 2024 8:32 AM  
**To:** Sager, John E - DNR <[John.Sager@wisconsin.gov](mailto:John.Sager@wisconsin.gov)>  
**Cc:** [hansen.scott@epa.gov](mailto:hansen.scott@epa.gov)  
**Subject:** 2024 Ashland MGP Site Injection Request

**CAUTION: This email originated from outside the organization.  
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John,

Attached is the scope of work for the *2024 Phase 1 Operations, Enhanced NAPL Recovery/Maintenance Technology Evaluation*

Ashland/NSP Lakefront Site scheduled for the week of May 20<sup>th</sup>, 2024. Please review and

respond with any comments and/or approval for this event.

Thank you,

**Lynn Hall**

**Xcel Energy**

**Environmental Analyst IV**

122 North 14th Avenue West

Ashland, Wisconsin 54806

**P:** 715.682.7355 **C:** 906.364.2835 **F:** 715.682.7207

**E:** [lynn.m.hall@xcelenergy.com](mailto:lynn.m.hall@xcelenergy.com)

**From:** [Hall, Lynn M](#)  
**To:** [Sager, John E - DNR](#)  
**Cc:** [hansen.scott@epa.gov](mailto:hansen.scott@epa.gov)  
**Subject:** 2024 Ashland MGP Site Injection Request  
**Date:** Tuesday, April 9, 2024 8:33:41 AM  
**Attachments:** [2024 ChemOx Scope of Work 040824.pdf](#)

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John,

Attached is the scope of work for the *2024 Phase I Operations, Enhanced NAPL Recovery/Maintenance Technology Evaluation*

Ashland/NSP Lakefront Site scheduled for the week of May 20<sup>th</sup>, 2024. Please review and respond with any comments and/or approval for this event.

Thank you,

**Lynn Hall**

**Xcel Energy**

**Environmental Analyst IV**

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E: [lynn.m.hall@xcelenergy.com](mailto:lynn.m.hall@xcelenergy.com)

April 8, 2024

Lynn Hall  
Xcel Energy  
Environmental Analyst V - Waste and Remediation  
414 Nicollet Mall  
2<sup>nd</sup> Floor  
Minneapolis, MN 55401

Dear Ms. Hall:

RE: *Phase 1 Operations, Enhanced NAPL Recovery/Maintenance Technology Evaluation*  
Ashland/NSP Lakefront Site

The goal of this project is to evaluate its effectiveness to reduce concentrations of the target compounds, increase mobility/removal efficiency of NAPL, remove thick NAPL from the well screens, and remove thick NAPL from the pump parts. This will be accomplished by injecting reagent into injection wells. The work scope of the project consists of injecting 10,500 gallons of reagent into CFW-1, CFW-3, CFW-9, CFW-7 IP, CFW-10 IP, IP-3D, MW-45U, and MW-52. Contingent injection points are IP-2D, IP-5, IP-6, and CFW-8 IP. This is discussed in more detail below.

***Application:***

The contaminants of concern (COC) are primarily DNAPL coal tar in the CFW area and total benzene concentrations as high as 31,000 ppb.

The CFW area has a highly variable targeted vertical treatment zone. Lithology at the injection depth is sandy silts and silty sands with some gravels.

Due to the high levels of DNAPL coal tar and therefore extremely high oxidant demand in this area, a strategy of in-situ chemical injection utilizing sonic drilled injection wells will be utilized. The methodology will incorporate extraction, described in more detail below. The proposed process would consist of sodium persulfate chemistry catalyzed with sodium hydroxide injected through the injection wells. The treatment chemistry will emulsify the NAPL, resulting in increased and more efficient recovery of the NAPL than pumping alone. The injection wells are screened at a depth or depths determined for each individual location. The attached Figure shows the locations of the injection wells.

Treatment chemistry will be injected at multiple locations to effectively disperse the treatment chemistry into the subsurface.

Chemical Mixing and Delivery Methodology

The remedial injection treatment chemistry will be prepared using ORIN's specialized injection equipment. The treatment chemistry will be mixed and temporarily staged prior to injection in 200-gallon tanks located inside ORIN's enclosed injection trailer. The tank will first be filled with the proper amount of water to achieve the appropriate treatment chemistry solution concentration.

Multiple tanks will be mixed and used during the injection, which enables work to proceed steadily and efficiently. The treatment chemistry will be pumped into the formation using air-driven, chemical resistant pumps. The rate, pressure, and volume will be monitored using a chemical resistant inline electronic flow meter and pressure gauge. Shut-off valves are present at numerous locations throughout the delivery system for health and safety purposes. To further mitigate accidental spills and/or leaks, ORIN uses a variety of catch basins and sorbent pads/socks.

