Chiccine, Catherine

From: Knowles, Susan B <SKnowles@ameren.com>
Sent: Monday, November 7, 2022 4:50 AM
To: Chiccine, Catherine
Subject: Fwd: Work Plan for PZ-11 and area around CW-6 - Huster Substation OU4
Attachments: PZ-11 Work Plan - 2022.pdf

Cathie

Attached is a work plan we submitted to EPA this weekend. We are also responding to the City's recent correspondence this morning -- I'll send you a copy of that communication when issued.

SBK

From: Miller, Barbara J <BMiller2@ameren.com>
Sent: Sunday, November 6, 2022 8:00 PM
To: Knowles, Susan B <SKnowles@ameren.com>
Subject: Fwd: Work Plan for PZ-11 and area around CW-6 - Huster Substation OU4

FYI

Barbara

From: Miller, Barbara J <BMiller2@ameren.com>
Sent: Sunday, November 6, 2022 4:17 PM
To: Howell, Tonya <Howell.Tonya@epa.gov>; feyi.ilesanmi@dnr.mo.gov <feyi.ilesanmi@dnr.mo.gov>; Brown, Randolph <Brown.Randolph@epa.gov>; Sperry, Clint <Sperry.Clint@epa.gov>
Subject: Work Plan for PZ-11 and area around CW-6 - Huster Substation OU4

Dear Tonya Howell and Huster OU4 team:

Attached for your review and approval is Ameren's draft Pilot Test Work Plan that we have been discussing with you in connection with Remedial Action at or near PZ-11. The purpose of the work described in the Plan is to maintain levels of protection for the Elm Point Well Field and to allow the continued use of all operable municipal water supply wells by decreasing or eliminating concentrations of the DCE and Vinyl Chloride recently detected at PZ-11 from an unknown source. In light of data trends and patterns, it seems unlikely that the Ameren Substation is the source of those recent detections, but we nevertheless are happy to put such determinations on the back burner while providing our expertise and resources to address the concern as soon as possible.

This work already has been proven remarkably effective within OU4 for the purpose of eliminating any potential threats to the municipal water supply. As you will recall, this same Pilot Test procedure was used successfully in connection with Municipal Well 5 a few years ago, when it quickly controlled groundwater conditions at that location and prevented any

further groundwater quality issues at Municipal Well 5. In fact, US EPA's prior approval of this process in that context was one of the key factors that facilitated Ameren's ability to eliminate the groundwater plume associated with the Huster Road substation much more quickly and effectively than other approaches that were being considered at the time.

Of course, this work will complement and coordinate with US EPA's upcoming efforts to investigate the source of the chemical detections in and near PZ-11, as we view that investigation to be a critical path forward for determining next steps and addressing public questions. Regardless of the source, however, this approach is a proven and effective way to neutralize the chemicals as soon as possible, and Ameren sees no reason to wait to achieve that result. Assuming that this approach once again meets with your approval, we look forward to implementing the work as soon as the weeks of November 14 and/or 21 in order to address emerging public questions about aquifer conditions as soon as possible.

Sincerely,

Barbara J Miller

Environmental Specialist
Ameren Missouri Environmental Services
Working remotely
Cell: 314-223-4655

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Pilot Test Work Plan for Remedial Action at PZ-11 Area

Findett Corporation/Hayford Bridge Road OU4

Huster Road Substation

St. Charles, MO 63301

November 2022

Prepared for

Ameren Missouri

1901 Chouteau Avenue

St. Louis, MO 63103

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Pilot Test Work Plan for
Remedial Action at PZ-11 Area

Findett Corporation/Hayford Bridge Road OU4
Huster Road Substation
St. Charles, MO 63301

November 4, 2022

Prepared for

Ameren Missouri
1901 Chouteau Avenue
St. Louis, MO 63103

Prepared by

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Comm. No. 088UE2.18

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1. INTRODUCTION

Loureiro Engineering Associates (LEA) has prepared this Pilot Test Work Plan for remedial action in PZ-11 rea (work plan) on behalf of Ameren Missouri (Ameren). The work plan presents a summary of the proposed remedial approach to treat groundwater contaminants of concern (COCs) 1,2-cis-dichloroethene (cis-1,2-DCE) and vinyl chloride north of Highway 370 and in the vicinity of the City of St. Charles Elm Point well (City well) W-6 located on Huster Road in St. Charles, Missouri (Site) (**Figure 1**).

2. SITE CONCEPTUAL MODEL

The geology of the site consists of a silty clay/silt material 25 to 30 feet in thickness. Underlying the cohesive unit is a medium grained sand material that extends from approximately 30 feet below ground surface (ft bgs) to the top of bedrock observed at approximately 110 ft bgs. The depth to groundwater at the site varies, dependent on the Mississippi River located approximately 2 miles north, but is typically encountered at approximately 20 feet bgs.

2.1 Site Background

Previous bench scale treatability studies performed by XDD Environmental (XDD) were used to determine the treatment effectiveness of several in situ chemical oxidation (ISCO) technologies. Refer to the *Plume Containment Pilot Study Work Plan (September 2014)* and the *Plume Containment Pilot Test Work Plan Addendum (December 2014)* for a detailed summary of the various technologies that were evaluated to treat site soils and groundwater.

