Whirlpool CORPORATION

ADMINISTRATIVE CENTER ■ BENTON HARBOR, MICHIGAN 49022

JEFFREY NOEL
CORPORATE VICE PRESIDENT
COMMUNICATIONS AND PUBLIC AFFAIRS

January 24, 2014

Robin Gifford
Enforcement and Inspection Branch, Hazardous Waste Division
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

Via Electronic Mail and Hand Delivery

RE: **Revised Work Plan**
Whirlpool Corporation, Ft Smith, Arkansas
CAO LIS 13-12
EPA ID No. ARD042755389
AFIN 66-00048

Dear Ms. Gifford,

Whirlpool Corporation appreciates the opportunity to provide the attached Work Plan prepared by ENVIRON to address trichloroethylene (TCE) in the on-site soils and groundwater on Whirlpool property and groundwater to the north of Ingersoll Avenue in Fort Smith. The attached Work Plan incorporates the requirements of the Remedial Action Decision Document (RADD) by revising the July 2013 Work Plan submitted to the Arkansas Department of Environmental Quality (ADEQ).

Whirlpool has been working closely and actively with ADEQ since 2001. Based on the results from the ongoing sampling program, ADEQ has determined there has been no expansion of the TCE plume for approximately eight years, no exposure or complete pathway to exposure, and therefore no health risk.

The science-based remediation plan required by ADEQ in the RADD was determined to be the most effective method for attacking and removing the TCE following extensive testing, research and community feedback.

Whirlpool is committed to moving forward with the remediation work in a diligent, expeditious and precise manner and to keeping the residents and elected officials in Fort Smith informed of important developments along the way.

In order to meet the RADD goals and monitor progress of the remediation efforts, Whirlpool will implement the five components of the final remedy defined in the RADD:

1. Onsite Institutional Controls
2. Soil Cover
3. In-Situ Chemical Oxidation (ISCO)
4. Monitored Natural Attenuation (MNA)
5. Performance Monitoring

While all five components are necessary and important, the heart of the remediation plan outlined in the RADD is the successful coupling of ISCO with monitored natural attenuation. The detailed Work Plan prepared by ENVIRON outlines the steps necessary to achieve the goals and Remedial Action Levels (RAL's) defined by ADEQ in the RADD.

As the body of knowledge from the successful implementation of ISCO and MNA at thousands of sites will attest, successful implementation of ISCO requires a step by step approach, with each step carefully executed to provide the basis for greater success at the next step. These building blocks, which lay the foundation for the ultimate success of the plan, include key elements such as predesign work, bench scale studies to screen appropriate oxidants, pilot scale studies using real-world on-site injections – to generate the information required for full scale design and full scale implementation. Collectively, these steps help ensure that the most effective ISCO oxidant is used, and that it is delivered in effective quantities utilizing the most effective delivery system(s) to maximize the impact of the treatment and meet the goals of the RADD. Bench Scale Studies, Pilot Scale Studies, Field Scale (or Full Scale) Implementation, and monitoring are discussed in many documents and publications, including the US Environmental Protection Agency (USEPA) Publication on In Situ Chemical Oxidation (EPA 600-R-06-072, 2006).

Whirlpool Corporation is committed to expediting the process wherever possible, while remaining disciplined in strict adherence of the science. Proper execution at each step along the way best assures long term success. We also fully acknowledge the timetables outlined in the Work Plan require the appropriate reviews and approvals by ADEQ, which are dependent upon the receipt of the thorough analysis and conclusions of each stage of the process.

The five key steps in the Work Plan include:

Pre-Design. This first step, elements of which were initiated in September and December of 2013 and January 2014, is necessary to gain a complete understanding of the concentration, depth and properties of TCE in the groundwater at the three proposed ISCO treatment areas. Specific information about the activities required to obtain the needed information is outlined for each of the areas in the attached Work Plan.

Bench Scale Testing. Based on results from the pre-design activities, a thorough bench scale screening of oxidants is completed. The bench scale testing will screen oxidants using actual soil and groundwater from the Whirlpool site generating data needed for the more rigorous onsite pilot scale testing.

Pilot Scale Chemical Oxidation Injection Treatments. Based on the integrated analysis of the pre-design activities and the bench scale testing, onsite pilot scale injections of chemical oxidation treatment will be completed at Area 1. Pilot scale testing includes both injections of oxidation treatment and evaluation of performance over a six-month time frame. Pilot scale testing is a critical intermediate step necessary to ensure an effective larger scale treatment based on sound science. The process allows for verification and potential improvement of oxidant performance and delivery methods specific to site conditions before moving to expanded design and implementation.

Design Refinement. After the results and analysis of the pilot testing program are completed, the ISCO system design is then finalized. The data and results from the predesign, bench scale and onsite pilot scale chemical oxidation injections provide the information required for the ISCO Final Design basis for areas 1, 2 and 3.

Expanded Chemical Oxidation Injection Treatments. The fifth step in the ISCO treatment is full scale, expanded implementation, which is based on the prior four steps. The details of the phased implementation will be outlined in the ISCO Final Design Basis noted above. Based on current information, this expanded implementation is expected to be undertaken in two ISCO injection phases. Phase I of the expanded implementation is currently planned to include oxidant injections at the three locations using methods determined to be most effective and least disruptive to the community. Phase II implementation is expected to build on Phase I by further reducing any remaining COC concentrations in the three target areas thereby enhancing the effectiveness of the ongoing MNA.

Performance Monitoring

To ensure that each step is taken with the most accurate information and to provide ADEQ and the Fort Smith community with up-to-date information about the project, quarterly groundwater and vapor sampling will be conducted, with quarterly and annual progress reports submitted throughout this process. Further, a comprehensive Two Year Review will be prepared by Whirlpool and submitted to ADEQ by December 31, 2015. The Two Year Review will be followed by a comprehensive Five Year Review in December 2018.

Schedule

Whirlpool is committed to pushing forward with the implementation of the activities outlined in the Work Plan to meet the requirements of the RADD efficiently and expeditiously. We have assumed some period of time for permit reviews by ADEQ. Given the science behind each step of the process described below, we will keep the residents fully informed of the successful progress of the RADD at each milestone (completion of Bench Scale Studies, On-Site Pilot Scale Injections) leading to Full Scale Implementation.

The implementation schedule presented in the Work Plan represents Whirlpool Corporation's estimate of the timing for completion of each of the outlined tasks above. The schedule reinforces Whirlpool Corporation's commitment to an efficient, expeditious implementation program to meet the requirements of the RADD. An overview of the schedule is listed below, along with start dates for each task:

- Ongoing Quarterly Groundwater Monitoring, Monitored Natural Attenuation and Soil Vapor Monitoring (February 2014)
- ISCO
    - Pre-Design (November 2013)
    - Bench Scale Testing (January 2014)
    - On-Site Pilot Scale Chemical Oxidation Injection Program (February 2014)
    - Design Refinement (June 2015)
    - Full Scale Chemical Oxidation Injection Treatments
        - Phase I (Spring 2016)
        - Phase II (Spring 2017)
- Soil Cover (following completion of ISCO)

Conclusion

Whirlpool remains committed to staying in Fort Smith to work with ADEQ, area residents and the City of Fort Smith, until this project is complete. As part of its ongoing commitment to keep the Fort Smith community informed, Whirlpool has made this Work Plan and additional background information, including all site testing data and reports submitted to ADEQ, publicly available on www.whirlpoolfortsmith.com.

Sincerely,

D. Jeffrey Noel
Corporate Vice President, Communications & Public Affairs
Whirlpool Corporation

cc Ray Gosack – City Administrator, City of Ft Smith Arkansas

Final Remedy Work Plan

Ft. Smith, Arkansas

Prepared for:
Whirlpool Corporation
Benton Harbor, MI

Prepared by:
ENVIRON International Corporation
Little Rock, Arkansas

Date:
January 24, 2014

Project Number:
2131344B

STATE OF ARKANSAS
REGISTERED PROFESSIONAL GEOLOGIST
No. 1965
KERRY TODD STONESTREET

ENVIRON

Contents

Page

1.	**Introduction**	**1**
1.1	Background	1
1.1.1	General Site Description	1
1.1.2	Facility Operations	1
1.1.3	Previous Site Investigations	2
1.1.4	Historical Bench Scale and Pilot Studies	2
1.1.5	Conceptual Site Model	3
1.2	Human Health Risk Assessment Conclusions	4
1.3	Remedy Objectives	5
1.4	Remedy Technical Approach	5
2	**Remedy Implementation**	**5**
2.1	Institutional Controls	6
2.2	Impermeable Soil Cover	6
2.3	In-Situ Chemical Oxidation	6
2.3.1	Pre-Design	7
2.3.2	Bench Scale Testing	11
2.3.3	On-Site Pilot ISCO Treatments	11
2.3.4	Design	12
2.3.5	Implementation	12
2.4	Monitored Natural Attenuation	14
2.5	Soil Vapor Monitoring	14
2.6	Groundwater Monitoring	16
3	**Performance Monitoring**	**16**
3.1.1	Quarterly Performance Monitoring	16
3.1.2	Annual Progress Reports	16
3.1.3	Two Year Review	17
3.1.4	Alternative Remedy Plan	17
3.1.5	Five Year Review	17
3.2	Contingency Plan	17
4	**Schedule**	**17**

List of Figures

Figure 1: Site Location Map
Figure 2: Site Layout Map
Figure 3: Groundwater Treatment Areas and Fall 2012 Groundwater Results
Figure 4: Pre-Design Testing Locations – Area 1
Figure 5: Pre-Design Testing Locations – Areas 2 and 3
Figure 6: Proposed Additional Soil Gas Locations
Figure 7: Typical Nested Soil Gas Monitoring Point Construction Details
Figure 8: Final Remedy Work Plan Schedule

Acronyms and Abbreviations

ADEQ:	Arkansas Department of Environmental Quality
bgs:	below ground surface
cis-1,2-DCE:	cis-1,2-dichloroethylene
COC:	constituent of concern
CSM:	conceptual site model
1,1-DCE:	1,1-dichloroethylene
EC:	Electrical Conductivity
HHRA:	human health risk assessment
HPT:	hydraulic profiling tool
IC:	institutional control
ISCO:	*in-situ* chemical oxidation
ITMW:	International Technology monitoring well
IW:	injection well
MCL:	Maximum Contaminant Level
MIP:	membrane interface probe
MNA:	monitored natural attenuation
MW:	monitoring well
PCE:	tetrachloroethylene
PID:	photoionization detector
psi:	pounds per square inch
RADD:	Remedial Action Decision Document
RAL:	remedial action level
RRMP:	Revised Risk Management Plan
SOD:	soil oxidant demand
TCA:	trichloroacetic acid
TCE:	trichloroethylene
trans-1,2-DCE:	trans- 1,2-dichloroethylene
UST:	underground storage tank
USEPA:	United States Environmental Protection Agency
Work Plan	Final Remedy Work Plan
VOC:	volatile organic compound

1. Introduction

In accordance with the Remedial Action Decision Document (RADD) dated December 27, 2013, ENVIRON on behalf of Whirlpool Corporation is submitting this Revised Final Remedy Work Plan (Work Plan). The purpose of the Work Plan is to outline relevant elements to implement the final remedy defined by the RADD. This Work Plan provides details on the activities and schedule for implementation of the final remedy for the Whirlpool Site.