### Inject-and-Extract

A two-part approach will be utilized including chemical injection and simultaneous extraction from nearby monitoring/extraction wells. A quick connect fitting will be attached to the top of each injection well. The treatment chemistry is injected into the wells and delivered to the surrounding formation. Extraction recovers highly impacted groundwater via screened wells. A pneumatic pump will be used to extract water and emulsified NAPL during the injection. Extracted groundwater and emulsified NAPL will be pumped into 275-gallon totes for treatment on site or proper disposal at Veolia. The extraction draws in treatment chemistry from adjacent injection points providing hydraulic control and more precise placement of injected chemicals. As the chemistry is drawn through the subsurface, contaminant mass becomes mobilized and more easily recovered via extraction. Extracted material will be monitored to ensure that active treatment chemicals are not being removed from the subsurface.

To further maximize the enhanced recovery, injection and extraction rates are coordinated to create cones of impression, and cones of depression. Cones of impression allow the treatment chemistry to influence the smear zone, enabling desorption and subsequent recovery of contaminant held in the smear zone. Cones of depression are caused by groundwater being extracted from wells adjacent to the injection areas. The depression causes treatment chemistry to be drawn at a higher rate toward the extraction well. This allows for the chemistry to contact the largest area possible enabling more efficient product recovery.

### Sodium Persulfate

Sodium persulfate is a stable, highly soluble, crystalline material, which upon activation generates the sulfate radical, a very strong oxidant, capable of oxidizing a broad range of recalcitrant compounds. Laboratory studies in water have shown favorable destruction of VOC compounds using catalyzed persulfate.

In addition to its oxidizing strength, persulfate and sulfate radical oxidation has several advantages over other oxidant systems. It is kinetically slower than other oxidizing chemistries, and therefore able to transport greater distances in the sub-surface while still active. Persulfate also has less affinity for natural soil organics and is thus more efficient in high organic soils. These attributes combine to make persulfate a viable option for the chemical oxidation of a broad range of contaminants.

The byproduct of persulfate reaction with the COC is sodium monosulfate that subsequently breaks down into sulfate ions.

### **Scope of Services**

The rationale for injection point selection is choosing locations with the highest amount of measurable NAPL, and wells that have screens fouled with thick NAPL. The injection is two-fold, to increase NAPL destruction/recovery, and as a form of well maintenance.

**Injection in the CFW-1, CFW-3, CFW-9, CFW-7 IP, CFW-10 IP, IP-3D, (1,500 gallons in each), and MW-52 and MW-45U (750 gallons in each)**

- Targeted treatment will utilize existing CFWs and drilled injection wells.
- The impacted footprint of the CFW area to be targeted during this injection event with chemical oxidation is approximately 6,000 ft<sup>2</sup>.
- Nine locations: 4 stacked injection wells each containing 2 injection screens (CFW-1, CFW-9, CFW-7 IP, and CFW-10 IP); 4 single screened injection well (CFW-3, IP-3D, MW-52, and MW-45U).
- Isolate each injection screen with packer system and inject an average of 1,500 gallons of 15% sodium persulfate catalyzed with sodium hydroxide treatment chemistry into each of 6 injection wells. 750 gallons of treatment chemistry will be injected into each of the remaining two injection wells (MW-45U and MW-52).
- Implementation in the field will take approximately 4 day depending on unforeseen site and matrix conditions.
- Several adjacent wells will be used for extraction during injection. The wells anticipated to be used for extraction are IP-2D, IP-4D, CFW-3 IP, CFW-9 IP, CFW-10, and MW-51. The proposed extraction well network may be modified based on field observations.

If issues are encountered that preclude injection into any of the identified injection wells, alternative injection wells IP-2D, IP-5, IP-6, and/or CFW-8 IP will be utilized.

**Monitoring:**

***Effective Radius of Influence - ORP***

Oxidation Reduction Potential (ORP) increases as oxidant concentration in the groundwater increases, therefore an increase in ORP in a monitoring point would indicate the monitoring point is within the effective radius of influence. ORP readings in select monitoring points will be recorded once before injection, every 3 hours during injection, and twice per week following the injection. The Field Parameter Monitoring Form is attached. A Graph of the ORP fluctuation before, during and after the injection will be prepared.

Based on previous injection events at the Site a 20-foot effective radius of influence is anticipated.

***DNAPL Thickness Increase or Reduction***

NAPL thickness in the injection areas will be measured before and after injection. The NAPL thickness may increase after injection, indicating increased mobilization due to emulsification; or may decrease due to significant NAPL removal during injection/extraction.

