

IN-SITU CHEMICAL OXIDATION REMEDICATION PROGRAM INTERIM REPORT – PHASE 2B

SITE:

**CHAMPAIGN FORMER MGP SITE
CHAMPAIGN, ILLINOIS**

JULY 24, 2013

PREPARED FOR:

**PSC INDUSTRIAL OUTSOURCING, LP
210 WEST SAND BANK ROAD
COLUMBIA, ILLINOIS 62236**

PROJECT No. 901144

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1.0 INTRODUCTION

In-Situ Oxidative Technologies, Inc. (ISOTEC) was retained by PSC Industrial Outsourcing, LP (PSC) to conduct an in-situ chemical oxidation (ISCO) remediation program at the former Manufactured Gas Plant (MGP) located at 308 N. 5th Street, in Champaign, Illinois (**Figure 1**). In this report the former Champaign MGP site is also identified as the “site”.

The purpose of the ISCO remediation program is to address the perimeter of the site where concentrations of organic constituents of concern (COCs) exceed Tier 1 Remedial Objectives (ROs) for the soil inhalation exposure pathway in the upper 10 feet of soil. The remediation technology chosen for the site was ISOTEC’s proprietary modified Fenton’s reagent (MFR) technology.

The field activities conducted by ISOTEC to date have occurred during two injection events (Phase 2A and Phase 2B) between April 29 and June 26, 2013. Field operations completed by ISOTEC during the Phase 2A injection event were detailed in the *In-Situ Chemical Oxidation Remediation Program Interim Report- Phase 2A*, dated June 18, 2013.

This *In-Situ Chemical Oxidation Remediation Program Interim Report- Phase 2B* describes the field activities completed by ISOTEC during the second injection event (Phase 2B) of the remediation program. The field activities were performed in accordance with the *In-Situ Chemical Oxidation Work Plan* that was prepared by PSC and submitted to the Illinois Environmental Protection Agency (IEPA) in March 2013.

1.1 SITE-SPECIFIC CHARACTERISTICS

The ISCO treatment area occupies approximately 35,000 square feet of the 2.5 acre site and encompasses the western and northern portion of the site perimeter. The extent of the treatment area was determined from post-excavation soil confirmation sample analytical data.

According to data provided by PSC, the remediation site has vadose and saturated zone soils impacted by inorganics, metals, volatile aromatics and polycyclic aromatic hydrocarbons (PAHs). The primary COCs at the site are benzene, toluene, ethylbenzene, and xylenes (BTEX) and naphthalene.

The treatment interval for the ISCO remediation program is from 3 to 10 feet. Two additional treatment intervals, 20 to 25 feet bgs and 36 to 44 feet bgs, were identified by PSC at three limited areas within the designated ISCO remediation treatment area. The first area is located along the northern perimeter and has exceedances in soils from 3 to 10 feet bgs and 20 to 25 feet bgs. The second area is located in the middle portion of the site and has soil exceedances present from 20 to 25 feet bgs. The third area is located along the southern perimeter of the site and has soil exceedances from 3 to 10 feet bgs

and potential groundwater exceedances present at approximately 36 to 44 feet bgs. The ISCO treatment areas are illustrated on **Figure 1**.

Review of lithologic logs for soil borings advanced across the site indicate that the subsurface soils consist of fill material from grade surface to depths of 3 to 4 feet bgs. This surficial fill unit along the perimeter of the site is underlain by a clay and silty-clay unit to a depth of approximately 16 to 20 feet bgs. Below this unit is a weathered till unit present from 16 feet bgs to a maximum depth explored of 33 feet bgs. This weathered till unit is comprised of silty-clay and sandy-clay with some gravel and fine-grained sand. According to PSC, depth to groundwater ranges from 2 to 10 feet bgs.

1.2 ISCO REMEDIATION PROGRAM OBJECTIVES

The objective of the ISCO remediation program is to reduce benzene, ethylbenzene, toluene, xylenes and naphthalene concentrations in the upper 10 feet of soil to their respective Tier 1 ROs for the soil inhalation exposure pathway.

The Tier 1 ROs for the soil inhalation pathway are:

- Benzene - 0.8 mg/kg
- Ethylbenzene - 400 mg/kg
- Toluene - 650 mg/kg
- Xylenes - 320 mg/kg
- Naphthalene - 170 mg/kg

Based on post-excavation soil confirmation data and past experience, it was determined that multiple injection events would be required to reach the remediation program objective.

1.3 ISCO REMEDIATION PROGRAM DESIGN

ISOTEC proposed to utilize neutral pH chelated iron catalyst and stabilized 8% hydrogen peroxide to implement an MFR ISCO program. ISOTEC was to utilize direct-push technology (DPT) to introduce reagents into the subsurface at the site. The ISCO program was designed to address vadose zone and saturated zone soils within the treatment areas specified by PSC (**Figure 1**).

The design was based upon data supplied by PSC and had several potentially limiting factors to implementation success. Limiting factors at the site included the presence of previous investigative penetrations and the fact that the majority of the target treatment interval is shallow vadose zone soils (3 to 10 feet bgs). These factors, in unison, presented potential problems for the injection of modified Fenton's reagent. The presence of previous penetrations in the treatment area may provide vertical conduits through which produced gas can travel to the surface. Surfacing was a significant issue during the Phase 1 2009 ISCO pilot test and would most certainly occur during Phase 2. Chemical oxidation remediation is a dissolved phase/saturated zone technology. Since the majority of the Phase 2 target treatment interval is shallow vadose zone soils,

ISOTEC would have to attempt to saturate the vadose zone soils with reagent in order to achieve the project objectives, which would most likely result in varying amounts of surfacing. In order to achieve project success, the site's limiting factors were taken into account when the injection program was designed.

Based on review of site data provided by PSC, ISOTEC anticipated that two full-scale injection applications and one reduced application would be required. ISOTEC assumed that the full-scale ISCO remediation program would be designated Phase 2 and that each injection event would be given the following alphabetical designations:

- Phase 2A – First Injection Event (Entire Treatment Area)
- Phase 2B – Second Injection Event (Entire Treatment Area)
- Phase 2C – Third Injection Event (50% of the Treatment Area)

During Phase 2A, also referred to as “first event”, temporary injection screens were to be installed at approximately 120 injection locations within the on-site perimeter treatment areas. Two separate direct-push rods were to be installed at each location; one screen deployed from approximately 3 to 6 feet bgs to target the upper shallow vadose zone soils and the second screen deployed from approximately 6 to 10 feet bgs to target the lower shallow vadose/saturated zone soils.

The injection locations within the on-site perimeter ISCO treatment areas would be spaced approximately 15 feet apart based on an anticipated 7.5-foot radius of influence (ROI). The actual spacing for the locations may vary due to underground utilities, above-ground impediments and other associated field conditions. The injection locations were to be placed on a triangular grid-like pattern across the treatment area. The subsequent injection event locations (Phase 2B and Phase 2C) would be shifted laterally from the First event locations.

The effectiveness of the remediation program was to be determined by comparing the concentrations of soil samples collected prior to injection activities with the concentrations of soil samples collected during post-injection sampling events. The post-injection soil samples were to be collected from the 3 to 6 feet bgs interval and the 6 to 10 feet bgs interval at multiple selected locations within the treatment area(s). The post injection performance soil samples would be collected at locations immediately adjacent to the baseline boring locations and from the same associated depth intervals. This would allow for the most direct comparison possible of concentration reductions as a result of the injection application. In the event that a specific post-injection soil sample reports all of the target COC concentrations at or below the Tier 1 ROs for the soil inhalation exposure pathway, that specific boring location and/or depth interval would no longer be sampled and injections in the immediate vicinity of the boring(s) and/or depth interval(s) would be eliminated from the subsequent injection applications. These soil sampling and evaluation procedures would be repeated following each of the injection applications.

2.0 ISCO REMEDIATION PROGRAM

To date, ISOTEC has conducted two injection events at the site from April 29 to June 26, 2013. Specifically, Phase 2A was conducted from April 29 to May 15, 2013 and Phase 2B was conducted from June 19 through 26, 2013.

Field operations completed by ISOTEC during the Phase 2B injection event included equipment mobilization and demobilization, temporary injection screen installations and abandonments, reagent preparation, and reagent injections. ISOTEC injected reagents into target treatment intervals within the ISCO treatment areas at 72 injection locations through 128 injection screens. The Phase 2B injection locations are shown on **Figure 2**.

It is important to note that a total of 94 injection locations (2I-1 through 2I-94) are identified on the Phase 2B Injection Location Map (**Figure 2**). As detailed in the *In-Situ Chemical Oxidation Remediation Program Interim Report- Phase 2A*, dated June 18, 2013, multiple injection locations were eliminated due to their proximity to confirmation soil sample locations that reported benzene and/or naphthalene concentrations in soil below Tier 1 RO's. The Phase 2B injection locations that were eliminated are illustrated on **Figure 2** and include: 2I-1, 2I-2, 2I-14, 2I-15, 2I-38, 2I-42, 2I-43, 2I-46, 2I-47, 2I-48, 2I-51, 2I-52, 2I-53, 2I-56, 2I-57, 2I-58 and 2I-92. Additionally, injection locations 2I-12, 2I-24, 2I-26 and 2I-27 were not injected into due to the occurrence of surfacing in the immediate vicinity of confirmation soil boring location CS-06.

ISOTEC utilized either one or two injection screens to deliver reagents across the target treatment interval(s) at each of the 72 injection locations during the second event. For identification purposes, each injection screen was labeled with an injection event identifier ("2I" for the Phase 2B injection event), followed by an injection location number, and ending in an injection interval identifier ("A", "B", "C" or "D"). The "A" designation indicates a 3 to 6 feet bgs screen, the "B" designation indicates a 6 to 10 feet bgs screen, the "C" designation indicates a 20 to 25 feet bgs screen, and the "D" designation indicates a 36 to 44 feet bgs screen.