The RADD provides the basis for the final remedy selection, including a summary of activities already completed at the site. This Work Plan presents the plan to meet the requirements of the RADD, and is not intended to restate or summarize the RADD. The Work Plan is complimentary to the Revised Risk Management Plan dated May 21, 2013 and the Revised Risk Management Plan Addendum dated June 14, 2013 (hereinafter collectively referred to as the RRMP). The Work Plan will reference relevant sections of the RRMP where appropriate.

1.1 Background

The following is a summary of Section 1.1 of the RRMP. For more detail refer to Section 1.1 of the RRMP.

1.1.1 General Site Description

The Whirlpool Fort Smith facility is located at 6400 Jenny Lind Road on the south side of Fort Smith, Arkansas (Figure 1) and is currently inactive. The entire facility is approximately 153 acres and includes the main manufacturing building (approximately 1.3 million square feet), separate warehouse and administrative offices, and approximately 21 acres of undeveloped land (Figure 2). Additional buildings located on the north side of the property include a water treatment plant and boiler house. The majority of the property surrounding the buildings is covered with concrete or asphalt service roads and parking. Some gravel parking areas are also present.

1.1.2 Facility Operations

Historical manufacturing processes at the Whirlpool Fort Smith facility involved metal fabrication, plastic thermoforming and assembly operations. Constituents in the soil and groundwater identified during facility investigations are the result of historical practices.

Dating back to approximately 1967, equipment degreasing operations utilizing trichloroethylene (TCE) were performed in the former degreaser building located near the northwestern corner of the main manufacturing building and west of the boiler house (Figure 2). The degreasing equipment consisted of a tank and parts rack. The degreasing operations involved placing parts into the parts rack positioned over the tank. The TCE tank was then heated, creating a TCE vapor in the area where the parts were placed. Following degreasing activities, the vapor was condensed and returned to the tank below the parts rack.

The use of TCE in the degreasing operations ceased after TCE was classified as a hazardous waste and the TCE degreasing process was addressed in hazardous waste regulations promulgated in 1980. Trichloroacetic acid (TCA) replaced the use of TCE until the degreaser operation stopped altogether in 1989. No historical records that document any TCE spills or release incidents from the degreaser building have been located. It is possible that historical leaks from the tank or surface spills in the vicinity of the degreaser building may have occurred, resulting in releases to the soil and groundwater.

1.1.3 Previous Site Investigations

A series of soil and groundwater studies were initiated at the site as part of a project to remove one underground storage tank (UST) previously containing fuel. The UST closure certification analytical data indicated the presence of TCE and other solvents in the shallow groundwater. Subsequent investigations have been completed to delineate soil and groundwater impacts. Based on previous investigations it was determined the primary constituent of concern (COC) is TCE. Tetrachloroethylene (PCE) and TCE daughter products (including cis-1,2-dichloroethylene (cis-1,2-DCE), trans- 1,2-dichloroethylene (trans-1,2-DCE), 1,1-dichloroethylene (1,1-DCE), and vinyl chloride) have also been periodically detected in monitoring wells.

1.1.4 Historical Bench Scale and Pilot Studies

In 2000, a bench scale treatability study was completed to investigate the effectiveness of permanganate for treating chlorinated compounds in site-specific soils. Soil samples were collected from groundwater monitoring well MW-25, and used for the study. In this study, TCE was detected at a concentration of 100,000 ug/l, which was representative of site conditions. Testing was then completed to determine the total permanganate demand as well as to verify that the permanganate oxidant could destroy the TCE in the site-specific sample. The bench scale study results indicated that permanganate was able to reduce TCE concentrations in the representative soil sample by almost 100%. A total potassium permanganate demand of 1 to 2.5 g/kg wet weight soils was identified; however, it was noted that the concentration of permanganate would most likely need to be increased in the field.

An on-site pilot scale test was conducted in 2002 to evaluate the use of permanganate for full scale treatment at the site based on the results of the bench scale evaluations. This test was conducted in the transmissive gravel zone on-site. The soil oxidant demand used for oxidant calculations during this test was less than the oxidant demand identified during the bench scale study, therefore, less than the suggested amount of oxidant was applied during the field scale test. The results indicated that in-situ chemical oxidation (ISCO) was effective in treating the COCs within the treatment zone and over 20 feet outside the treatment zone in the transmissive gravel portion. After the test was completed, COC concentrations rebounded to pre-test levels as a result of the placement of the test area being too far from the plume. Back diffusion occurred due to the flow direction from areas of higher TCE concentrations through the test location.

Permanganate was also evaluated in off-site interim measure activities in April and June of 2009. The objective of this interim measure was to evaluate the effectiveness of using ISCO to treat the core of the off-site plume. Permanganate was applied to eight injection wells and has been continually monitored. As evidence of either very slow movement of groundwater or variation in the transmissive layer underneath the residential properties in the area, permanganate was still present well after the initial event. This shows that previously injected permanganate was not being uniformly distributed throughout the subsurface to treat impacted groundwater throughout the plume. However, in the 2010 Interim Measure Status Report, the following was noted: "The analytical data suggest permanganate treatment is very effective within the radius of influence of the injection well". As part of the interim measure, in late 2010 and early 2011, a groundwater extraction well was used to attempt movement of the permanganate through the subsurface; however, this effort was only marginally successful due to the tight clays making it impractical for consideration on a larger scale off-site. Therefore, although ISCO may not be effective for treating the entire off-site plume, the study indicated that it can be an effective tool for reducing higher TCE concentrations in targeted locations within the transmissive zone.

Based upon these completed bench scale and pilot scale studies, it is apparent that ISCO can treat TCE at portions of the site within the transmissive zone, however additional design information is required to determine an effective modified approach and/or other oxidant.

1.1.5 Conceptual Site Model

The Conceptual Site Model (CSM) characterizes the site conditions and summarizes the basis for the hypothetical exposure pathways evaluated in the Human Health Risk Assessment (presented as Appendix A to the RRMP). Key components of the CSM include actual and potential land use and exposure based on physical, release and risk management profiles on-site and off-site. A summary of the current site conditions is provided below:

1.1.5.1 Onsite Current Conditions

Whirlpool Corporation manufactured refrigerators and trash compactors at the site until June 2012. There are currently no active on-site manufacturing operations.

Future site activities will be restricted to nonresidential (commercial and/or industrial) uses through restrictive covenants to be recorded with the property deed(s). All future uses at the site will be nonresidential.

Based on the data collected to date, the known area of impacted soil is on-site within the property boundaries and surrounded by security fencing (see Figure 3 of the RRMP). Impacted soils approximately 50 by 250-feet in size are localized to the area immediately to the west of the former degreaser building where elevated concentrations of TCE were detected in groundwater.

As a result of surface spills, TCE is thought to have migrated through fractures in the silt/clay soil onsite and eventually encountered the permeable sand/gravel soil above the shale bedrock, which served as a preferential migration pathway for TCE to the subsurface.

The highest impact of TCE in groundwater on-site has been identified at groundwater monitoring well MW-25 near the northwestern corner of the building. Higher levels of impact (great than 10 mg/L of TCE) were also identified at ITMW-19. Together these two points currently constitute the heart of the source area on-site.

Current groundwater modeling indicates that the TCE plume extends approximately 1,000 feet to the south southwest from the source on-site and to the north across Ingersoll Avenue offsite (Figure 3). The southern boundary of affected groundwater remains on-site. There are no known off-site groundwater impacts to the east, south or west of the Whirlpool facility property boundaries.

1.1.5.2 Offsite Current Conditions

Land use down-gradient (north) of the site is residential. Residential properties to the north include both single-family and multifamily homes. A recreational facility is located over 500 feet northeast of the Whirlpool property boundary, adjacent to the residential area. No agricultural properties are located in the vicinity of the site. Discussion concerning properties to the east, south and west are not incorporated into this discussion since they have no impact from the site.

Groundwater with detected concentrations of TCE above United States Environmental Protection Agency (USEPA) drinking water criteria maximum contaminant levels (MCLs) extends into the residential neighborhood north of the site. There are no known soil or groundwater impacts off-site to the east, west or south. The recreational facility to the northeast is located over 1,000 feet east of the impacted groundwater area. The extent of the off-site groundwater plume is shown on Figure 3. While the transmissive zone is mostly comprised of clayey material, the gravel-containing zone contains some gravel and sandy gravel that varies in thickness from about 6 to 7 feet near the source area on-site and thins until almost nonexistent immediately north of Jacobs Avenue as identified on existing boring logs. The higher TCE concentrations in groundwater are generally limited to a gravel-containing portion of the transmissive zone. Additional details on the site geology and hydrogeology are documented in multiple previous reports and work plans (see RRMP).