***Changes in Benzene and Naphthalene Concentrations***

Semi-Annual groundwater sampling will be conducted in April/May 2024 (pre-injection – Baseline). Semi-Annual groundwater sampling is also scheduled to be conducted in late October 2024 (post-injection) for VOCs. A Graph of benzene and naphthalene concentrations will be prepared.

**Schedule**

The Oxidation Injection Event is tentatively scheduled to begin May 20, 2024.



**Figure 1**  
**2024 Proposed**  
**Injection**  
**Locations**

**Ashland Wisconsin**

**Legend**

- Installed Injection Wells - 2022
- Installed Injection Wells - 2021
- ⊕ Groundwater Recovery Well
- ⊕ Monitoring Well
- 2021 Injection Area
- 2022 Injection Area
- 2024 Proposed Injection Wells

**Drawn By:**  
 JNR

**Checked By:**  
 EF

**Document Name:**  
 Figure\_2\_2022\_Injection\_Locations\_CFW\_v3

**Date Saved:**  
 3/2/2023 2:58:25 PM

**Coordinate System:**  
 NAD 1983 StatePlane Wisconsin North FIPS 4801 Feet  
 Projection: Lambert Conformal Conic  
 Datum: North American 1983

**Imagery:**  
 WROC 2015 Mosaic from WI DNR  
[https://dnrmaps.wi.gov/arcgis\\_image/rest/services/DW\\_Image/EN\\_Image\\_Basemap\\_Leaf\\_Off/ImageServer](https://dnrmaps.wi.gov/arcgis_image/rest/services/DW_Image/EN_Image_Basemap_Leaf_Off/ImageServer)

**O&M, Inc.**  
**Environmental Solutions**



**From:** [Hansen, Scott](#)  
**To:** [Ealy, Eric J](#)  
**Cc:** [Sager, John E - DNR](#)  
**Subject:** FW: Determination regarding Ashland NSP Lakefront Injection Request  
**Date:** Wednesday, April 28, 2021 11:36:13 AM  
**Attachments:** [ORIN - Ashland Injection Work Plan.docx](#)  
[UIC Request 1020.docx](#)  
[20191108\\_99\\_DNR\\_Injection\\_Determination.pdf](#)  
[20191105\\_99\\_Injection\\_Reg.pdf](#)

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Eric,

John emailed me about this so I am forwarding to you.

Scott

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**From:** Sager, John E - DNR <John.Sager@wisconsin.gov>  
**Sent:** Thursday, October 29, 2020 12:26 PM  
**To:** Hansen, Scott <hansen.scott@epa.gov>  
**Subject:** Determination regarding Ashland NSP Lakefront Injection Request

Scott,

The Wisconsin Department of Natural Resources (Department) issued a determination of a temporary exemption of Wis. Admin. Code ch. NR140 for the injection of a remedial material into groundwater at the Ashland/NSP Lakefront site on November 8, 2019 (attached). This temporary exemption was set to expire on November 8, 2024. The Department received a submittal from O & M, Inc. on October 23, 2020 documenting planned changes to the injection project (attached). The submittal also contained a new injection request. Changes to the November 8, 2019 determination include using a new injection contractor, Orin Technologies, LLC as well as changes to the substances and quantities of compounds being injected. Therefore, based on the changes proposed by O & M, Inc. the Department has modified the determination. This determination replaces the determination issued by the Department on November 8, 2019. The Department has evaluated the request for equivalency with WPDES General Permit for Contaminated Groundwater from Remedial Action Operations. This email documents the substantive requirements or exemption from requirements for the proposed injection project.

O&M, Inc. and Orin Technologies, LLC proposes the injection of approximately 400 gallons of 15% sodium persulfate catalyzed with sodium hydroxide into each of 6 drilled injection locations and approximately 300 gallons of 15% sodium persulfate catalyzed with PermeOx Ultra and sodium hydroxide of into each of 5 direct push injection locations in the area of extraction well CFW-1 once a year over the next five years. The depth of the injection is approximately 19-39 feet below grade surface. Also, the injection of approximately 175 gallons of Orin Technologies Bioavailable Absorbent Material containing >80% fixed carbon at a depth of 40-50 feet below grade in 11 direct push injection locations in the area of MW-8. The purpose of the injection is a pilot scale study determine if these treatments will assist in remediation of remaining contamination at the site.

**Determination on the Wis. Admin. Code ch. NR 812 Injection Prohibition:**

The injection prohibition under Wis. Adm. Code s. NR 812.05, is not applicable in this case because the proposed action is a Department-approved activity necessary for the



remediation of groundwater. This email serves as the Department's approval to inject the compounds at the locations, volumes, and concentrations stated above, in accordance with this temporary exemption. The injection area, volume and chemistry may be modified during subsequent injections with Department approval.