2.1 FIELD METHODS

ISOTEC injection screens were installed with a DPT drill rig operated by Bulldog Drilling at specific locations across the treatment area. At each location, ISOTEC injection screens were used to deliver reagents to the target treatment interval(s). In general, Bulldog Drilling advanced a direct-push rod with an expendable point to a predetermined depth at each injection location. A specially designed injection screen was then placed in each rod. The direct-push rods were retracted to expose the preferred length of injection screen. ISOTEC reagents were injected through each rod and injection screen into the subsurface. The following sections detail the injection screen installation and abandonment (**Section 2.1.1**), reagent preparation procedures (**Section 2.1.2**), and injection method during the injection event (**Section 2.1.3**).

2.1.1 Injection Screen Installation and Abandonment

Temporary injection screens installed with direct-push technology (DPT) were used to deliver ISOTEC's modified Fenton's reagents into the target treatment depth intervals. The equipment and tooling provided by Bulldog Drilling included a track-mounted AMS drill rig, 1.25-inch and 1.5-inch diameter direct-push drill rods, extension rods used to deploy and retrieve the injection screens, and decontamination equipment. Tooling provided by ISOTEC included specialized 0.5-inch diameter injection screens designed to pass through the center of the drill rods, specialized point holders designed to hold the injection screens in place within the target injection interval, and 1-inch expendable drive points.

Bulldog Drilling (Bulldog) began each screen installation by advancing drill rods to a desired depth at each injection location. Once the proper depth was reached, an injection screen was lowered through the center of the rods to the bottom of the rod string and then held in place with extension rods. The rod string was then slowly retracted until the entire length of injection screen was exposed across the specific target treatment interval. ISOTEC reagents were then injected through the newly installed temporary injection screen and into the subsurface. A direct-push injection screen schematic illustrating the A- and B-screen installation is included as **Figure 3**.

Following daily injection activities, ISOTEC oversaw the proper abandonment of each injection location by Bulldog. After removing the rod string, each borehole was abandoned by slowing hand pouring 3/8-inch bentonite chips from the bottom of the borehole to approximately 6-inches bgs. The bentonite was hydrated and the borehole was then completed with a concrete patch.

2.1.2 Reagent Preparation

ISOTEC reagents consist of a neutral pH chelated ferrous iron solution (catalyst) and dilute stabilized hydrogen peroxide (oxidizer). During Phase 2B, ISOTEC utilized an oxidizer concentration of 8%. Hydrogen peroxide at a concentration of 30% was shipped directly to the site immediately prior to field injection activities and stored in DOT-approved 55-gallon drums. The 30% hydrogen peroxide was diluted to an 8% concentration in 300-gallon polyethylene bulk tanks with water obtained from a fire hydrant located in the southwest corner of the site. ISOTEC's proprietary catalyst is a pH buffered (pH of approximately 7) ferrous iron complex. The catalyst components were shipped to the site in dry form and mixed with water in 300-gallon polyethylene bulk tanks. A reagent mixing schematic is included as **Figure 4**.

2.1.3 Injection Method

The injections were accomplished using air-operated double-diaphragm pumps, flow meters, polyvinyl chloride (PVC) reinforced tubing, cam-lock valves & fittings, and steel wellhead assemblies. The wellhead assemblies, with pressure gauges and relief valves, were attached to the uppermost drill rod at each injection screen location. The wellhead assemblies were attached with PVC reinforced tubing to an air-operated diaphragm pump

and from the pump to either the oxidizer, catalyst or water tanks with additional PVC tubing. Oxidizer, catalyst and water were conveyed through the PVC tubing using a pneumatic diaphragm pump with air supplied by a portable air compressor.

In general, the injection process was similar for each injection screen. First, water was injected, followed by catalyst, a second water flush to clear the injection equipment of catalyst, then the oxidizer, and a final water flush to clear the injection equipment of oxidizer. An injection method schematic detailing the injection process is included as **Figure 5**.

Reagent volumes, flow rates, and injection pressures were monitored at regular intervals and recorded in a field log during the injection process at each injection screen. Reagent volumes and flow rates were measured with battery-operated turbine flow meters/totalizers. Injection pressures were measured with pressure gauges attached to the wellhead assemblies.

2.2 PHASE 2B INJECTION FIELD ACTIVITIES

During the Phase 2B injection event, ISOTEC attempted to inject catalyst and oxidizer into 128 injection screens installed at 72 locations (2I-2 through 2I-13, 2I-16 through 2I-23, 2I-25, 2I-29 through 2I-37, 2I-39 through 2I-41, 2I-44, 2I-45, 2I-49, 2I-50, 2I-54, 2I-55, 2I-59 through 2I-91, 2I-93 and 2I-94). At locations where multiple injection screens were required in order to target separate treatment intervals, the individual screens were installed in separate boreholes spaced approximately two feet apart. The majority of the Phase 2B injection locations utilized two injection screens; the A-screen deployed from 3 to 6 feet bgs and the B-screen deployed from 6 to 10 feet bgs. In addition to utilizing either an A-screen or a B-screen, five injection locations (2I-68, 2I-69, 2I-70, 2I-73, and 2I-74) utilized a second injection screen that was deployed from 20 to 25 feet bgs (C-screen). Injection locations 2I-84 through 2I-87 utilized only one injection screen deployed from 20 to 25 feet bgs (D-screen). Injection locations 2I-88 through 2I-91 utilized only one injection screen deployed from 36 to 44 feet bgs .

ISOTEC was able to inject 8,175 gallons of reagent (catalyst and oxidizer) into the 128 injection screens (61 A-screens, 53 B-screens, 6 C-screens and 4 D-screens) installed during the Phase 2B injection event. Surfacing of reagent occurred at approximately 55% of the A-screens, approximately 52% of the B-screens and 56% of the C-screens. Surfacing is described as the migration of gasses, groundwater or reagent to the ground surface through natural or man-made conduits in the subsurface. When surfacing occurred, the injection process at the screen observed to be surfacing was stopped and no further injection activities were attempted at that particular injection screen location. Surfacing did not occur while injecting into the D-screens.

The average volume of total reagent (oxidizer and catalyst) injected into the A-screens was approximately 47 gallons per screen. The average volume of total reagent injected into the B-screens was approximately 58 gallons per screen. The average volume of total

reagent injected into the C-screens was approximately 87 gallons per screen. The average volume of total reagent injected into the D-screens was 315 gallons per screen.

Reagent flow rates ranged from approximately 1.8 to 2.8 gallons per minute (gpm). Injection pressures ranged from approximately 0 to 30 pounds per square inch (psi) during injection activities. A summary of the volumes injected at each location during the first event is presented in **Table 1**.

3.0 SOIL ANALYTICAL RESULTS

As detailed in the *In-Situ Chemical Oxidation Remediation Program Interim Report-Phase 2A*, dated June 18, 2013, the Post-Phase 2A analytical data indicated benzene and naphthalene on soil across the 3 to 10 feet bgs interval at several areas of the treatment area met the Tier 1 ROs. Specifically, the soil samples collected from the 3 to 6 feet bgs and 6 to 10 feet bgs intervals at confirmation sample locations CSA-01, CSA-09, CSA-11, CSA-21 and CSA-22 did not report benzene and naphthalene concentrations above the Tier 1 ROs. The Post-Phase 2A analytical data also indicated that specific intervals at various confirmation soil boring locations met the Tier 1 ROs. Specifically, the 3 to 6 feet bgs interval at boring locations CSA-06, CSA-15 and CSA-23 did not report benzene and naphthalene concentrations above Tier 1 ROs. The 6 to 10 feet bgs interval at boring locations CSA-08, CSA-10, CSA-14 and CSA-17 also met the Tier 1 ROs. As a result, confirmation soil borings were not collected from the locations and/or specific intervals during the Post-Phase 2B confirmation sampling event.

A total of 29 samples were collected by PSC from 18 confirmation soil boring locations during the Post-Phase 2B sampling event. Post-Phase 2B confirmation soil samples were collected at sample locations CSB-02 through CSB-08, CSB-10, CSB-12 through CSB-20 and CSB-23 within the ISCO treatment areas (**Figure 1**). Samples were collected from specific depths within the 3 to 6 feet bgs interval and 6 to 10 feet bgs interval at boring locations CSB-02 through CSB-05, CSB-07, CSB-12, CSB-13, CSB-16 and CSB-18. Samples were collected from specific depths only within the 3 to 6 feet bgs interval at boring locations CSB-06, CSB-08, CSB-10 and CSB-17. Samples were collected from specific depths only within the 6 to 10 feet bgs interval at boring locations CSB-06 and CSB-23. Samples were collected from specific depths within the 3 to 6 feet bgs interval and 20 to 25 feet bgs interval at boring location CSB-14. Samples were collected from specific depths within the 6 to 10 feet bgs interval and 20 to 25 feet bgs interval at boring location CSB-15. Soil samples were collected from a specific depth interval within the 20 to 25 feet bgs interval at boring locations CSB-19 and CSB-20.

Soil confirmation samples were collected using a DPT drill rig operated by Bulldog Drilling. Samples were collected using macrocore samplers with acetate liners, and drilling implements were decontaminated between samples. An onsite geologist selected the sample depths within the target intervals based upon field observations and PID readings. The geologist wore a new pair of clean nitrile gloves to collect each sample to avoid cross contamination. The soil confirmation samples were placed into laboratory provided containers and labeled according to sample location, depth, date, time, and analytical method upon collection. The samples were placed into coolers with ice and delivered to Teklab, Inc. for analysis under proper chain of custody procedures.

The soil samples were analyzed for the four BTEX compounds using SW-846 Method 8260 and naphthalene using SW-846 Method 8270 SIM. The COCs at the site that exceed the Tier 1 Remediation Objectives are benzene and naphthalene. Therefore, the subsequent discussion is focused on these compounds. The soil analytical data is

presented in **Section 3.1**. Since baseline soil samples were not collected, the Post-Phase 2A soil analytical data will be used for comparison purposes with the Phase 2B sampling event analytical data.

The soil sample collection dates and analytical data for benzene are included in **Table 2**. The soil sample collection dates and analytical data for naphthalene are included in **Table 3**.