The current understanding of site lithology, contaminant concentration, and groundwater flow pathway suggest that groundwater from the source area is likely not flowing directly north/northeast into the residential area. However given the flat groundwater elevation of the area around Ingersoll Ave, groundwater may potentially be flowing from the dissolved phase plume (i.e., areas located within the groundwater plume not associated with the source area) northwest of MW-25, past Ingersoll Avenue, and into the residential neighborhood. High precipitation events have the potential to alter this flow path as well as the presence of the groundwater divide just south of Ingersoll Avenue.

All potable water used by the Whirlpool facility and the surrounding area's residents is provided by the municipal water system. There are currently no uses of groundwater within or near the impacted groundwater. However, there is no ordinance or restriction prohibiting groundwater use in the impacted area at this time.

1.2 Human Health Risk Assessment Conclusions

As discussed in the Human Health Risk Assessment (HHRA) (Appendix A of the RRMP), potential exposures to COCs detected in on-site soil and off-site groundwater under current land and groundwater uses do not present potentially significant risks to the evaluated receptors.

Under current on-site land and groundwater uses, potential risks could exist for certain onsite exposures to groundwater as presented in the HHRA (Appendix A of the RRMP).

In the hypothetical scenario in which water use wells are installed in the area of impacted off-site groundwater, potentially significant exposures could result from use of the groundwater.

1.3 Remedy Objectives

The RADD states containment of soils, and ISCO/reduction coupled with monitored natural attenuation (MNA) for the groundwater are the most effective remedial approaches for the site to meet the remedial action levels (RALs) defined by the RADD.

- On-site Soils – RALs defined by RADD will be met with a containment-based corrective measure coupled with institutional controls.
- On-site groundwater – RALs defined by RADD will be met with ISCO/reduction coupled with monitored natural attenuation and institutional controls to reduce concentrations in groundwater at the source and reduce or eliminate the source to the off-site groundwater plume which will facilitate the reduction in concentrations in off-site groundwater as well.
- Off-site groundwater – RALs defined by RADD will be met with ISCO/reduction coupled with monitored natural attenuation to reduce concentrations in groundwater. Institutional controls may also be considered to prevent the use of groundwater that has COC concentrations that exceed the RADD RALs until those concentrations decrease to levels that are at or below RALs.

1.4 Remedy Technical Approach

To achieve the remedial objectives, the final remedy defined by the RADD includes the following actions to address surface and subsurface soils and groundwater. To address surface and subsurface soils an asphalt cover will be placed over the impacted soil surface area and a soil gas monitoring program will be implemented. Groundwater will be treated with on and off-site ISCO to reduce or eliminate COC concentrations and on and off-site MNA. Institutional controls (ICs) will also be implemented to further protect human health at the facility. Subsequent sections of this Work Plan provide discussion of the tasks required to complete the final remedy to prevent exposures, reduce COC concentrations, and monitor the progress of the remedy. A schedule for implementation of these tasks is also included as Figure 8.

2 Remedy Implementation

The following sections of the Work Plan outline how the final remedy, as defined by the RADD, will be implemented to meet the RADD RALs and monitor progress. The elements are:

1. On-site ICs
2. Impermeable soil Cover
3. ISCO
4. MNA
5. Performance Monitoring

Use of active and passive technology in conjunction with the proposed ICs, to eliminate exposure, is designed to shorten the necessary duration over which these restrictions are necessary. The monitoring is designed to provide a quantitative mechanism for tracking reduction of COCs in groundwater and confirm that potentially significant exposures do not exist.

The overarching implementation strategy will incorporate an adaptive remedial approach as outlined in USEPA guidance. As the project progresses and each critical step is completed, additional data collected will be evaluated and incorporated into the site understanding in order to guide future activities and expedite achievement of the requirements of the RADD. Effective remediation requires the gathering and analysis of the necessary facts in order to be successful. In the instance that deviations from the current Work Plan are needed, an adaptive remedial approach that incorporates the use of supplemental work plans that are based on the findings of previous activities will be used. Whirlpool Corporation will use the reporting required by the RADD to keep ADEQ, the City of Fort Smith, and residents informed of the progress.

2.1 Institutional Controls

As summarized in Section 1.4, no current exposures to COCs detected in on-site soil and off-site groundwater present potentially significant risks to the evaluated receptors. Exposure to on-site groundwater could present potentially significant risks under current on-site land and groundwater uses. In a hypothetical future scenario in which water use wells are installed in the area of impacted off-site groundwater, potentially significant exposures could result from use of the groundwater.

To control on-site exposures and eliminate hypothetical future potable use of groundwater, restrictive covenants will be utilized. The restrictive covenants will control potential current exposure to on-site soil and groundwater. Whirlpool Corporation will record a restrictive covenant for the entire property prohibiting any groundwater well installation, and a restrictive covenant only in the area of impacted soil, restricting excavation and removal of the impermeable soil cover without ADEQ consent. All restrictive covenants will require future owners of the property to adhere to the recorded restrictions. These ICs will be maintained until concentrations of COCs meet the requirements of the RADD.

2.2 Impermeable Soil Cover

The impacted soil surface area will be covered with asphalt and an impermeable coating. The cover will be designed to prevent surface water from migrating through impacted soils. The soil cover will be installed after completion of all ISCO injections.

2.3 In-Situ Chemical Oxidation

Successful ISCO remedy implementation involves the completion of several steps, each of which is a building block for the subsequent step. These steps, which are outlined in more detail in the sub-sections below, include:

1. Pre-Design
2. Bench Scale Testing
3. Pilot Scale Testing

4. Design
5. Implementation Phases I and II

This remedial process incorporates a phased approach including a pre-design phase followed by two phases (Implementation Phases 1 and 2) of chemical oxidant injections. The purpose of the pre-design phase is to gather additional information to ensure that the proper oxidant is being used and it is delivered in the correct quantity and in the correct method(s) to maximize contact with impacted medium. Phase 1 includes the first round of injections at the three predefined areas of treatment (Figure 3), although these areas may be modified if pre-design results indicate that treatment in other or additional areas would be more beneficial.

2.3.1 Pre-Design

The first component of a successful ISCO treatment plan for the site is the completion of pre-design activities. Building on current site data, the pre-design activities are needed to fully develop COC characterization necessary for the final remedy design within the three proposed injection locations.

The effectiveness of previous ISCO applications was reduced due to back diffusion and a site characterization that was not thoroughly developed. Therefore, it is critically important to further understand the formation and location of the transmissive zones, the characterization of the COC mass, the hydraulic conductivity of all of the layers (or lenses) within the transmissive zone, the radius of influence of an injection point, the availability of an oxidant to oxidize COCs within site-specific soils, and amount of oxidant required to effectively oxidize COCs to below target levels. Collection of this information will allow for an ISCO remedy that is properly designed.

Results from pre-design activities will also assist in determining correct oxidant delivery methods. If the zone of contamination is thicker (in depth) than previously identified, and if radius of influence tests produce smaller effective areas than the 10-foot radius of influence identified in previous pilot studies, then other oxidant delivery methods such as the Lang Tool in-situ mixing method may be evaluated in lieu of injection wells.

A review of each area and associated pre-design testing information to be completed within that area is detailed below. Areas 1, 2, and 3 are defined on Figures 3, 4, and 5. Field work associated with pre-design efforts was completed in September and December 2013 and January 2014.

2.3.1.1 AREA 1 Pre-Design Activities

Area 1 (see Figures 3 and 4) is located within the on-site source area near the northern edge of the former manufacturing building. Historical groundwater data for wells located within, and near, Area 1 indicate that groundwater concentrations are highest at groundwater monitoring wells MW-25 and ITMW- 19. The well logs for these two wells indicate differences in subsurface stratigraphy profile, depth and degree of saturation and COC impacts within a relatively small area. The saturated sand and gravel layers within the moist clay and fine sand and silts in ITMW-19 result in very large conductivity ranges within a small vertical interval and maximizes the potential for absorbing COCs into clayey material.

The rebound of COCs following the 2002 field pilot test of ISCO treatment in the source area occurred within 90 days following injection[1]. The field pilot report indicates the rebound may be attributed to recharge of the area with impacted groundwater. The discussion relating to the possibility of desorption of COCs from fine-grained soils is limited to an implication based on changing groundwater levels. The pilot test was centered in the area around groundwater well ITMW-11. The boring log for ITMW-11 indicates elevated field screening results in the fine soils from near grade to saturated soil at depth. The ISCO application was directed into the basal aquifer unit only in temporary wells screened from 20 to 24 feet below ground surface (bgs). Saturated conditions in ITMW-11 are indicated from 16 to 29 feet bgs in material ranging from fine silty sand to sand and gravel. The mass of COCs in the fine grained soil is important information for design of the ISCO application.

To fully understand the soil (vadose and saturated) and groundwater COC concentrations within the proposed remedial area, as well as the potential oxidant demand, the conductivity profiles, the potential radius of influence for injection of an oxidant, etc. the following data will be collected in Area 1:

- Geoprobe soil borings with Membrane Interface Probe (MIP) profiling to generate screening data to refine and focus the further Geoprobe efforts below in the area;
- Geoprobe soil borings and groundwater sampling to refine the extent of the source area to the north, south, east and west;
- Geoprobe soil borings to collect groundwater and saturated soil samples for bench testing for oxidant selection and oxidant demand;
- Geoprobe borings for Hydraulic Profiling Tool (HPT) and conductivity profiling to determine slug test intervals; and
- Geoprobe borings to complete discrete interval slug testing.

Figure 4 depicts the approximate sampling locations to confirm the treatment area. Continuous soil sampling will be conducted, soil will be field screened with a PID and the site lithological profile recorded as observed by the geologist. Soil samples will be collected for laboratory analysis from potential zones of impact as defined by PID readings and visual observations. Groundwater sampling will also be completed. The soil and groundwater samples will be analyzed by SW486 Method 8260B.

The range in lithology noted on the well logs indicates the site horizontal conductivity varies greatly with depth. Former pilot work near Area 1 resulted in a rebound in COC concentrations within 90 days of oxidant application. The oxidant was applied through a four foot screened interval placed near the upper portion of approximately 13 feet of saturation. The conclusions of the pilot test (ERM 2002) pose the following:

[1] Final Report on Field Pilot Test of In-Situ Ground Water Treatment Using Chemical Oxidation, ERM August 2002.