Results of the treatability studies indicated alkaline activated sodium persulfate (AAP) was an effective technology to address the COCs in site soils and groundwater. ISCO pilot tests were performed in 2014 (Phase 1) and 2015 (Phase II), targeting groundwater impacts in the vicinity of City Well W-5 and south of Highway 370. The impacted interval was approximately 15 feet and based on vertical impacts in groundwater, measured from approximately 30 ft bgs to 45 ft bgs.

A total of approximately 124,000 gallons of AAP solution was injected between the two phases of pilot test activities. The results of the pilot test activities in 2014/15 showed significant reductions in COCs in groundwater in all wells within the treatment area. By March 2018, COCs in all wells within the Phase I/II pilot test treatment area were below Maximum Contaminant Levels (MCLs) for Drinking Water.

In March 2019, low concentrations of cis-1,2-DCE and vinyl chloride were detected for the first time in PZ-11. PZ-11 is a groundwater quality monitoring point located north of Highway 370.

Data from PZ-11 shows a spike in cis-1,2-DCE and vinyl chloride concentrations first occurring December 2021. COC concentrations fluctuated between December 2021 and June 2022, until another increase in concentrations occurred in September 2022 that has been relatively steady state since. Based on the success of previous ISCO applications at the site, and given the proximity to City Well W-6, additional pilot test injection activities using AAP were deemed appropriate to reduce COCs in and around the area of PZ-11. Due to limited access by third parties, the only points of injection currently available are PZ-11 and PZ3-.

3. PILOT TEST OBJECTIVES

Based on discussions with Ameren, the primary objective of the pilot test is to treat COC impacts in PZ-11 and in the vicinity of City Well W-6 North of Highway 370 (**Figure 1**). The results of the pilot test, along with future groundwater data, will be used to determine if additional subsurface investigation is needed to further delineate the extents of COC impact.

4. REMEDIAL DESIGN OVERVIEW

Due to limited access in the treatment area, only existing wells may be used to treat COC impacts. The pilot test design will include implementation of AAP using existing piezometers PZ-3 and PZ-11 (**Figure 1**). For security and safety reasons, sodium persulfate (persulfate) and sodium hydroxide (NaOH) will be delivered to and stored within Ameren's Huster Road Substation (substation) that is located south of Highway 370. A mixture of persulfate, NaOH, and potable water will be batched to create a concentrated AAP solution. The AAP solution will be batched in 1,100 gal poly tanks and transferred to 250-gallon intermediate bulk containers (IBC) to be used in the pilot test treatment area by a licensed hauler where it will be blended with extracted aquifer water for injection.

4.1 Proposed ISCO Pilot Test

The proposed AAP ISCO pilot test application is described in detail below.

- ISCO will be used to target groundwater in PZ-11 and in the vicinity of City Well W-6. The target interval is approximately 35 to 45 ft below ground surface (bgs) and may vary depending on the thickness of the overlying silty clay layer.
- Approximately 33,060 pounds (lb) of sodium persulfate will be applied during pilot test injection activities. The anticipated reagent injection volume of up to approximately 40,000 gallons, or the equivalent to approximately four pore volumes, will be injected into PZ-11 at a concentration of approximately 95 grams per liter (g/L).
- The anticipated radius of influence per pore volume is approximately 10 ft. If evenly distributed, four pore volumes will cover approximately 1,250 ft^2.

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- Sodium persulfate will be received as a solid powder in 2,204-lb super sacks and batched on-site into approximately 1,000 gallons of water for a 264 g/L concentration solution which will be diluted during injection.
- Water used for batch dilution during injection will be initially extracted from PZ-3 to draw injected fluids from PZ-11 westwardly. Once it is determined that AAP is present at the PZ-3, remaining waters needed for batching will be extracted from PZ-2. This approach has two benefits in that it utilizes water from the same area of the injection for batching and that it provides the for the widest area of injection with the limited access available.
- Using the 2:1 molar ratio of sodium hydroxide to sodium persulfate for alkaline activation, approximately 11,108 lbs of sodium hydroxide will be injected with the persulfate. The sodium hydroxide will be purchased as a 25% solution (approximately 4,168 gallons required).

4.2 ISCO Application – Process Monitoring

Periodic monitoring for persulfate or elevated pH, which indicate distribution of the oxidant will be conducted at PZ-3 during the ISCO pilot test application. If persulfate is detected at PZ-3, extraction will stop, and dilution water will be extracted from PZ-2. Chemetrics test kits will be used to test the persulfate concentration and pH paper will be used for a general reading on alkalinity.

4.3 Post-ISCO Application – Performance Monitoring

Groundwater monitoring post-application is required to evaluate the overall treatment effectiveness and determine if rebound is occurring. The post-application monitoring plan will be conducted monthly for a minimum of 5 months, starting 1 month after the ISCO application is complete. The monitoring duration may change based on the results of the ISCO application monitoring and/or the Phase 2 injection.