3.1 POST-PHASE 2B SAMPLING EVENT: JULY 1 AND 2, 2013

3.1.1 Benzene

3.1.1.1 3 to 6 feet bgs

The average Post-Phase 2B benzene soil concentration in the 3 to 6 feet bgs interval was approximately 11.3 milligrams per kilogram (mg/kg). Post-Phase 2B benzene concentrations above varying detection limits (due to dilution) ranged from 0.002 mg/kg at CSB-05 (4.5-5.5) to 44.3 mg/kg at CSB-03 (5.0-6.0).

Three of the 13 Post-Phase 2B confirmation soil locations sampled at this depth were below the Tier 1 ROs: CSB-05 (4.5-5.5), CSB-08 (4.5-5.5) and CSB-10 (5.0-6.0).

3.1.1.2 6 to 10 feet bgs

The average Post-Phase 2B soil benzene concentration in the 6 to 10 feet bgs interval was approximately 20.3 mg/kg. Reported Post-Phase 2B benzene concentrations above detection limits ranged from 0.156 mg/kg at CSB-16 (7.0-8.0) to 64.8 mg/kg at CSB-05 (9.0-10.0).

Four of the 12 confirmation soil locations sampled at this depth were below the Tier 1 ROs: CSB-15 (8.0-9.0), CSB-16 (7.0-8.0), CSB-18 (7.0-8.0) and CSB-23 (9.0-10.0).

3.1.1.3 20 to 25 feet bgs

The average Post-Phase 2B soil benzene concentration in the 20 to 25 feet bgs interval was approximately 3.7 mg/kg. Post-Phase 2B soil benzene concentrations in the four samples collected from the 20 to 25 feet bgs interval were reported at 2.99 mg/kg at CSB-14 (20.5-21.5), 0.804 mg/kg at CSB-15 (20.5-21.5), 6.72 mg/kg at CSB-19 (22.5-23.5) and 4.33 mg/kg at CSB-20 (9.0-10.0).

3.1.2 Naphthalene

3.1.2.1 3 to 6 feet bgs

The average naphthalene soil benzene concentration in the 3 to 6 feet bgs interval was approximately 155.1 mg/kg. Post-Phase 2B naphthalene soil concentrations above detection limits ranged from 1.67 mg/kg at CSB-10 (5.0-6.0) to 840 mg/kg at CSB-03 (5.0-6.0).

Nine of the 13 confirmation soil locations sampled at this depth were below the Tier 1 ROs: CSB-02 (5.0-6.0), CSB-04 (5.0-6.0), CSB-05 (4.5-5.5), CSB-07 (5.0-6.0), CSB-08 (4.5-5.5), CSB-10 (5.0-6.0), CSB-12 (4.0-5.0), CSB-16 (4.0-5.0) and CSB-17 (5.0-6.0).

3.1.2.2 6 to 10 feet bgs

The average Post-Phase 2B naphthalene soil concentration in the 6 to 10 feet bgs interval was approximately 310.7 mg/kg. Post-Phase 2B naphthalene soil concentrations ranged from 8.27 mg/kg at CSB-07 (7.5-8.5) to 1,260 mg/kg at CSB-04 (8.0-9.0).

Six of the 12 confirmation soil locations sampled at this depth were below the Tier 1 ROs CSB-06 (9.0-10.0), CSB-07 (7.5-8.5), CSB-13 (9.0-10.0), CSB-15 (8.0-9.0), CSB-16 (7.0-8.0) and CSB-18 (7.0-8.0).

3.1.2.3 20 to 25 feet bgs

The average Post-Phase 2B naphthalene soil concentration in the 20 to 25 feet bgs interval was approximately 25.3 mg/kg. Reported Post-Phase 2B naphthalene soil concentrations collected from the 20 to 25 feet bgs interval were reported at 41.4 mg/kg at CSB-14 (20.5-21.5), 9.14 mg/kg at CSB-15 (20.5-21.5), 49.48 mg/kg at CSB-19 (22.5-23.5) and 1.17 mg/kg at CSA-20 (22.0-23.0).

All four confirmation soil boring at this depth were below Tier 1 ROs.

4.0 CONCLUSIONS

The objective of the ISCO remediation program using ISOTEC's Fenton's-based oxidation process is to reduce COCs in soil to below Tier 1 ROs for the soil inhalation pathway in the upper 10 feet of soil.

To achieve this goal, ISOTEC estimated that three separate injection mobilizations would be required. To date, ISOTEC has completed two of the three injection events at the site.

As stated in **Section 1.3** above, the effectiveness, and therefore progress, of the remediation program was to be determined by comparing the concentrations of soil samples collected prior to injection activities with the concentrations of soil samples collected during post-injection sampling events. If a specific post-injection soil sample reports all of the target COC concentrations at or below the Tier 1 ROs for the soil inhalation exposure pathway, that specific boring location and/or depth interval would no longer be sampled and injections in the immediate vicinity of the boring(s) and/or depth interval(s) would be eliminated from the subsequent injection applications.

4.1 ISCO PARAMETERS AND EFFECTIVENESS

The effectiveness of the ISCO remediation program, and therefore the parameters (volumes, concentrations, rates, pressures and ROI) used, can be evaluated by changes in benzene and naphthalene in soil concentrations collected from the 18 Post-Phase 2B confirmation soil boring locations.

Review of the Post-Phase 2B analytical data indicates that the ISOTEC process continues to be effective at reducing benzene and naphthalene concentrations in soil to below the Tier 1 ROs. Specifically, the 3 to 6 feet bgs interval at boring locations CS-05, CS-08 and CSA-10 did not report benzene and naphthalene concentrations above 0.8 mg/kg and 170 mg/kg, respectively. The 6 to 10 feet bgs interval at boring locations CS-15, CS-16 and CS-18 also met the Tier 1 ROs. The 20 to 25 feet bgs interval at boring location CS-15 also reported benzene and naphthalene concentrations that meet the Tier 1 ROs.

4.2 RECOMMENDATIONS

Based on the results of the Phase 2B injection event, ISOTEC recommends continuing with the original injection design for the remediation program. ISOTEC recommends no changes to the ISCO parameters for the next injection event as they appear to be sufficient for contaminant mass reduction at the site.

Based on the IEPA approved *In-Situ Chemical Oxidation Work Plan* prepared by PSC, ISOTEC recommends the continued elimination of those injection locations that are adjacent to the confirmation soil boring locations that currently meet Tier 1 ROs. Specifically, in addition those locations and/or screened intervals eliminated as a result of the Phase 2A injection event, ISOTEC recommends:

- Eliminating the A-screens from the Phase 2C injection locations surrounding CS-05, CS-08 and CS-10; and

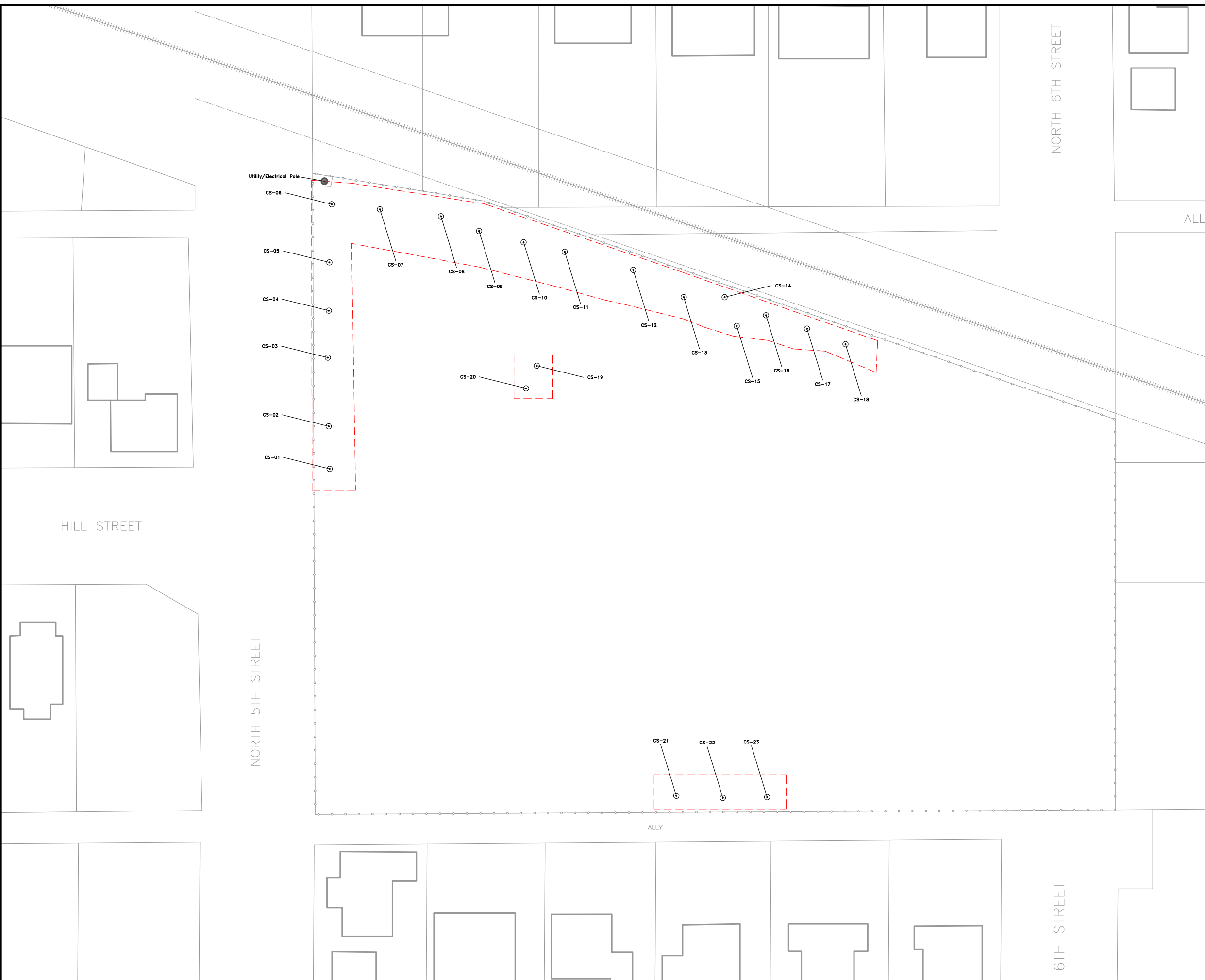
- Eliminating the B-screens from the Phase 2C injection locations surrounding CS-15, CS-16 and CS-18; and
- Eliminating the C-screens from the Phase 2C injection locations surrounding CSA-15.