- The generally accepted groundwater flow velocity is approximately 2-feet per month. If rebound is due to the influx of additional impacted water post treatment then the groundwater flow velocity may be greater than 2-feet per month and/or groundwater flow direction is more variable than assumed.
- Groundwater color change with well purging (purple) indicated the presence of residual permanganate six months post injection. Therefore the permanganate may not have been distributed across the impacted zone.

During injection activities the oxidant will follow the path of least resistance. This path may not be where the dissolved and/or adsorbed COCs reside in the soil matrix. The purpose of this task is to refine the understanding of the site hydraulic characteristics within the saturated impacted zone is needed to design the injection methodology.

The Geoprobe down-hole HPT, utilizes two direct sensing technologies to record a continuous soil profile as the probe is advanced to depth. These are the Electrical Conductivity (EC) sensor and fluid injection pressure response sensor. This information relates in-situ grain size distribution to the fluid transmittal properties of the unconsolidated profile. As the probe is advanced, clean water is pumped through a screen on the side of the HPT probe at rates in the range of 100 to 400 mL/minute while the injection pressure and EC response is measured with depth. Injection pressure is an indication of the hydraulic properties of the soil (i.e., relatively low pressure response is indicative of a relatively large grain size and the ability to easily transmit water and vice versa). EC measurements with depth generally correlate to grain size and water injection flow rate (i.e., the high electrical conductivity indicates reduced grain size such as clay which requires higher fluid injection pressure and lowers the water flow rate and vice versa). The resulting output is a standard electrical conductivity graph with a graph of pressure and flow rate of the fluid injection. This work will be completed in Area 1 as shown on Figure 4. Based on these results, hydraulic slug tests will be completed as also shown on Figure 4.

Examination of the well logs indicates a high degree of variability vertically in lithology over the 10 to 15 feet saturated soil zone. The results of the slug testing will assist in designing the injection methodology by providing an estimate of conductivity for each of the impacted lithologic zones.

2.3.1.2 AREA 2 Pre-Design Activities

Site groundwater sampling results for wells located within Area 2 indicates groundwater concentrations are highest at groundwater monitoring well IW-79[2].

As discussed above for Area 1, additional data collection is necessary to fully understand the lithology, hydraulic conductivity, oxidant demand, etc. in Area 2, therefore the following data will be collected:

- Geoprobe soil borings with MIP profiling will be completed to focus the efforts in this area;

[2] Figures 3 and 4, 2012-2013 Annual Groundwater Monitoring Report

- Geoprobe soil borings and groundwater sampling at the east and west edge of the treatment area to confirm there are no large changes in lithological profile that will affect the injection design and collect saturated soil and groundwater samples to confirm the treatment area;
- Geoprobe soil borings to collect groundwater and saturated soil samples for bench testing for oxidant selection and oxidant demand;
- Geoprobe borings for conductivity profiling to determine slug test intervals; and,
- Geoprobe borings to complete discrete interval slug testing.

Figure 5 indicates the approximate locations for sampling to confirm the area to be treated. Continuous soil sampling will be conducted, soil will be field screened with a PID and the site lithological profile will be recorded as observed by the geologist. Soil and groundwater samples will be collected for laboratory analysis. The soil and groundwater samples will be analyzed by USEPA method 8260B.

The purpose of conducting the conductivity profiling in Area 2 is to refine the understanding of the site hydraulic characteristics within the Area 2 saturated impacted zone to design the injection methodology. One slug test will be completed at Area 2 as shown on Figure 5.

2.3.1.3 AREA 3 Pre-Design Activities

Groundwater concentrations at IW-77 are higher than at the upgradient wells in Area 2. The field screening data indicates there are low level detects of COCs above the saturated soils.

As discuss above for Areas 1 and 2, additional data collection is necessary to fully understand the lithology, hydraulic conductivity, oxidant demand, etc. in Area 3, therefore the following data will be collected:

- Geoprobe soil borings with MIP profiling will be completed to focus the efforts in this area;
- Geoprobe soil borings and groundwater sampling at the east and west edge of the treatment area to confirm there are no large changes in lithological profile that will affect the injection design and collection of saturated soil and groundwater samples to confirm the treatment area;
- Geoprobe soil borings to collect groundwater and saturated soil samples for bench testing for oxidant selection and oxidant demand;
- Geoprobe borings for conductivity profiling to determine slug test intervals; and
- Geoprobe borings to complete discrete interval slug testing.

Figure 5 depicts the approximate locations for Geoprobe sampling to confirm the area to be treated. Continuous soil sampling will be conducted, soil will be field screened with a PID and the site lithological profile will be recorded as observed by the geologist. Soil and groundwater samples will be collected for laboratory analysis. The soil and groundwater samples will be analyzed by USEPA method 8260B.

As discussed, the purpose of conducting the conductivity profiling is to refine the understanding of the site hydraulic characteristics within the Area 3 saturated impacted zone to design the injection methodology. One hydraulic slug test will be completed in Area 3 as shown in Figure 5.

2.3.2 Bench Scale Testing

The second step in the implementation of the ISCO treatment is the completion of bench scale testing. Bench scale testing is required to identify the appropriate oxidant to use in the following pilot scale test and, when successful in the pilot scale testing, in the full scale implementation phase(s).

In order to complete the bench scale testing on impacted soils and groundwater from the site, samples will be collected from Areas 1 through 3 as shown on Figures 4 and 5. These samples will be submitted to a lab for bench scale testing and screening. During this bench scale testing, based activated sodium persulfate and modified Fenton's reagent activated sodium persulfate will be reviewed for ability to oxidize COCs at the site. In addition to a review of oxidants, the bench scale testing will be used to determine the current soil oxidant demand at the areas of injection to calculate the amount of oxidant required to treat each specific area.

2.3.3 On-Site Pilot ISCO Treatments

Based on the results and analysis of the pre-design activities and bench scale testing, an on-site pilot scale ISCO injection treatment will be completed at Area 1. Pilot scale testing includes injections of oxidation treatment, evaluation, and monitoring of performance over a six-month time frame. Pilot scale testing is an intermediate step necessary to design an effective larger scale treatment remedy. The pilot scale program gathers information required to verify the effectiveness of the remedy under site-specific conditions before moving to expanded design and implementation. The pilot test will provide important design scale-up information based on the site-specific application of the chosen oxidant into the subsurface.

The on-site pilot-scale treatments will begin after receiving the necessary permits from ADEQ required to complete the subsurface injections. The specifics and timing of the issuance of the permits will vary based on the information obtained during the pre-design activities and bench-scale testing. Other on-site pilot treatment activities may be completed at Areas 2 and 3 if results from the Area 1 tests suggest additional information prior to application of ISCO at these areas is necessary.

Conceptual On-Site Pilot Test Scenario:

- Install approximately 20 direct push (Geoprobe) boreholes deployed across a 10-foot vertical interval (exact placement to be determined based upon pre-design and bench scale test results).

- Borehole locations will be generally placed on a grid pattern with offsets on each row to encourage overlap of radius of influence from the injection points.
- Geoprobe tooling will be driven to depth at each location and injectant(s) added at quantities determined based on results of the bench scale testing; injection pressures will also be determined based upon pre-design results.
- A minimum of four 1-inch piezometers will be installed within and adjacent to the pilot test area, to monitor performance. These piezometers will be located at varying distances from the pilot test area to assist in evaluation of oxidant reaction/COC reduction with distance from the pilot area. If possible, based upon pilot location, in place monitoring wells will also be used to monitor performance.

2.3.4 Design

The fourth step is the design of the full-scale ISCO remedy, which will commence after completion of the pilot scale testing. The data and results from the prior activities provides site-specific information to determine the most effective amount, process(s), and method(s) of delivery of the oxidant to the target areas. An ISCO Final Basis of Design that may include the following components will be prepared.

- Site Plan
- Design Basis
- Bench / Pilot Scale Review
- Plans / Specifications
    - Process Diagrams
    - Equipment Lists
    - Operating procedures
    - Specifications for Equipment and Material
    - Identification of injection location type (permanent / temporary)
- Health and Safety Plan
- Waste Management Plan
- Required Permits
- Long Lead Procurement Considerations
- Detailed Project Schedule
- Final Basis of Design Report

2.3.5 Implementation

The fifth step in the ISCO treatment is implementation of the full-scale design. The details of the phased implementation will be described in the Final Basis of Design Report as described in

Section 2.3.4. The following outline of the phased implementation of ISCO is presented as an overview based on current site understanding.

2.3.5.1 Phase I Implementation

Phase I includes the first round of oxidant injection into the approximate locations identified on Figure 3. Information gathered in the pre-design and design stages will be used to further refine the areas selected for injection, the oxidant type, and the manner of injection or oxidant delivery.

Phase I will include the injection of an oxidant into the three areas outlined on Figure 3. Injection points will be installed on 10-foot centers (unless pre-design results show the need for a different spacing). Information gathered during the pre-design stage will help determine the appropriate delivery method(s), however if injection points are used, most of the points are currently planned to be completed as temporary points via Geoprobe to allow the greatest flexibility for continued oxidant delivery as required in later stages. Some permanent points may be installed in the source area (Area 1) if data gathered during the pre-design investigation show that injection at specific depths will continue to provide the contact required to adequately oxidize the COCs. Assuming injection points will be used as the delivery method, these injection points will be screened in the transmissive zone only. Area 1 (the on-site source area) is currently estimated to be 320 feet by 80 feet, and as such would require approximately 256 injection points. Area 2 (north of Ingersoll Avenue) is estimated to be 210 feet by 20 feet and as such would require approximately 42 injection points. Area 3 (near IW-77) is estimated to be 90 feet by 30 feet, and as such would require approximately 27 injection points. Injection points may be added or removed depending upon the hydraulic conductivity and lithology identified during the pre-design phase of work and resulting design.