**Wis. Admin. Code ch. NR 140 Temporary Exemption:**

The need to obtain a temporary exemption for the injection of a remedial material for which a groundwater quality standard has not been established is required under Wis. Adm. Code s. NR 140.28 (1) (d). Based on the information provided by O&M, Inc. and Orin Technologies, LLC, it appears the requirements for a temporary exemption for the injection of a remedial material for which a groundwater quality standard has not been established under s. NR 140.28 (1) (d) have been or will be met, in accordance with Wis. Adm. Code s. NR 140.28 (5) (c) and (d). Therefore, the Department approves the injection to groundwater on the Ashland/NSP Lakefront site, with certain terms and conditions specified below. The expiration date of this temporary exemption shall be five (5) years from the date of this email.

Terms and conditions:

A. General:

1. 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 groundwater.
2. Any infiltration or injection of contaminated water or remedial material into groundwater shall not significantly increase the threat to public health or welfare, or to the environment.
3. There shall be no expansion of contamination, or migration of any infiltrated or injected contaminated water or remedial material, beyond the edge 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 groundwater, and the requirements of s. NR 140.18 (1), Wis. Adm. Code will be met.
4. All necessary federal, state and local licenses, permit equivalencies and other approvals are obtained and compliance with all applicable environmental protection requirements is required. A WPDES general permit for Discharge of Contaminated Groundwater from Remedial Action Operations equivalency is required for this action.

B. Specific:

5. The remedial materials to be injected to the groundwater shall be limited to Cool-Ox ©.
6. The remedial material and injection project shall be as described in the injection request submitted by O&M, Inc. on October 23, 2020 which included the Proposal for Pilot Scale Remedial Injection at the Ashland/NSP Lakefront Site Located in Ashland, WI dated October 23,2020.
7. O&M,Inc. shall notify the Department of field activities no less than one (1) week before implementation unless the Department approves a shorter notification.

8. Status reports shall be submitted not more than 5 (five) months following each injection. The status reports shall include all data collected during implementation of the monitoring plan.
9. Any significant changes based on information from the injection groundwater monitoring reports or results shall be submitted to the Department for approval prior to the changes being implemented at the Ashland/Northern States Lakefront Superfund site. This includes, but is not limited to, adjustments to the volume/mass of the media injected, additional injection points, number of injection events, and/or changes in the type of remediation media used in the injection points.
10. Modifications to the sampling schedule may be requested.
11. In the event of future injection activities, the responsible party may apply for an extension of this approval. A request for an extension of this approval must be received by the Department before the expiration date.
12. Any extension approvals will be dependent on Department review of site-specific data or any other information it deems necessary.
13. Upon completion of the project, the injection holes must be abandoned in accordance with s. NR 141.25, Wis. Adm. Code, and later topped off with grout or native soils if settling occurs, unless converted to Wis. Admin. Code ch. NR 141 complying monitoring wells, or an alternative approved by the DNR Project Manager.

-  
Monitoring Conditions:

Monitoring will be conducted according to the Monitoring Plan contained in November 6, 2019 O&M Inc. Injection Request.

**WPDES Permit Equivalency**

The proposed discharge is eligible for coverage under the general Wisconsin Pollutant Discharge Elimination System (WPDES) permit WI-0046566-07 for Discharge of Contaminated Groundwater from Remedial Action Operations. The permit and factsheet can be downloaded from the DNR website at <http://dnr.wi.gov/topic/wastewater/GeneralPermits.html>. Discharges under this permit are required to be consistent with a discharge management plan that has been approved by the Department. The November 6, 2019 O&M, Inc. Injection Request will be considered the discharge management plan outlined in section 3.3 of the permit. Extracted water will be treated through the Long-term Wastewater Treatment Facility (LTWTF) located onsite. Any significant system changes will require Department approval.

The Department hereby authorizes Xcel Energy's pollutant discharge occurring as a result of the activities contained in the injection request submitted by O&M, Inc. on October 23, 2020 which included the Proposal for Pilot Scale Remedial Injection at the Ashland/NSP Lakefront Site Located in Ashland, WI dated October 23, 2020 under the requirements of general WPDES permit for Discharge of Contaminated Groundwater from Remedial Action Operations, (WI-0046566-7). The following conditions are highlighted for your information:

Reporting Conditions:

A copy of all monitoring results provided to the RR Program shall also be submitted to the Wastewater Program via mail to WI DNR, Attn: Leila Jenkins, 810 W. Maple St, Spooner, WI 54801 or via email to [Leila.Jenkins@wisconsin.gov](mailto:Leila.Jenkins@wisconsin.gov).

Please contact me if you have any questions regarding this email.

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John Sager

Hydrogeologist – Remediation and Redevelopment Program

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