As a result of eliminated screened interval and/or intervals based on the Post-Phase 2A and Post-Phase 2B analytical data, the scope of work for the Phase 2C injection event includes:

- Injections into the A-screens and B-screens at those injection locations surrounding confirmation soil borings CS-02, CS-03, CS-04, CS-12 and CS-13; and
- Injections into the B-screens only at those locations surrounding CS-05, CS-06, CS-07 and CS-23; and
- Injections into the C-screens at the injection locations surrounding CS-14, CS-19 and CS-20; and
- Injections into the D-screens at the four locations in the vicinity of CS-21.

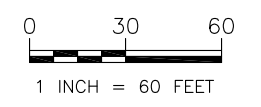
The proposed Phase 2C injection locations are shown on **Figure 6**.

FIGURES



LEGEND

- Existing Structure
- Fence/Remediation Site Boundary
- Approximate Extent of ISCO Treatment Area
- Confirmation Soil Sample Location

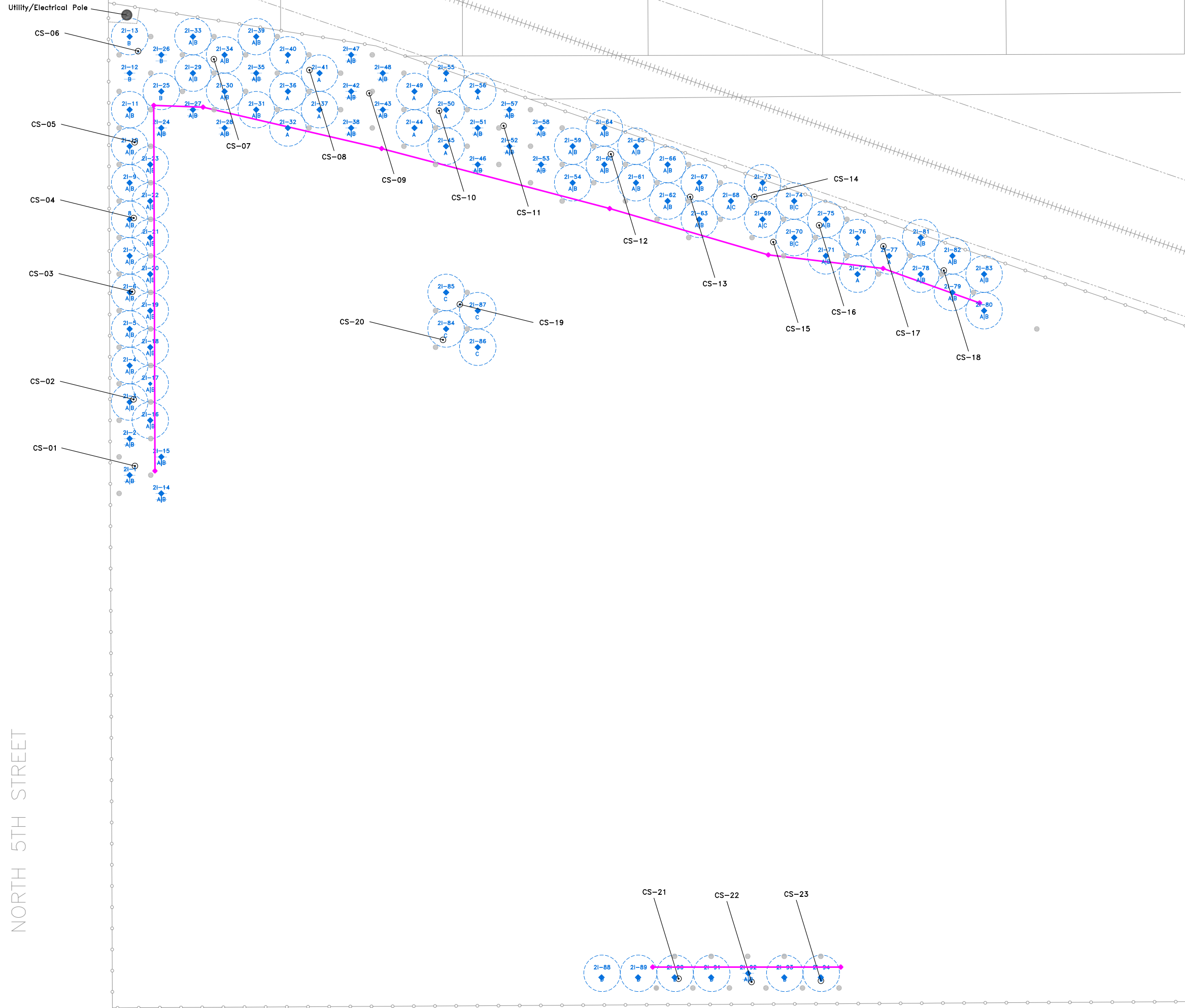


Base map provided by PSC Industrial Outsourcing, LP.

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SITE MAP
ISCO REMEDIATION PROGRAM
 Former Champaign MGP Site
 Champaign, Illinois

DRAWN BY: TE	DATE: 7/23/2013	FIGURE
CHECKED BY: SH	PROJECT NO: 901144	1



NORTH 5TH STREET

LEGEND

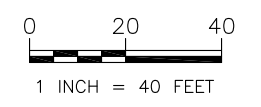
- Existing Structure
- Fence/Remediation Site Boundary
- Approximate Extent of Excavation Limits
- Confirmation Soil Sample Location

Injection Locations

- Phase 2A Injection Location
- Phase 2B Injection Location
- Phase 2B Locations Eliminated

Injection Intervals

- A 3 to 6 feet bgs
- B 6 to 10 feet bgs
- C 20 to 25 feet bgs
- D 36 to 44 feet bgs

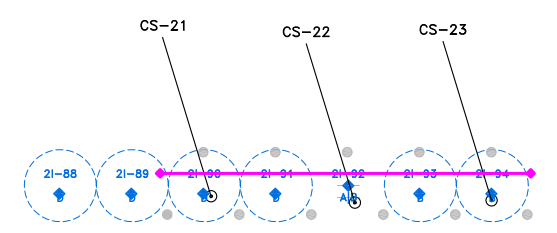


Base map provided by PSC Industrial Outsourcing, LP.

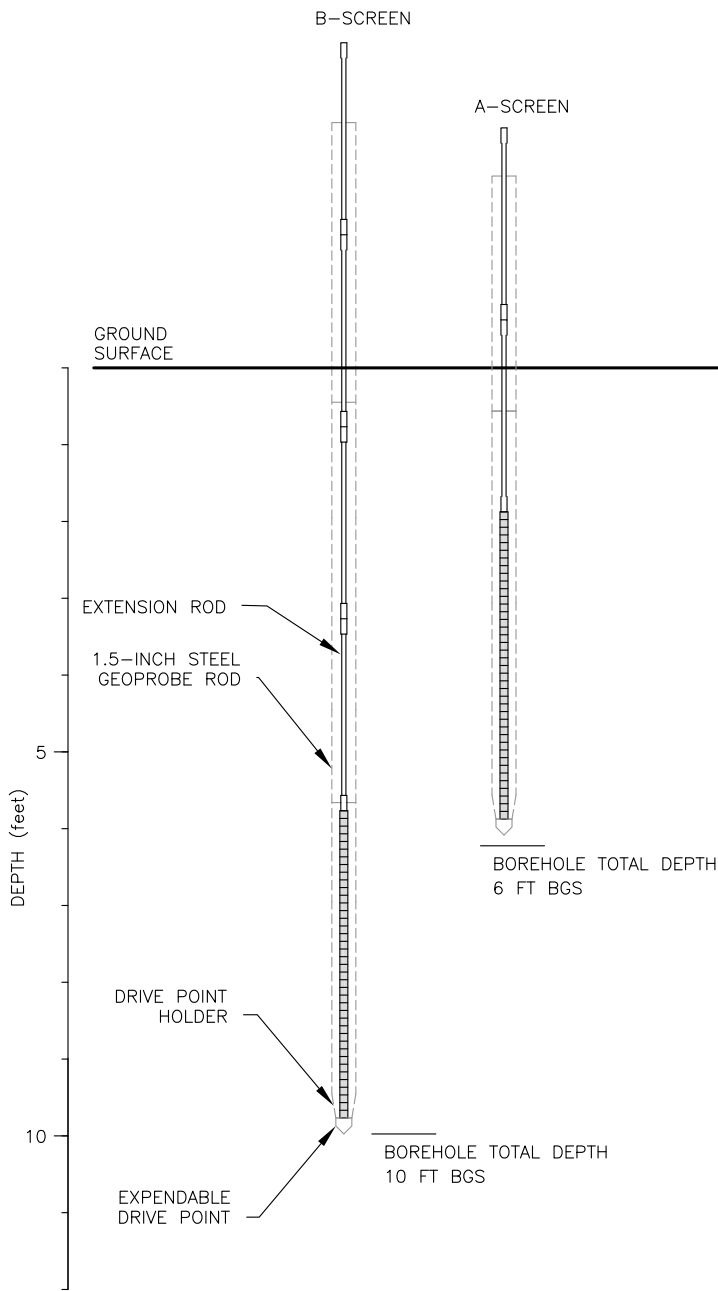
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PHASE 2B INJECTION LOCATION MAP
ISCO REMEDIATION PROGRAM
 Former Champaign MGP Site
 Champaign, Illinois