As an example, if persulfate is determined to be more effective in treating COCs than permanganate which was previously used, up to 45,000 pounds of persulfate could be injected into Area 1, up to 7,000 pounds of persulfate could be injected into Area 2, and up to 4,500 pounds of persulfate could be injected into Area 3 (assuming a soil oxidant demand of 5 grams of persulfate per kg of treated soil). All injections would be completed under pressure. To determine the correct pressure breakthrough, pressure would be decreased to approximately 3 to 5 psi. Based on bench test results, peroxide may be added to continue to reduce mass following the persulfate injections if manganese is not identified within the injection area due to prior permanganate injections. The type and dosage of oxidant used are both critically important to the treatment of the proposed areas. Additional evaluation during the pre-design phase will aid in determining the oxidant type and oxidant potential on site-specific soils prior to injection event(s).

As part of Phase I implementation, additional monitoring points will be installed at various locations within Areas 1, 2, and 3 to determine the level of effectiveness at the 3 month and 6 month stages post ISCO application. Additional monitoring events maybe completed if pilot test results indicate the need for a longer monitoring period. The location of these monitoring points will be affected by the data gathered during the pre-design investigation. Hydraulic conductivity and estimated radius of influence data will assist in determining the correct placement of the monitoring wells so that short term effectiveness can be appropriately measured. Monitoring points will be analyzed for VOCs via 8260B as currently completed during semi-annual monitoring events.

After monitoring is completed (at least 6 months post ISCO injection) Phase II implementation will begin if deemed necessary.

2.3.5.2 Phase II Implementation

While the purpose of Phase I is mass COC reduction and control of COC migration off-site, Phase II may be designed to focus on further reduction of residual COC concentrations by ISCO to enhance further reduction of COC concentrations via on-going MNA. Phase II may address any identified back diffusion after implementation of Phase I.

Based upon the data gathered during the previous stages, Phase II may include additional targeted ISCO delivery. It is likely that additional Geoprobe injection borings may be completed in appropriate locations in all three areas identified by Phase I results to achieve oxidant delivery to impacted soil and groundwater. It is assumed that the same oxidant used during Phase I would be used during Phase II.

As described within Phase I implementation, Phase II may also include 3- and 6-month monitoring events to evaluate the effectiveness of the ISCO application. Groundwater samples collected from these monitoring points will be analyzed for COCs via USEPA Method 8260B as currently completed during semi-annual sampling events.

At the end of the 6-month monitoring program, results will be evaluated to determine if additional ISCO phases are required to reach appropriate COC levels.

2.4 Monitored Natural Attenuation

MNA is the continuing reliance on naturally occurring subsurface processes to control or prevent migration and/or over time achieve site-specific remediation objectives (USEPA 1989). Natural attenuation processes (the NA of MNA) include a variety of naturally occurring physical, chemical, and biological processes that, under favorable conditions, substantially reduce the mass, toxicity, mobility, volume, or COC concentrations in soil and/or groundwater. COCs can be biologically degraded both anaerobically (via reductive dechlorination) or aerobically. MNA will be relied upon to reduce residual COCs after the effectiveness of the ISCO is reduced.

Since MNA relies on source reduction, natural recovery processes can potentially be inhibited or stalled if ongoing sources of contamination are not controlled. Efforts to reduce or eliminate the source(s) benefit the ongoing natural recovery of the site.

Natural attenuation will continue to be monitored throughout the final remedy process as defined by the RADD.

2.5 Soil Vapor Monitoring

Whirlpool installed soil gas monitoring points in May 2012 to collect soil gas data to provide an additional line of evidence to compliment the vapor intrusion modeling analysis completed by

ADEQ and ENVIRON to date. These soil gas data and the vapor intrusion modeling results have been presented in the RRMP. The soil gas data collected over the off-site plume to date[3] show that TCE volatilizes from the groundwater and the TCE vapor reaches levels that are not indicative of a public health concern by the time it is within seven feet of the ground surface, if not sooner, at the locations monitored to date. These data show the vapor intrusion pathway from groundwater through the overlying soil terminates at a soil depth well below the ground surface and therefore well below any residential structure. These findings corroborate the modeling results which indicate vapor intrusion is not occurring at levels that would present a public health concern.

Although the existing soil gas monitoring results already provide data that corroborates the conclusion that there is no unacceptable vapor intrusion risk from the Site, Whirlpool concluded that additional soil gas monitoring points should be installed in order to enhance coverage of the off-site plume. As discussed in the RRMP and defined by the RADD, the performance monitoring activities for the site will include a soil gas monitoring plan. The objective of this soil gas monitoring component is to provide additional assurance that the off-site groundwater plume north of the Site does not present a concern for vapor intrusion into the indoor air of buildings overlying the plume. Whirlpool Corporation will evaluate the additional soil gas data following the approach used in the RRMP and as part of the overall evaluation of remedy performance.

Whirlpool Corporation will work with the ADEQ to finalize the locations defined in the RADD for additional soil gas monitoring points to augment the existing soil gas monitoring points. The new soil gas monitoring points will provide additional lateral coverage over the off-site groundwater plume area. The locations of the additional soil gas monitoring points will be selected based on proximity to: (1) existing off-site groundwater monitoring wells with higher concentrations of TCE, and (2) an occupied residential building. The idea is to install additional soil gas monitoring points at locations that have higher potential for vapor intrusion to occur compared with other locations in the area. The additional soil gas monitoring locations defined by the RADD are shown on Figure 6.

At each of these locations, monitoring points will be installed at two depths between the ground surface and the groundwater (as shown on Figure 7). The first will be installed just above the groundwater surface to characterize the soil gas due to volatilization of TCE from the groundwater. The second monitoring point will be installed at a depth approximately midway between the groundwater surface and the ground surface, or at least five feet bgs, to characterize the degree to which TCE in vapor from the groundwater is or is not migrating to the shallower depth. Soil gas samples will be collected using USEPA and industry standard methods and analyzed for TCE and breakdown components by an accredited analytical laboratory. Soil cuttings generated during the installation of these monitoring points will be containerized, characterized, and disposed of at a licensed disposal facility.

[3] Included in Table 4 of Appendix A in the May 21, 2013 Revised Risk Management Plan (ENVIRON 2013).

2.6 Groundwater Monitoring

In addition to the enactment of ICs, an impermeable soil cover, ISCO applications, and vapor monitoring, groundwater will also be monitored. Groundwater monitoring will continue to be conducted to confirm that the chosen remedial elements continue to be protective of human health. Groundwater monitoring will be completed in accordance with the RADD.

3 Performance Monitoring

As defined by the RADD, Whirlpool Corporation will complete the following performance monitoring and reviews and submit to ADEQ. Whirlpool Corporation will provide copies of all Performance Monitoring documents submitted to ADEQ to the City of Ft. Smith Directors and Administration and access for residents through the Whirlpool Corporation website www.whirlpoolftsmith.com.

3.1.1 Quarterly Performance Monitoring

Whirlpool Corporation will prepare quarterly Corrective Action and Operation and Maintenance Status Reports as required in the RADD. The quarterly reports will be due on February 15, May 15, August 15 and November 15 for the previous quarter’s activity. Quarters are based on a calendar year. The quarterly status reports will contain the following:

- Description of work completed,
- Summaries of all findings in the reporting period,
- Summaries of problems encountered during the reporting period and actions taken to address problems,
- Deviations from any approved work plans or schedules including justification for any delays with revised projected completion date(s), and
- Projected work for the next reporting period.

The Quarterly Status Reports will include the following appendix reports as required by the RADD:

- Soil Gas Monitoring Report
- Groundwater Monitoring Report

Included in the 4th Quarter Report, as an addendum, will be an impermeable soil cover assessment report.

3.1.2 Annual Progress Reports

Whirlpool will prepare annual progress reports that summarize the results of the remedial activities. The Annual Progress Report will be submitted annually on January 15 to ADEQ, the City of Ft. Smith, and the residents in the two block area defined by Ingersoll, Brazil, Jacobs and Jenny Lind.

3.1.3 Two Year Review

As required by the RADD a technical review of the remedial activities and status of the remediation at the site will be prepared and submitted to ADEQ by December 31, 2015. This technical review will assess the need for necessary further action beyond continued MNA. Chemical concentrations of TCE and associated breakdown products in the pilot area(s) will be significantly reduced and will be validated by comparison to pre-injection analytical data.

3.1.4 Alternative Remedy Plan

Based on the results and conclusions of the Two Year Review outlined in 3.1.3, ADEQ may require an alternative remedial plan be prepared by Whirlpool Corporation. The alternative remedial plan must be submitted within thirty (30) days of written notice by ADEQ that ISCO and MNA have not been effective in greatly reducing the COCs. The alternative remedy plan will address separate remedial alternatives to address the subsurface soils and on and off-site groundwater.

3.1.5 Five Year Review

Consistent with the 2005 Arkansas Groundwater Remediation Level Interim Policy, five years after initiating the Final Remedy, Whirlpool Corporation will submit a comprehensive five-year technical review on December 27, 2018 to detail the status of the Whirlpool site final remedy and assess the need for further actions if necessary.

3.2 Contingency Plan

If during the course of the final remedy implementation, progress in meeting remedial action criteria is not satisfactory to both ADEQ and Whirlpool Corporation, additional measures will be undertaken as presented in the RRMP to expedite meeting the remedial action criteria in concurrence with ADEQ participation and approval.