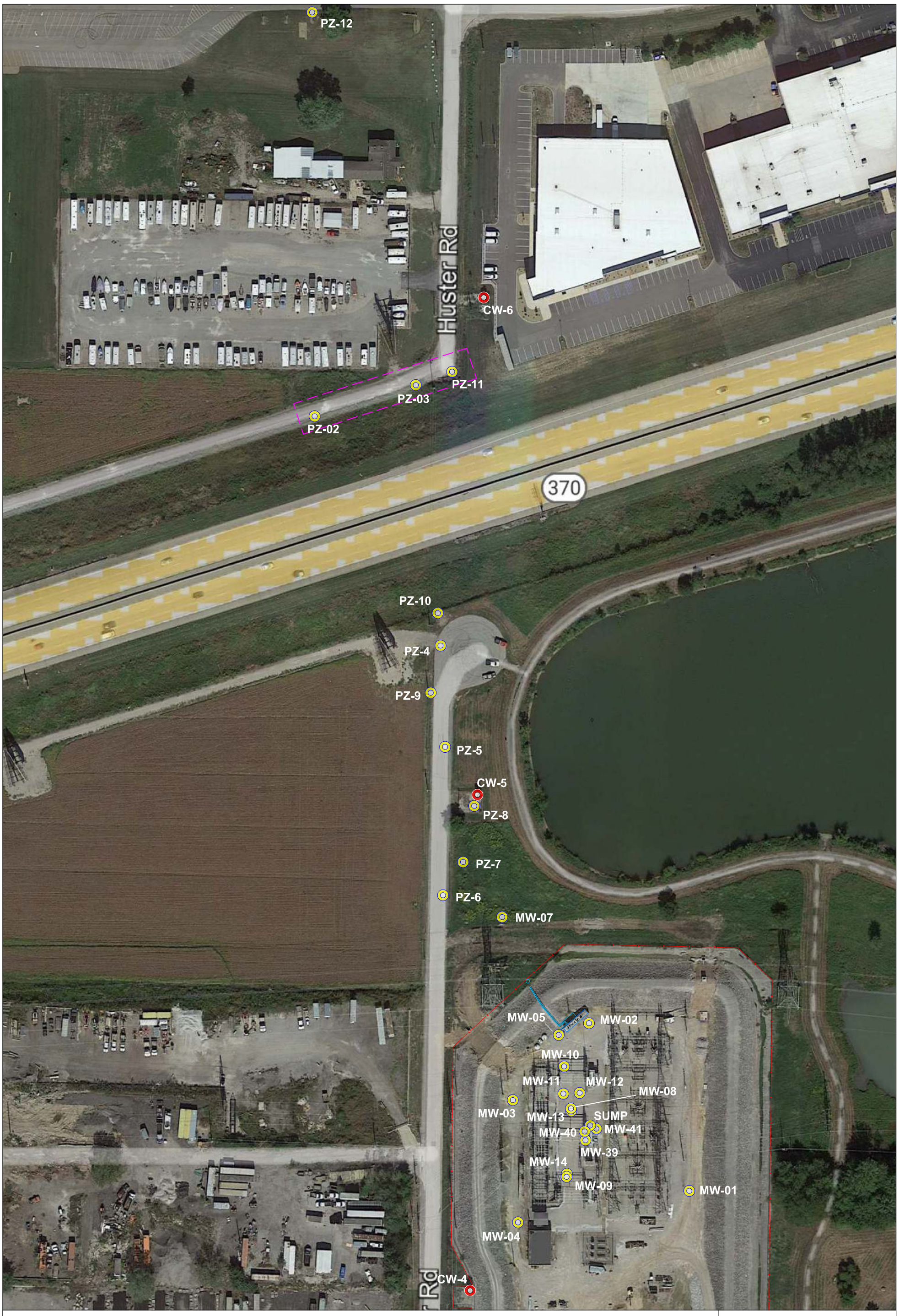
5. PILOT TEST SCHEDULE

The schedule and estimated task duration is presented below. LEA can be prepared to start the mobilization portion of the ISCO pilot test the week of November 14, 2022.

Task	**Date (duration)**
AAP ISCO Pilot Test Application	
Site Mobilization (2-3 days)	November 14, 2022
Chemical Delivery	November 16 and 17, 2022

ISCO Application	November 29 through December 12, 2022
Site Demobilization	December 14 through 17, 2022
Post-ISCO Application Performance Monitoring	January through May 2023 (minimum 5 months)

FIGURES



LEGEND

MW-04	MONITORING WELL
CW-6	CITY WELL
	PILOT TEST TREATMENT AREA

NOTES:

1. If AAP solution is detected in PZ-3 extraction water, PZ-2 will be used for dilution of the concentrated AAP solution.

0 125
SCALE (FEET)

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SCALE: 1" = 125'	TITLE: SITE PLAN ISCO PILOT TEST AREA (PZ-11) HUSTER RD. ST. CHARLES, MO
DATE: NOVEMBER 2022	
PROJECT NO.: 088UE2.08	
CLIENT: AMEREN	
DRAWN BY: PC	DRAWING NO. FIGURE 1
CHECKED BY: DI	REV.
APPROVED BY: DI	