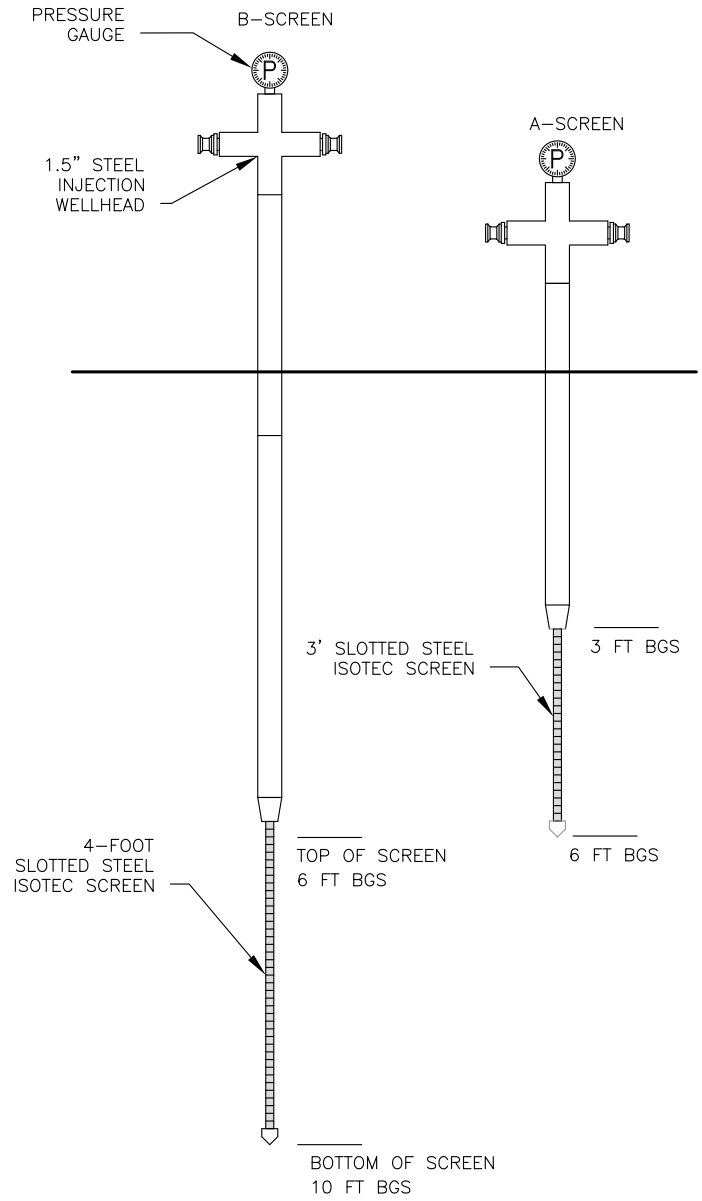
DRAWN BY: TE	DATE: 7/23/2013	FIGURE
CHECKED BY: SH	PROJECT NO: 901144	2



BEFORE INJECTION SCREEN EXPOSURE



AFTER INJECTION SCREEN EXPOSURE



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DIRECT-PUSH INJECTION SCHEMATIC
ISCO REMEDIATION PROGRAM
Former Champaign MGP Site
Champaign, Illinois

DRAWN BY: KH

DATE: 5/21/2013

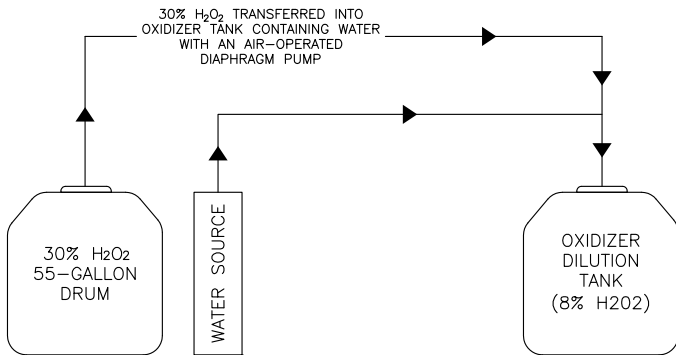
FIGURE

CHECKED BY: SH

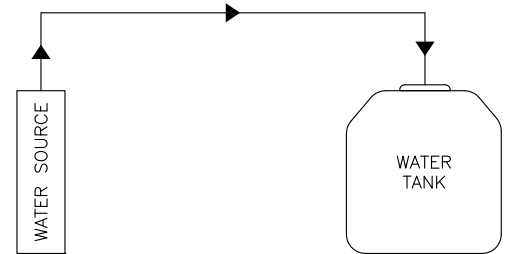
PROJECT NO: 901144

3

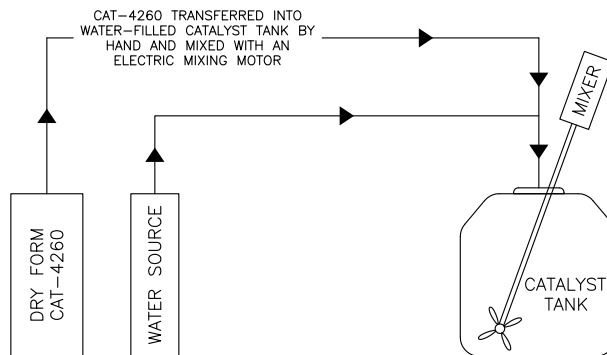
OXIDIZER TANK PROCEDURES



WATER TANK PROCEDURES



CATALYST TANK PROCEDURES



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REAGENT MIXING SCHEMATIC
ISCO REMEDIATION PROGRAM
Former Champaign MGP Site
Champaign, Illinois

DRAWN BY: KH

DATE: 5/21/2013

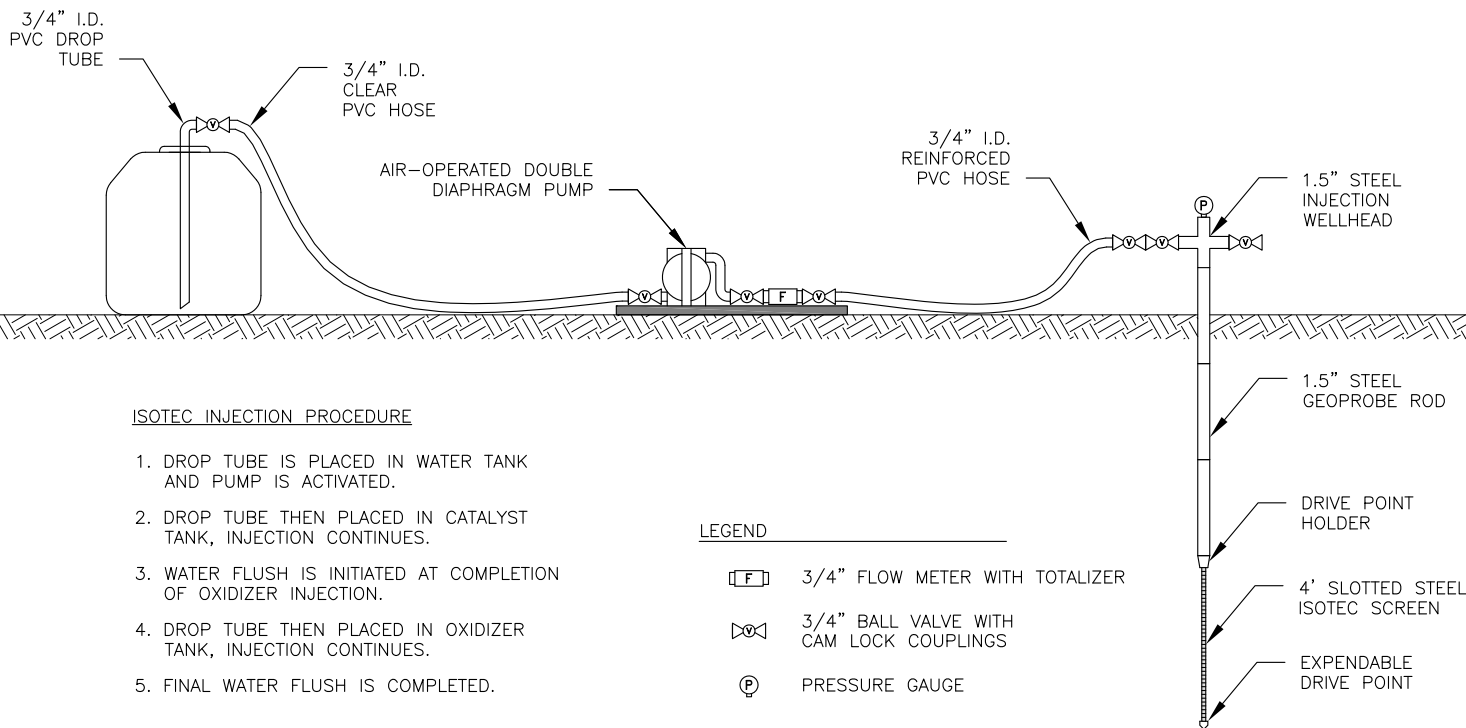
FIGURE

CHECKED BY: SH

PROJECT NO: 901144

4




REAGENT INJECTION DIAGRAM



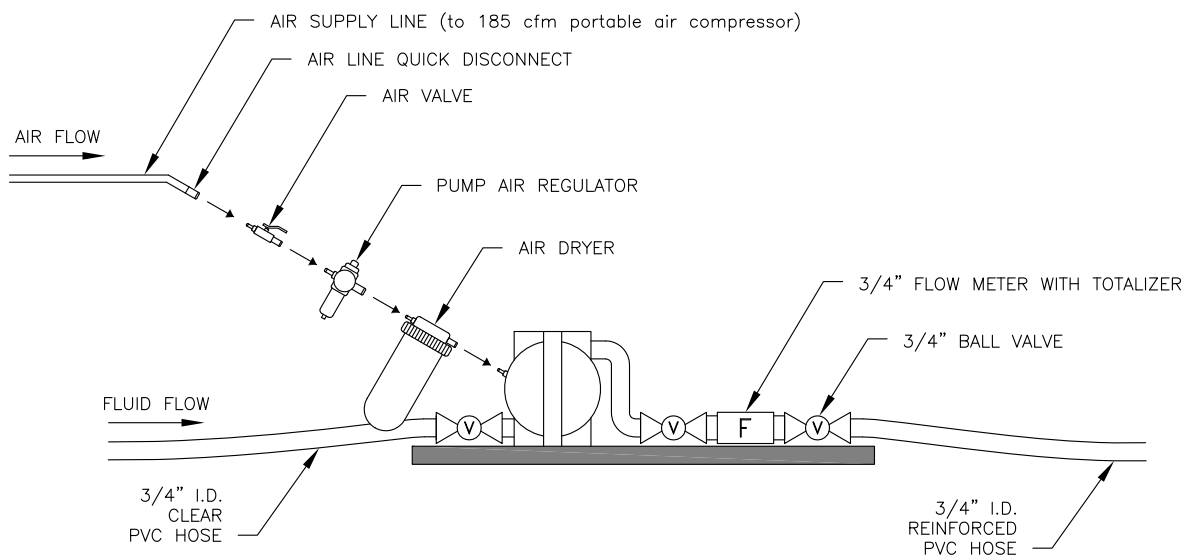
ISOTEC INJECTION PROCEDURE

1. DROP TUBE IS PLACED IN WATER TANK AND PUMP IS ACTIVATED.
2. DROP TUBE THEN PLACED IN CATALYST TANK, INJECTION CONTINUES.
3. WATER FLUSH IS INITIATED AT COMPLETION OF OXIDIZER INJECTION.
4. DROP TUBE THEN PLACED IN OXIDIZER TANK, INJECTION CONTINUES.
5. FINAL WATER FLUSH IS COMPLETED.