4 Schedule

The Work Plan implementation schedule is presented on Figure 8 and represents Whirlpool Corporation's estimate of the timing for completion of each of the outlined tasks above. The schedule reinforces Whirlpool Corporation's commitment to an efficient, expeditious implementation program to meet the requirements of the RADD. An overview of the schedule is listed below along with start dates for each task:

- Ongoing Quarterly Groundwater Monitoring, Monitored Natural Attenuation and Soil Vapor Monitoring (February 2014)
- ISCO
  - Pre-Design (November 2013)
  - Bench Scale Testing (January 2014)
  - On-site Pilot Scale Chemical Oxidation Injection Program (February 2014)
  - Design Refinement (June 2015)

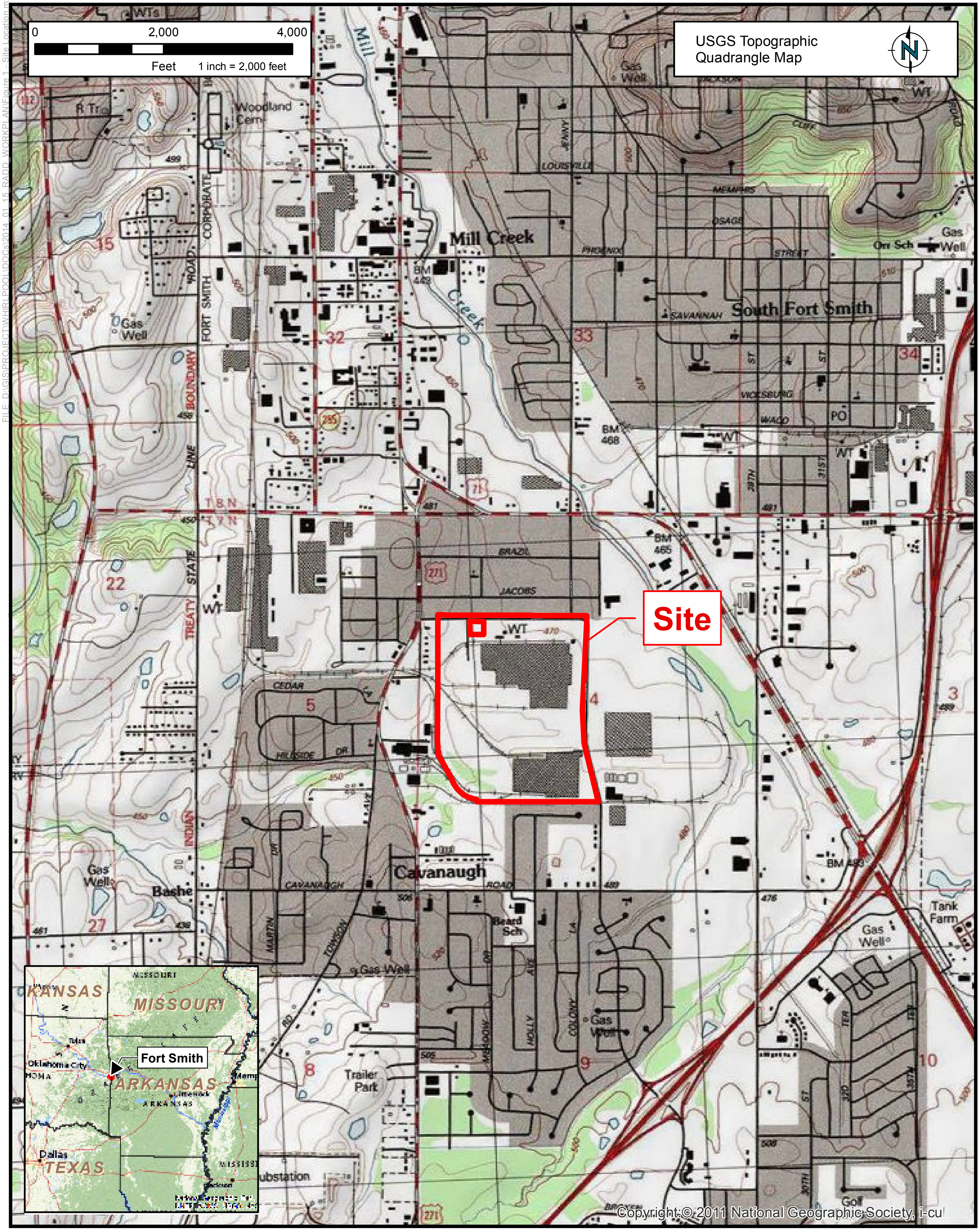
  - Full Scale Chemical Oxidation Injection Treatments
    - Phase I (Spring 2016)
    - Phase II (Spring 2017)
- Impermeable Soil Cover (following completion of ISCO)

Various assumptions were made in drafting this schedule, specific assumptions are listed below:

- Vendor and subcontractor schedules/lead times can accommodate the project schedule as submitted.
- Pilot Scale Implementation includes adequate time to fully measure the performance of the oxidant as well as evaluate potential back diffusion due to COCs contained within tight soil lenses.
- Design of Phase I Implementation commences prior to completion of Pilot Scale monitoring, therefore, it is assumed that information obtained from the last Pilot Scale monitoring event will be fairly consistent with earlier monitoring events.
- Property access issues can be resolved in a timely manner so as not to impact scheduled field work activities.
- Laboratory analytical data will be received within a two week turnaround time.
- Regulatory agencies will review and issue required permits in a timely manner.

The schedule will be reviewed on quarterly basis as part of the performance monitoring. Any schedule revisions will be addressed in the quarterly, two and five year review reports.

Figures



FILE: D:\GIS\PROJECT\WHIRLPOOL\DOCs\2014_01_15_RADD_WORKPLAN\Figure 1 - Site Location.mxd

ENVIRON

SITE LOCATION

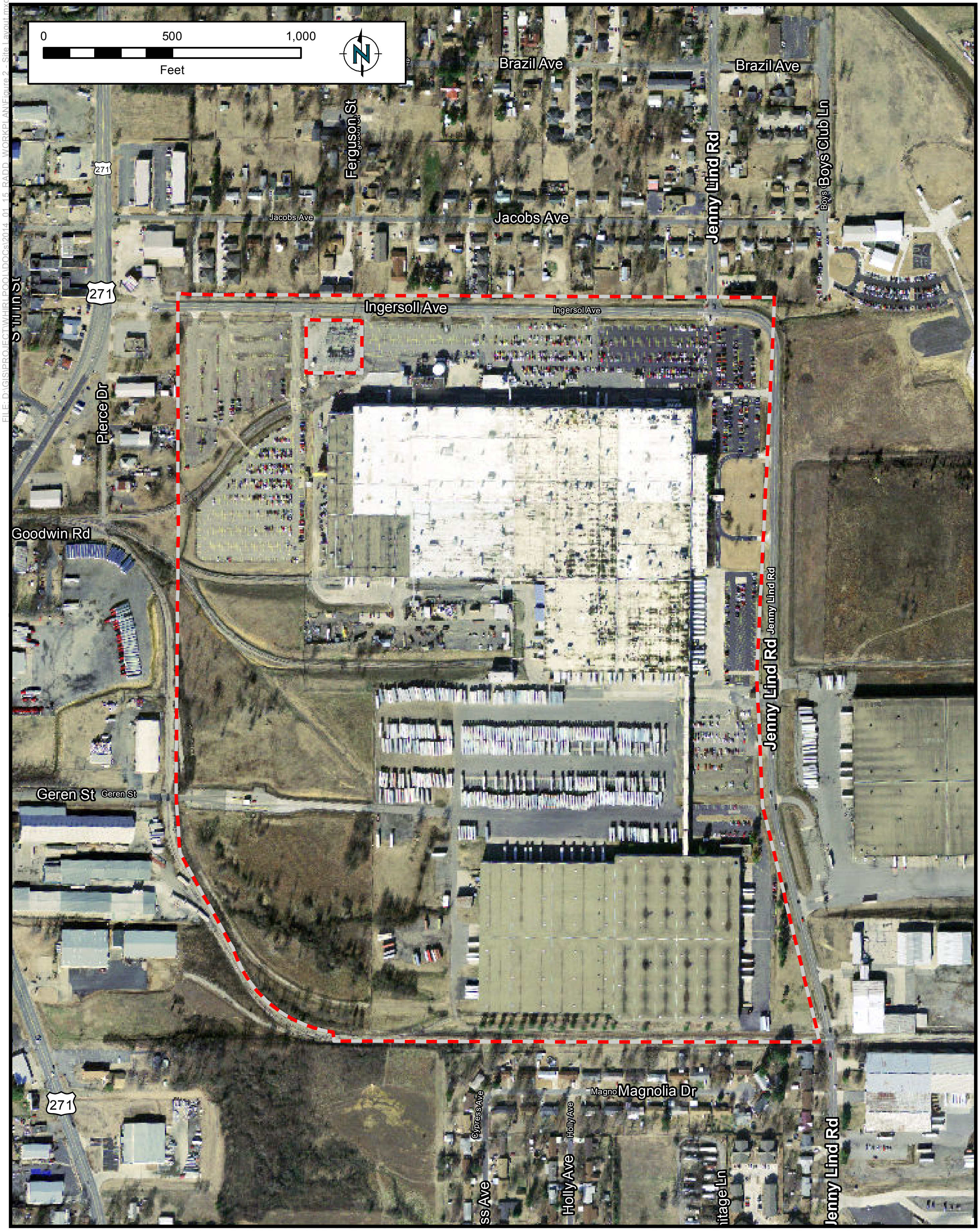
Whirlpool Facility - Fort Smith, Arkansas

Figure 1

DRAFTED BY: KTS

DATE: 01/17/2014

PROJECT: 2131344B



ENVIRON

DRAFTED BY: KTS

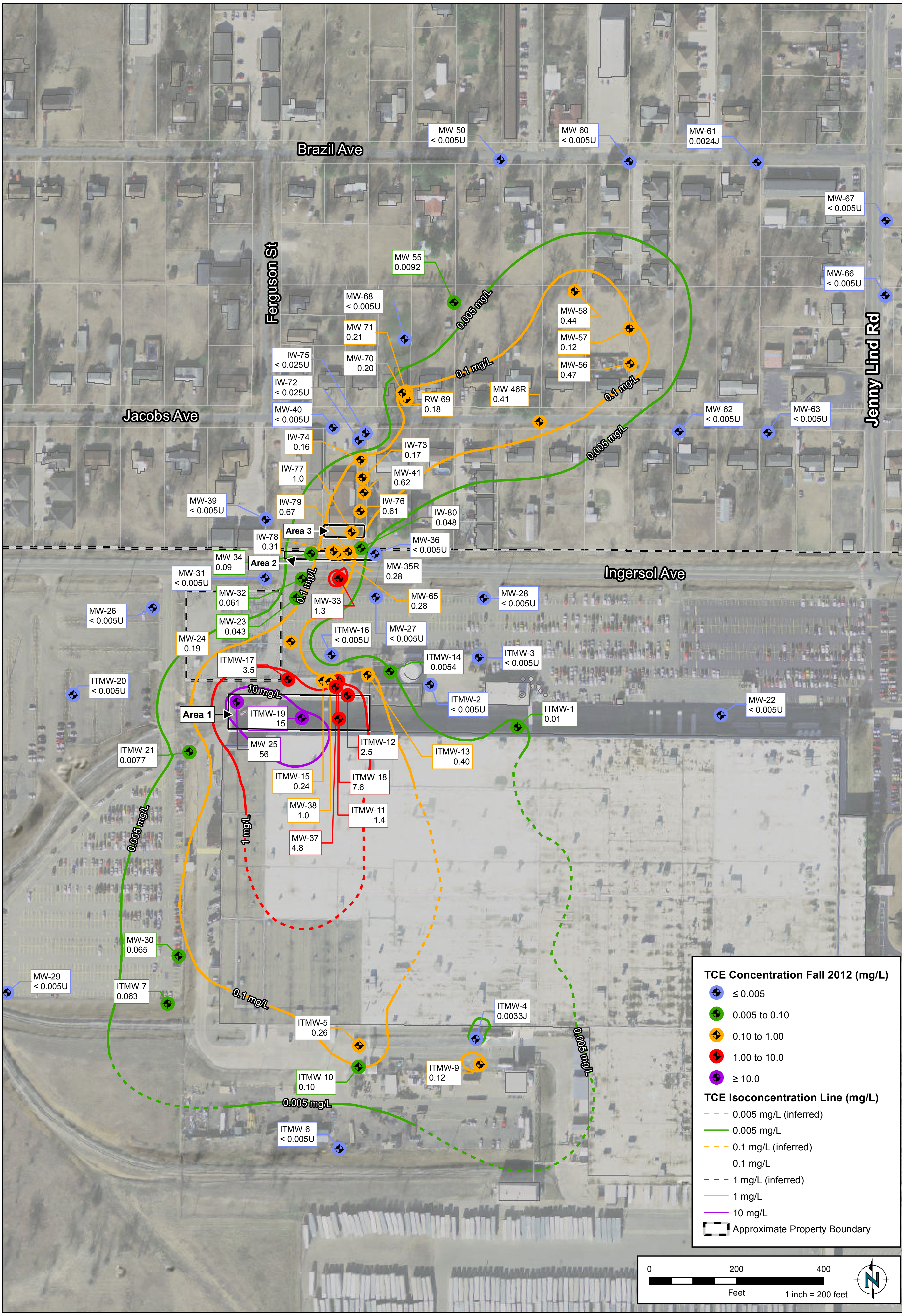
DATE: 01/17/2014

SITE LAYOUT

Whirlpool Facility - Fort Smith, Arkansas

Figure 2

PROJECT: 2131344B



ENVIRON

DRAFTED BY: KTS

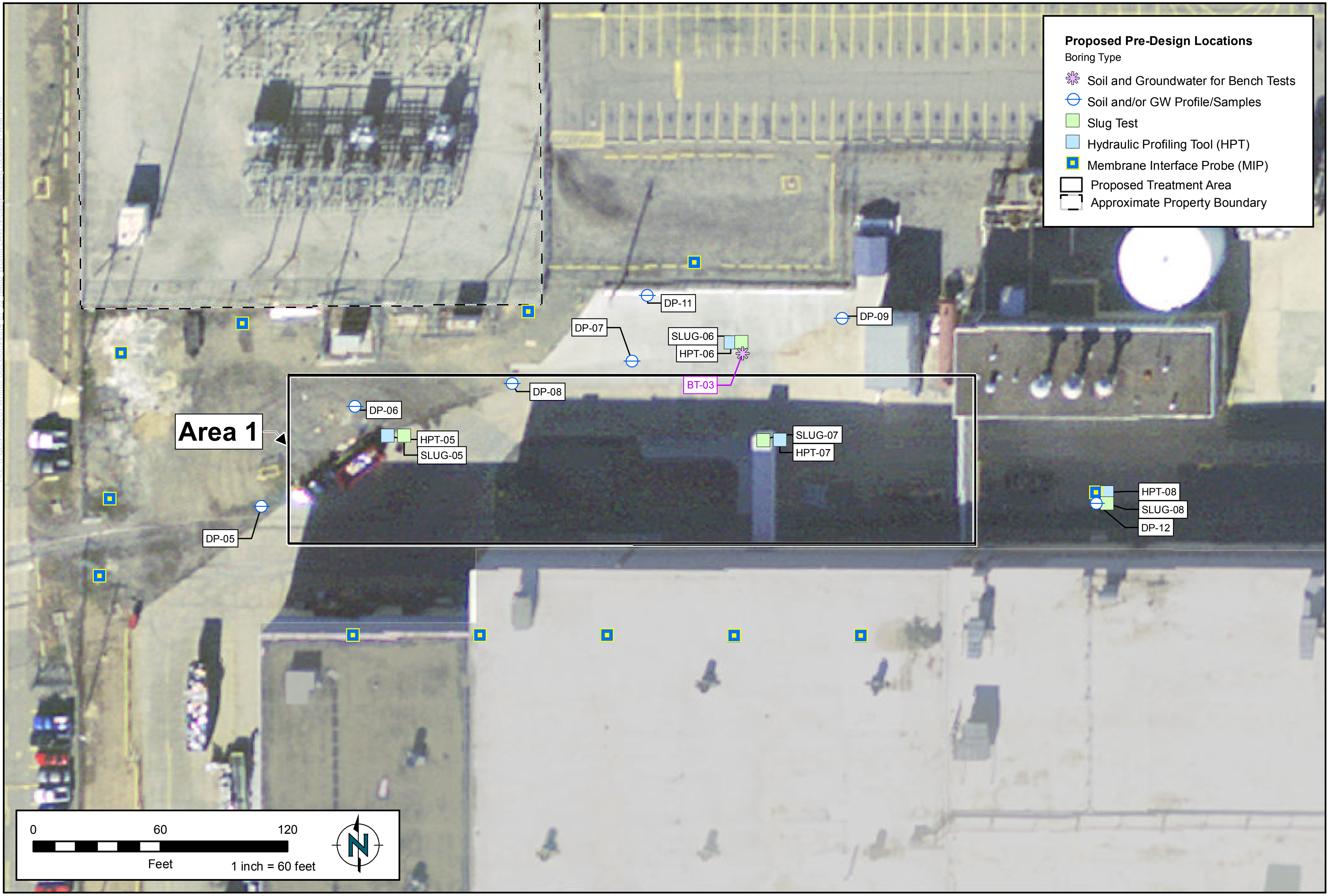
DATE: 01/24/2014

GROUNDWATER TREATMENT AREAS AND FALL 2012 TCE ISOCONCENTRATION MAP

Whirlpool Facility - Fort Smith, Arkansas

Figure 3

PROJECT: 2131344A



ENVIRON

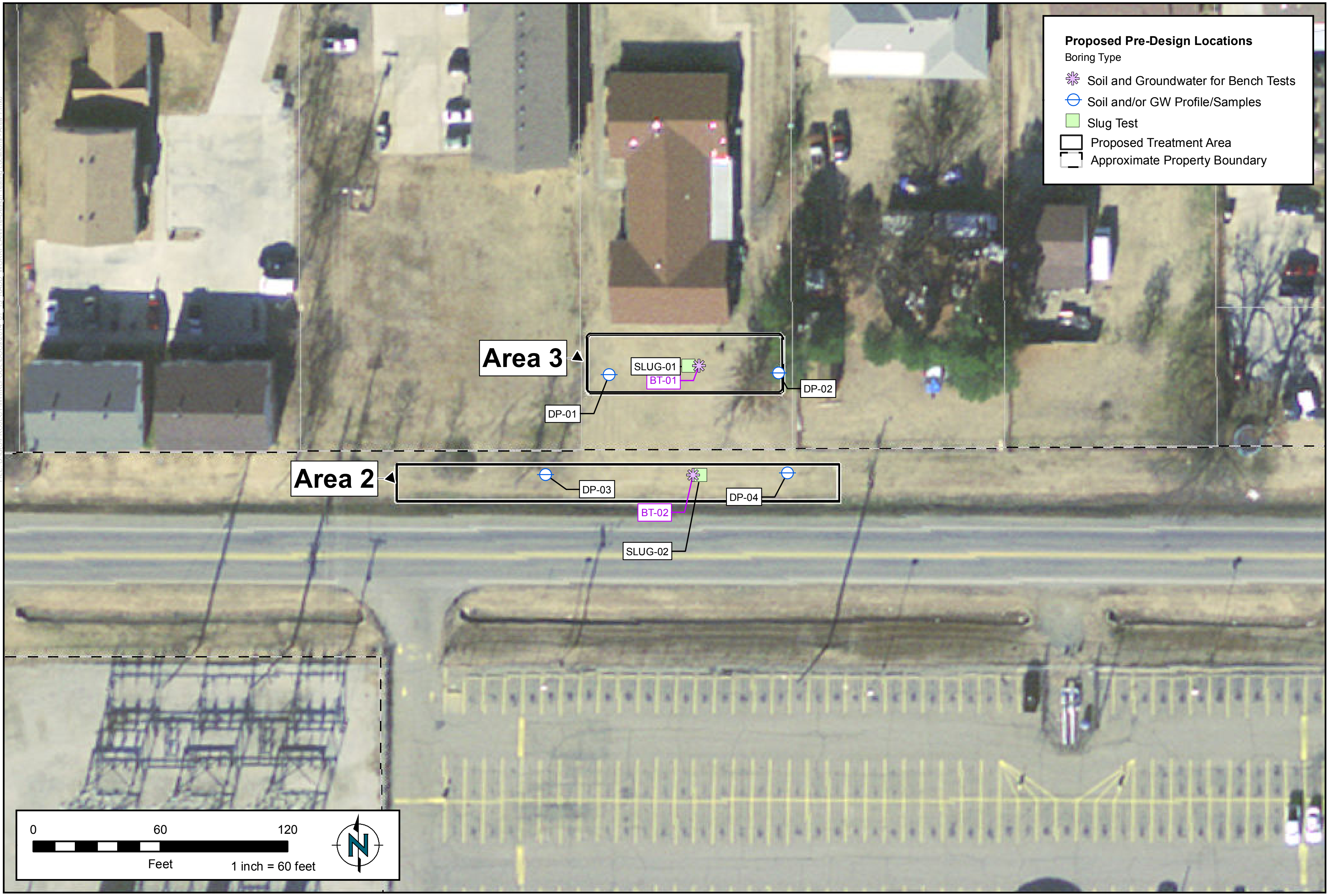
DRAFTED BY: KTS | DATE: 01/17/2014

PRE-DESIGN TESTING LOCATIONS – AREA 1

Whirlpool Facility - Fort Smith, Arkansas

Figure 4

PROJECT: 2131344B



ENVIRON

PRE-DESIGN TESTING LOCATIONS – AREAS 2 AND 3

Whirlpool Facility - Fort Smith, Arkansas

Figure 5

DRAFTED BY: KTS | DATE: 01/24/2014 | PROJECT: 2131344B

ENVIRON

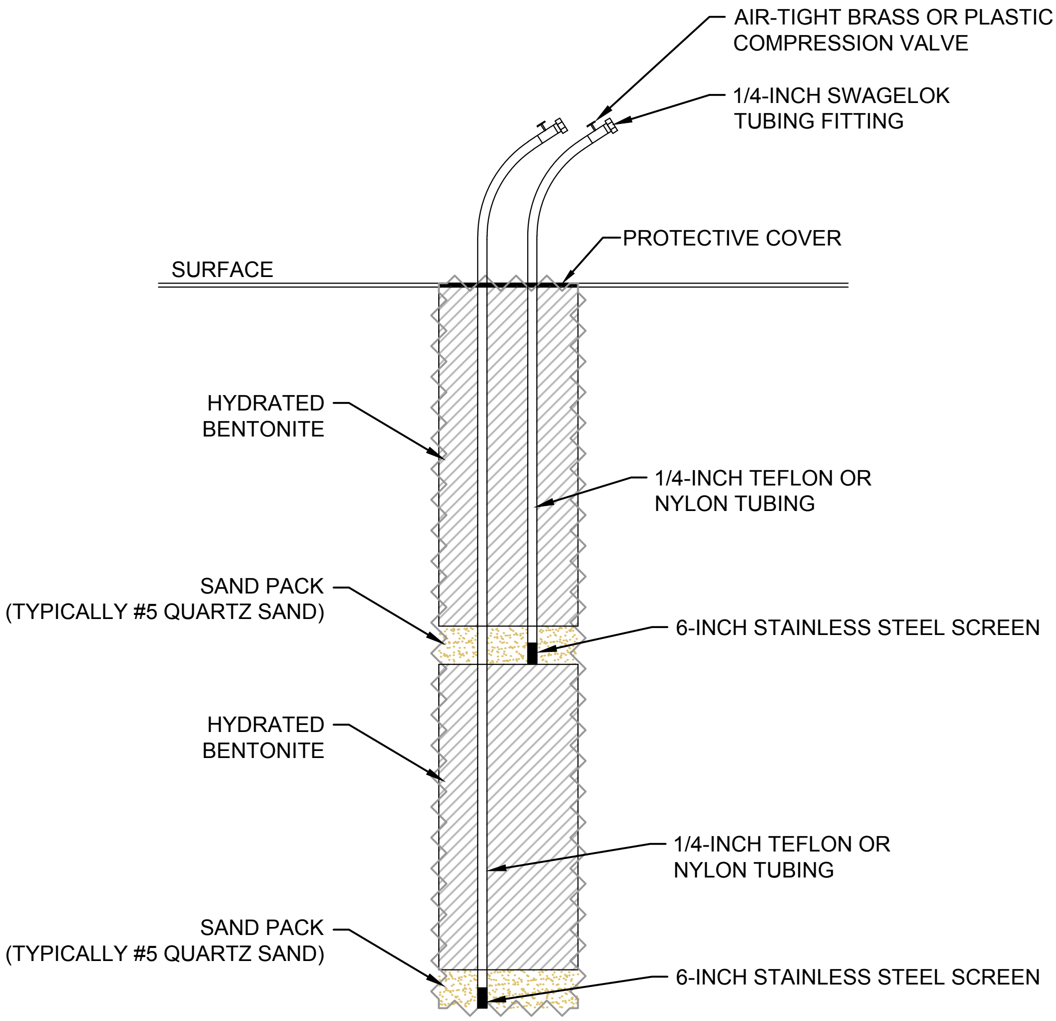
DRAFTED BY: KTS | DATE: 07/16/2013

PROPOSED ADDITIONAL SOIL GAS LOCATIONS

Whirlpool Facility - Fort Sm ith, Ark an sas

Figure 6

PROJECT: 2131344B



ENVIRON