LEGEND

-  3/4" FLOW METER WITH TOTALIZER
-  3/4" BALL VALVE WITH CAM LOCK COUPLINGS
-  PRESSURE GAUGE

INJECTION PUMP INSTALLATION



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INJECTION METHOD SCHEMATIC
ISCO REMEDIATION PROGRAM
Former Champaign MGP Site
Champaign, Illinois

DRAWN BY: KH

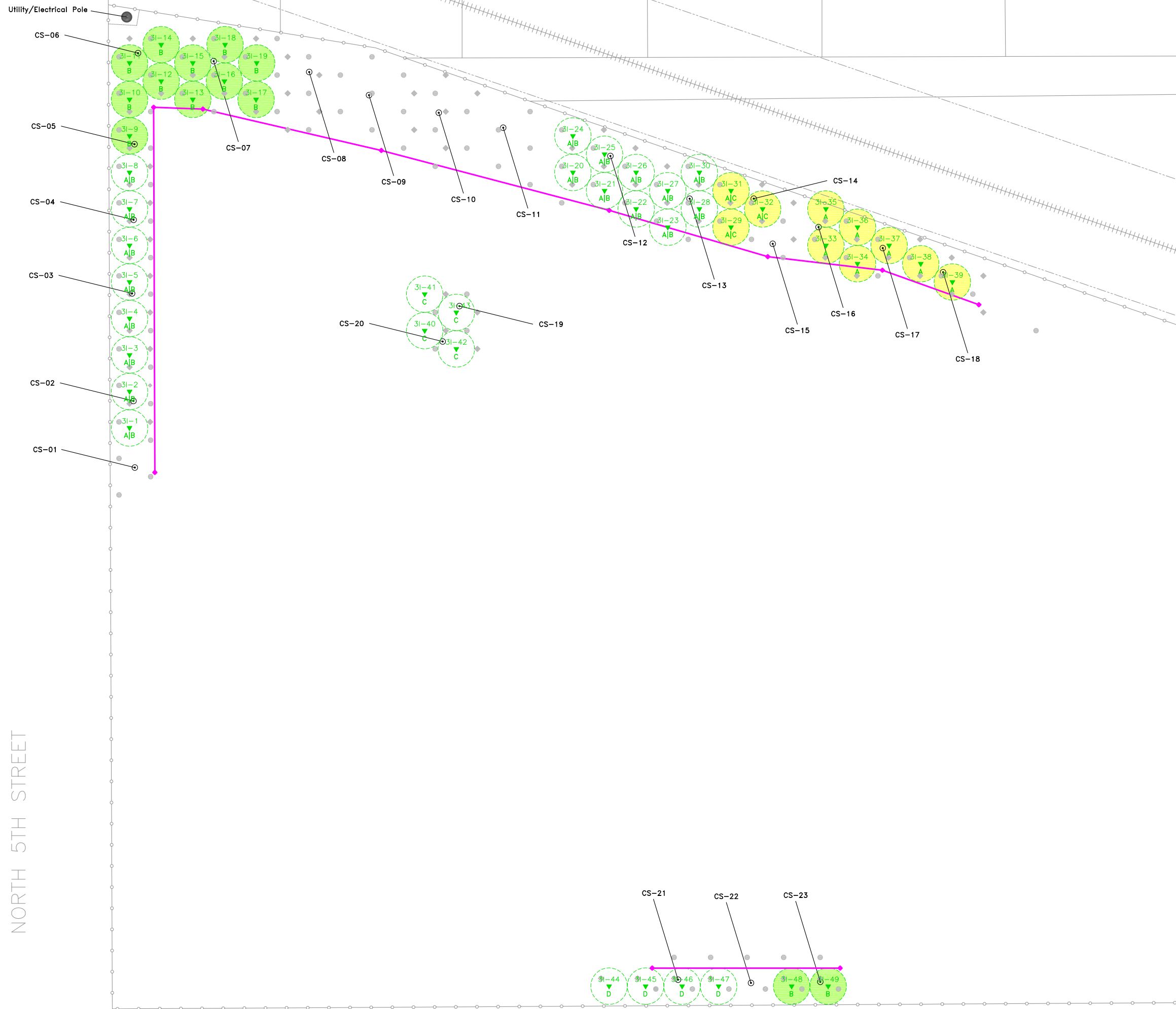
DATE: 5/21/2013

FIGURE

CHECKED BY: SH

PROJECT NO: 901144

5



LEGEND

- Existing Structure
- Fence/Remediation Site Boundary
- Approximate Extent of Excavation Limits

Confirmation Soil Sample Location

Injection Locations

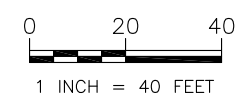
- Phase 2A Injection Location
- Phase 2B Injection Location
- Proposed Phase 2C Injection Location

Phase 2C Injection Locations

- Phase 2C Injection Location
- No Screens Eliminated
- A-Screen Eliminated
- B-Screen Eliminated

Injection Screen Intervals

- A 3 to 6 feet bgs
- B 6 to 10 feet bgs
- C 20 to 25 feet bgs
- D 36 to 44 feet bgs



Base map provided by PSC Industrial Outsourcing, LP.

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**PROPOSED PHASE 2C INJECTION LOCATION MAP
 ISCO REMEDIATION PROGRAM
 Former Champaign MGP Site
 Champaign, Illinois**

DRAWN BY: TE	DATE: 7/23/2013	FIGURE
CHECKED BY: SH	PROJECT NO: 901144	6

NORTH 5TH STREET

TABLES

**Table 1
PHASE 2B INJECTION LOG**

ISCO Remediation Program
Former Champaign MGP Site
Champaign, Illinois 61820

Inj. Date	Injection Point	Injection Interval (feet bgs)	ISOTEC REAGENT			FIELD OBSERVATIONS		
			H ₂ O ₂ (gallons)	Catalyst (gallons)	Total (gallons)	Rate (gpm)	Pressure (psi)	Notes (surfacing, refusal, pressure or flow rate changes, etc.)
6/19/13	2I-4A	3-6	25	25	50	2.0	0-30	
	2I-4B	6-10	25	25	50	2.0-3.0	10-15	
	2I-7A	3-6	20	25	45	2.0-3.0	0-12	Surfaced along annulus
	2I-7B	6-10	25	25	50	2.0-3.0	10-15	
	2I-10A	3-6	25	25	50	2.0-3.0	0-2	
	2I-10B	6-10	40	40	80	2.0-3.0	0-15	
	2I-13B	6-10	15	25	40	2.0-3.0	0-5	Surfaced 25 ft east
	2I-16A	3-6	30	30	60	2.0-3.0	0-5	
	2I-16B	6-10	30	30	60	2.0-3.0	0-5	
	2I-30A	3-6	30	30	60	2.0-3.0	0-20	
	2I-30B	6-10	25	25	50	2.0-3.0	0-10	
	2I-40A	3-6	25	25	50	2.0-3.0	0-15	
	2I-44A	3-6	25	25	50	2.0-3.0	5-20	
	2I-60A	3-6	15	25	40	2.0-3.0	0-5	Surfaced 12 ft south
	2I-60B	6-10	33	40	73	2.0-3.0	5-20	Surfaced 12 ft south
	2I-63A	3-6	2	25	27	2.0-3.0	50-80	Injection discontinued due to high pressure
	2I-63B	6-10	25	25	50	2.0-3.0	10-30	
	2I-73A	3-6	11	25	36	2.0-3.0	5-15	Surfaced 1 ft north
	2I-73C	20-25	50	50	100	2.0-3.0	0-30	
	2I-76A	3-6	12	25	37	2.0	0-15	Surfaced 12 ft southwest
2I-79A	3-6	0	0	0	-	80	Injection discontinued due to high pressure	
2I-79B	6-10	25	25	50	2.0-3.0	0-5	Surfaced 13 ft southwest	
6/20/13	2I-10A	3-6	30	30	60	2.0-3.0	0-5	
	2I-10B	6-10	15	15	30	3.0	0-15	
	2I-19A	3-6	30	30	60	2.0-3.0	0-10	
	2I-19B	6-10	30	30	60	2.0-3.0	5-15	
	2I-22A	3-6	7	15	22	3.0	5-10	Surfaced 12 ft south
	2I-22B	6-10	30	30	60	3.0	15-25	Surfaced 12 ft south
	2I-25B	6-10	25	25	50	3.0	5-15	
	2I-34B	6-10	30	30	60	3.0	5-15	Surfaced 24 ft east

**Table 1
PHASE 2B INJECTION LOG**

ISCO Remediation Program
Former Champaign MGP Site
Champaign, Illinois 61820

Inj. Date	Injection Point	Injection Interval (feet bgs)	ISOTEC REAGENT			FIELD OBSERVATIONS		
			H ₂ O ₂ (gallons)	Catalyst (gallons)	Total (gallons)	Rate (gpm)	Pressure (psi)	Notes (surfacing, refusal, pressure or flow rate changes, etc.)
	2I-37A	3-6	30	30	60	3.0	0-10	Surfaced 18 ft south
	2I-55A	3-6	30	30	60	3.0	0-5	
	2I-56A	3-6	30	30	60	3.0	2-4	
	2I-65A	3-6	15	15	30	3.0	10-15	Surfaced 30 ft south
	2I-65B	6-10	15	30	45	3.0	0-5	Surfaced 30 ft south
	2I-68A	3-6	15	15	30	3.0	12-14	Surfaced at CS-14
	2I-68C	20-25	0	5	5	3.0	0-5	Surfaced at CS-14
	2I-71A	3-6	0	0	0	-	-	Injection discontinued due to high pressure
	2I-71B	6-10	0	0	0	-	-	Injection discontinued due to high pressure
	2I-81A	3-6	30	30	60	3.0	5-10	Surfaced 11 ft west
	2I-81B	6-10	30	30	60	3.0	5-17	Surfaced 11 ft west
	2I-85C	20-25	50	50	100	3.0	15-40	
6/21/13	2I-17A	3-6	45	45	90	2.0-3.0	05	
	2I-17B	6-10	45	45	90	2.0-3.0	0-15	
	2I-20A	3-6	45	45	90	2.0-3.0	5-20	
	2I-20B	6-10	45	45	90	2.0-3.0	0-10	
	2I-23A	3-6	45	45	90	2.0-3.0	0-5	
	2I-23B	6-10	45	45	90	2.0-3.0	0-5	
	2I-34A	3-6	0	7	7	3.0	0-5	Surfaced 12 ft southwest
	2I-34B	6-10	15	15	30	2.0-3.0	0-5	Surfaced 12 ft southwest
	2I-45A	3-6	15	15	30	2.0-3.0	0-5	Surfaced 15 ft northwest
	2I-54A	3-6	0	13	13	3.0	0-2	Surfaced 10 ft southeast
	2I-54B	6-10	13	15	28	2.0-3.0	0-5	Surfaced 10 ft southeast
	2I-68A	3-6	15	15	30	2.0-3.0	0-5	Surfaced 9 ft southwest
	2I-68C	20-25	0	15	15	3.0	0-5	Surfaced 9 ft southwest
	2I-75A	3-6	30	30	60	2.0-3.0	0-5	
	2I-75B	6-10	30	30	60	2.0-3.0	10-15	
	2I-78A	3-6	45	45	90	2.0-3.0	0-30	Surfaced 6 ft southeast
2I-78B	6-10	45	45	90	2.0-3.0	0-15		
2I-88D	36-44	150	150	300	4.0-5.0	0-5		

**Table 1
PHASE 2B INJECTION LOG**

ISCO Remediation Program
Former Champaign MGP Site
Champaign, Illinois 61820

Inj. Date	Injection Point	Injection Interval (feet bgs)	ISOTEC REAGENT			FIELD OBSERVATIONS		
			H ₂ O ₂ (gallons)	Catalyst (gallons)	Total (gallons)	Rate (gpm)	Pressure (psi)	Notes (surfacing, refusal, pressure or flow rate changes, etc.)
	2I-90D	36-44	150	150	300	3.0-4.5	0-5	
	2I-93B	6-10	15	15	30	2.0-3.0	10-12	Surfaced 3 ft east
6/22/13	2I-3B	6-10	30	30	60	2.0-3.0	5-15	
	2I-5A	3-6	15	15	30	2.0-3.0	4-6	
	2I-5B	6-10	30	30	60	2.0-3.0	0-15	
	2I-8A	3-6	11	15	26	2.0-3.0	0-5	Surfaced 5 ft south
	2I-8B	6-10	30	30	60	2.0-3.0	0-10	
	2I-33B	6-10	30	30	60	2.0-3.0	0-5	
	2I-36A	3-6	28	30	58	2.0-3.0	8-30	Surfaced 14 ft south
	2I-49A	3-6	15	15	30	2.0-3.0	8-12	Surfaced 6 ft northwest
	2I-64B	6-10	30	30	60	2.0-3.0	5-12	
	2I-67B	6-10	25	30	55	2.0-3.0	2-24	Surfaced 12 ft west
	2I-72A	3-6	30	30	60	2.0-3.0	0-10	
	2I-74B	6-10	30	30	60	2.0-3.0	2-4	
	2I-75B	6-10	15	15	30	2.0-3.0	10-12	Surfaced 12 ft south
	2I-83B	6-10	15	15	30	2.0-3.0	0-5	
	2I-86C	20-25	50	50	100	2.5-3.0	10-30	
6/23/13	2I-3A	3-6	45	45	90	2.0-3.0	0-15	
	2I-3B	6-10	30	30	60	2.0-3.0	0-10	
	2I-5A	3-6	15	15	30	2.0-3.0	0-10	
	2I-8B	6-10	15	15	30	2.0-3.0	0-5	
	2I-11A	3-6	30	30	60	2.0-3.0	0-5	
	2I-11B	6-10	45	45	90	2.0-3.0	0-5	
	2I-31A	3-6	30	30	60	2.0-3.0	2-50	
	2I-31B	6-10	30	30	60	2.0-3.0	0-20	
	2I-33A	3-6	15	30	45	2.0-3.0	0-10	Surfaced 3 ft southeast
	2I-39B	6-10	10	15	25	2.0-3.0	2-4	Surfaced 25 ft west
	2I-50A	3-6	13	15	28	2.0-3.0	5-10	Surfaced 8 ft southwest
	2I-61A	3-6	15	15	30	2.0-3.0	0-5	Surfaced 15 ft north
2I-61B	6-10	30	30	60	2.0-3.0	2-10		

**Table 1
PHASE 2B INJECTION LOG**

ISCO Remediation Program
Former Champaign MGP Site
Champaign, Illinois 61820

Inj. Date	Injection Point	Injection Interval (feet bgs)	ISOTEC REAGENT			FIELD OBSERVATIONS		
			H ₂ O ₂ (gallons)	Catalyst (gallons)	Total (gallons)	Rate (gpm)	Pressure (psi)	Notes (surfacing, refusal, pressure or flow rate changes, etc.)
	2I-64A	3-6	15	15	30	2.0-3.0	2-12	
	2I-67A	3-6	15	15	30	2.0-3.0	10-12	
	2I-74C	20-25	50	50	100	2.0-3.0	5-25	Surfaced 12 ft south
	2I-75A	3-6	15	15	30	2.0-3.0	0-2	
	2I-82A	3-6	0	4	4	3.0	0-5	Surfaced 1 ft north
	2I-82B	6-10	15	15	30	2.0-3.0	2-4	Surfaced 1 ft north
	2I-83A	3-6	30	30	60	2.0-3.0	10-14	
	2I-83B	6-10	15	15	30	2.0-3.0	5-10	
	2I-84C	20-25	50	50	100	2.0-3.0	5-10	
6/24/13	2I-6A	3-6	45	45	90	2.5-3.0	0-10	
	2I-6B	6-10	15	15	30	2.0-3.0	5-10	Surfaced 2 ft north
	2I-9A	3-6	10	15	25	2.5-3.0	0-5	Surfaced 12 ft south
	2I-9B	6-10	15	15	30	2.0	10-14	Surfaced 12 ft south
	2I-11A	3-6	15	15	30	2.0-3.0	0-5	
	2I-29B	6-10	30	30	60	2.0-3.0	0-6	Surfaced 30 ft west
	2I-32A	3-6	30	30	60	2.0-3.0	0-19	Surfaced 12 ft south
	2I-55B	6-10	15	15	30	2.5-3.0	0-5	Surfaced 2 ft north
	2I-59A	3-6	30	30	60	2.5-3.0	0-5	
	2I-59B	6-10	30	30	60	2.0-3.0	10-15	
	2I-62A	3-6	0	6	6	3.0	-	Surfaced 6 ft south
	2I-62B	6-10	15	15	30	3.0	10-20	Surfaced 6 ft south
	2I-70B	6-10	15	15	30	2.0-3.0	0-15	Surfaced 6 ft northwest
	2I-70C	20-25	50	50	100	2.5	10-30	
	2I-77A	3-6	15	15	30	2.0-3.0	15-20	Surfaced 20 ft west
	2I-80A	3-6	15	15	30	2.5-3.0	20-22	Surfaced 8 ft south
2I-80B	6-10	30	30	60	2.0-3.0	0-5		
2I-87C	20-25	50	50	100	3.5	10-25		
6/25/13	2I-18A	3-6	15	15	30	3.0	0-5	Surfaced 7 ft northwest
	2I-18B	6-10	30	30	60	2.5-3.0	2-10	
	2I-21A	3-6	15	15	30	2.5-3.0	5-12	Surfaced 2 ft west

**Table 1
PHASE 2B INJECTION LOG**

ISCO Remediation Program
Former Champaign MGP Site
Champaign, Illinois 61820

Inj. Date	Injection Point	Injection Interval (feet bgs)	ISOTEC REAGENT			FIELD OBSERVATIONS		
			H ₂ O ₂ (gallons)	Catalyst (gallons)	Total (gallons)	Rate (gpm)	Pressure (psi)	Notes (surfacing, refusal, pressure or flow rate changes, etc.)
	2I-21B	6-10	29	30	59	2.5-3.0	0-5	Surfaced 2 ft west
	2I-35A	3-6	4	15	19	3.0	2-4	Surfaced 20 ft southwest
	2I-35B	6-10	15	15	30	2.5-3.0	10-12	Surfaced 18 ft southwest
	2I-41A	3-6	15	15	30	2.5-3.0	2-4	Surfaced 8 ft west
	2I-66A	3-6	0	15	15	3.0	5-10	Surfaced 6 ft north
	2I-66B	6-10	30	30	60	2.5-3.0	10-15	Surfaced 6 ft northwest
	2I-69B	6-10	30	30	60	2.5-3.0	2-15	Surfaced 12 ft west
	2I-69C	20-25	30	25	55	2.5-3.0	5-20	Surfaced 4 ft east
	2I-89D	36-44	150	150	300	4.0-5.0	0	
	2I-91D	36-44	150	150	300	4.0-5.0	0	
	2I-94B	6-10	4	15	19	2.5-3.0	14-15	Surfaced along annulus
6/26/13	2I-6B-R	6-10	59	60	119	2.5-3.0	5-20	Surfaced 24 ft northeast
	2I-50A-R	3-6	45	45	90	2.0-3.0	0-5	Surfaced 12 ft west
	2I-60A-R	3-6	15	15	30	2.5-3.0	0-5	Surfaced 12 ft south
	2I-68C-R	20-25	75	75	150	2.5-3.0	2-10	Surfaced 6 ft southwest
	2I-69B	6-10	15	15	30	2.0-3.0	2-4	Surfaced 15 ft east
	2I-69C	20-25	0	9	9	3.0	-	Surfaced 10 and 25 ft west
	2I-71A-R	3-6	30	30	60	3.0	15-20	
	2I-71B-R	6-10	30	45	75	2.5-3.0	0-2	Surfaced 8 ft south
	2I-77A-R	3-6	15	15	30	2.5-3.0	2-4	Surfaced 18 ft west
	2I-79A-R	3-6	30	30	60	3.0	2-22	
	2I-89D	34-44	35	25	60	5.0	0	
2I-94B-R	6-10	15	15	30	2.5-3.0	2-4	Surfaced 3 ft east	
PHASE 2B REAGENT TOTAL			3,966	4,209	8,175			