TYPICAL NESTED SOIL GAS MONITORING POINT CONSTRUCTION DETAILS
WHIRLPOOL CORPORATION
6400 JENNY LIND ROAD
FORT SMITH, ARKANSAS

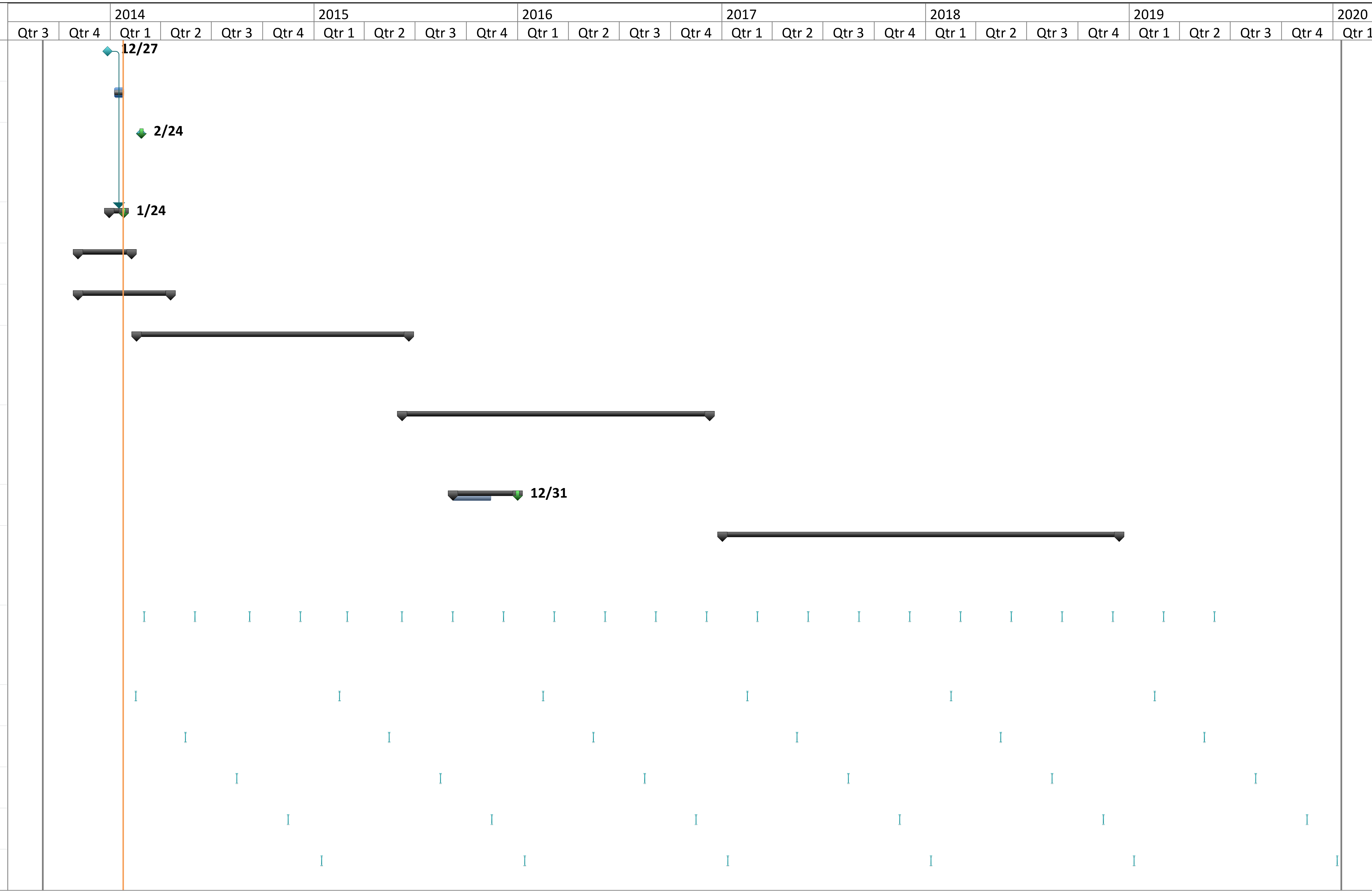
FIGURE
7

DRAFTED BY: BJK\TSP | DATE: 07/08/2013 | 2131344B

TSP 7/8/13 [2131344_DETAIL]
F:\2131344

Whirlpool Ft. Smith - Final Remedy Work Plan Schedule

ID		Task Name
1	✓	ADEQ Issues Final RADD
2	✓	Annual Progress Report
3		On-Site Institutional Controls Recorded
4		**Revised Final Remedy Work Plan**
6		**Soil Vapor Sample Points**
10		**ISCO: Pre-Design**
15		**On-Site ISCO Pilot Scale Treatment Program**
26		**Phase I ISCO Full Scale Treatment Program**
38		**Two Year Technical Review Report**
40		**Phase II ISCO Full Scale Treatment Program**
49		**Quarterly Groundwater & Vapor Sampling**
72		**1st Quartely Progress Report**
79		**2nd Quartely Progress Report**
86		**3rd Quartely Progress Report**
93		**4th Quartely Progress Report**
100		**Annual Progress Report**



Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			

Project: Figure 8 Schedule
Date: Fri 1/24/14