Table 2
BENZENE CONCENTRATIONS IN SOIL
WITH PERCENTAGE REDUCTIONS

ISCO Program Sample Locations
Former Champaign MGP Site
Champaign, Illinois 61820

Soil Sample Location ID	Sample Collection Depth (feet bgs)	Post-Phase 2A Injection	Post-Phase 2B Injection		Post-Phase 2C Injection		
		5/23/2013 (mg/kg)	7/2/2013 (mg/kg)	vs Post-Phase 2A	<date> (mg/kg)	vs Post-Phase 2A	vs Post-Phase 2B
CSA-01	5.0-6.0	0.0037	NS			-	-
	7.5-8.5	0.0057	NS			-	-
CSA-02	5.0-6.0	< 8.24	< 45	---		-	-
	7.0-8.0	< 138	< 51.1	63%		-	-
CSA-03	5.0-6.0	< 36.4	44.3	---		-	-
	9.0-10.0	33.3	54	---		-	-
CSA-04	5.0-6.0	0.9	3.83	---		-	-
	8.0-9.0	< 47.5	< 17.3	64%		-	-
CSA-05	4.5-5.5	7.54	0.002	100%		-	-
	9.0-10.0	< 189	64.8	66%		-	-
CSA-06	5.0-6.0	0.168	NS			-	-
	9.0-10.0	< 48.8	< 46.1	6%		-	-
CSA-07	5.0-6.0	19.9	36.5	---		-	-
	7.5-8.5	2.87	2.52	12%		-	-
CSA-08	4.5-5.5	3.13	0.313	90%		-	-
	8.5-9.5	0.734	NS			-	-
CSA-09	5.0-6.0	< 0.027	NS			-	-
	8.0-9.0	< 0.192	NS			-	-
CSA-10	5.0-6.0	4.12	0.594	86%		-	-
	8.5-9.5	0.426	NS			-	-
CSA-11	5.0-6.0	0.307	NS			-	-
	8.0-9.0	< 0.482	NS			-	-
CSA-12	4.0-5.0	2.43	2.03	16%		-	-
	9.0-10.0	1.89	4.59	---		-	-
CSA-13	5.0-6.0	2.31	2.72	---		-	-
	9.0-10.0	< 1.84	1.13	39%		-	-
CSA-14	4.0-5.0	2.12	1.39	34%		-	-
	7.5-8.5	0.101	NS			-	-
	20.5-21.5	< 0.842	2.99	---		-	-
CSA-15	5.0-6.0	0.712	NS			-	-
	8.0-9.0	0.456	0.19	58%		-	-
	20.5-21.5	28	0.804	97%		-	-

Table 2
BENZENE CONCENTRATIONS IN SOIL
WITH PERCENTAGE REDUCTIONS

ISCO Program Sample Locations
Former Champaign MGP Site
Champaign, Illinois 61820

Soil Sample Location ID	Sample Collection Depth (feet bgs)	Post-Phase 2A Injection	Post-Phase 2B Injection		Post-Phase 2C Injection		
		5/23/2013 (mg/kg)	7/2/2013 (mg/kg)	vs Post-Phase 2A	<date> (mg/kg)	vs Post-Phase 2A	vs Post-Phase 2B
CSA-16	4.0-5.0	3.36	< 1.82	46%		-	-
	7.0-8.0	1.02	0.156	85%		-	-
CSA-17	5.0-6.0	5.65	4.65	18%		-	-
	7.0-8.0	0.499	NS			-	-
CSA-18	3.5-4.5	< 5.28	3.9	26%		-	-
	7.0-8.0	< 1.77	0.665	62%		-	-
CSA-19	22.5-23.5	< 3.58	6.72	---		-	-
CSA-20	22.0-23.0	21.1	4.33	79%		-	-
CSA-21	5.0-6.0	< 0.0221	NS			-	-
	9.0-10.0	< 0.17	NS			-	-
CSA-22	5.0-6.0	< 0.0213	NS			-	-
	7.0-8.0	< 0.0958	NS			-	-
CSA-23	5.0-6.0	< 0.0779	NS			-	-
	9.0-10.0	7.27	0.37	95%		-	-
Average - 3.0-6.0 ft.		4.9	11.311	---	#DIV/0!	-	-
Average - 6-10 ft		22.7	20.2	11%	#DIV/0!	-	-
Average - 20-25 ft		13.4	3.7	72%	#DIV/0!	-	-

NOTES

mg/kg = Milligrams per kilogram

21.1 = Value in bold (RED) exceeds Tier 1 Remediation Objectives for Benzene of 0.8 mg/kg.

**Table 3
NAPHTHALENE CONCENTRATIONS IN SOIL
WITH PERCENTAGE REDUCTIONS**

ISCO Program Sample Locations
Former Champaign MGP Site
Champaign, Illinois 61820

Soil Sample Location ID	Sample Collection Depth (feet bgs)	Post-Phase 2A Injection	Post-Phase 2B Injection		Post-Phase 2C Injection		
		5/23/2013 (mg/kg)	7/2/2013 (mg/kg)	vs Post-Phase 2A	<date> (mg/kg)	vs Post-Phase 2A	vs Post-Phase 2B
CSA-01	5.0-6.0	0.006	NS			-	-
	7.5-8.5	0.005	NS			-	-
CSA-02	5.0-6.0	10.6	168	---		-	-
	7.0-8.0	1,750	455	74%		-	-
CSA-03	5.0-6.0	1,710	840	51%		-	-
	9.0-10.0	213	985	---		-	-
CSA-04	5.0-6.0	1.55	35.6	---		-	-
	8.0-9.0	300	1,260	---		-	-
CSA-05	4.5-5.5	4.09	31.9	---		-	-
	9.0-10.0	511	355	31%		-	-
CSA-06	5.0-6.0	0.73	NS			-	-
	9.0-10.0	1,450	21.5	99%		-	-
CSA-07	5.0-6.0	17	13.2	22%		-	-
	7.5-8.5	94	8.27	91%		-	-
CSA-08	4.5-5.5	47.4	21.1	55%		-	-
	8.5-9.5	7.81	NS			-	-
CSA-09	5.0-6.0	0.059	NS			-	-
	8.0-9.0	69.1	NS			-	-
CSA-10	5.0-6.0	1.8	1.67	7%		-	-
	8.5-9.5	15.2	NS			-	-
CSA-11	5.0-6.0	128	NS			-	-
	8.0-9.0	12.7	NS			-	-
CSA-12	4.0-5.0	83.4	54.4	35%		-	-
	9.0-10.0	79	305	---		-	-
CSA-13	5.0-6.0	111	221	---		-	-
	9.0-10.0	90	31.1	65%		-	-
CSA-14	4.0-5.0	142	207	---		-	-
	7.5-8.5	12.8	NS			-	-
	20.5-21.5	35.3	41.4	---		-	-
CSA-15	5.0-6.0	114	NS			-	-
	8.0-9.0	200	12.2	94%		-	-
	20.5-21.5	194	9.14	95%		-	-

**Table 3
NAPHTHALENE CONCENTRATIONS IN SOIL
WITH PERCENTAGE REDUCTIONS**

ISCO Program Sample Locations
Former Champaign MGP Site
Champaign, Illinois 61820

Soil Sample Location ID	Sample Collection Depth (feet bgs)	Post-Phase 2A Injection	Post-Phase 2B Injection		Post-Phase 2C Injection		
		5/23/2013 (mg/kg)	7/2/2013 (mg/kg)	vs Post-Phase 2A	<date> (mg/kg)	vs Post-Phase 2A	vs Post-Phase 2B
CSA-16	4.0-5.0	137	74.5	46%		-	-
	7.0-8.0	48.7	40.1	18%		-	-
CSA-17	5.0-6.0	124	99	20%		-	-
	7.0-8.0	2.85	NS			-	-
CSA-18	3.5-4.5	417	249	40%		-	-
	7.0-8.0	95.9	28.4	70%		-	-
CSA-19	22.5-23.5	66.8	49.4	26%		-	-
CSA-20	22.0-23.0	156	1.17	99%		-	-
CSA-21	5.0-6.0	0.305	NS			-	-
	9.0-10.0	36.5	NS			-	-
CSA-22	5.0-6.0	0.634	NS			-	-
	7.0-8.0	0.344	NS			-	-
CSA-23	5.0-6.0	2.38	NS			-	-
	9.0-10.0	6.59	227	---		-	-
Average - 3.0-6.0 ft.		145.4	155.1	---	#DIV/0!	-	-
Average - 6-10 ft		237.9	310.7	---	#DIV/0!	-	-
Average - 20-25 ft		113.0	25.3	78%	#DIV/0!	-	-

NOTES

mg/kg = Milligrams per kilogram

194 = Value in bold (RED) exceeds Tier 1 Remediation Objectives for Naphthalene of 170 mg/kg.

NS = Not Sampled. Sample depth interval reported Post-Phase 2A naphthalene concentrations in soil below Tier 1 RO's.