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February 22, 2010

Ms. Bhooma Sundar
Toxicologist/Project Manager
RCRA Corrective Action
Mail Code DE-9J
USEPA Region 5
77 W. Jackson Blvd.
Chicago, Ill 60604

Dear Bhooma;

Subject: AOC US EPA Docket No. RCRA-05-2007-0003

Attached is the Corrective Measures Proposal report and appendices for the Area 9 and Riverbank (SB-59) areas.

Please call me at 215-900-7745 should you have any questions or require additional information.

Sincerely,

Walt Kozlowski /am

Walter E. Kozlowski
Director, Environment, Health & Safety
C&D Technologies, Inc.

Cc:

Aria Klees - Deputy General Counsel
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RS-896

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CORRECTIVE MEASURES PROPOSAL
C&D TECHNOLOGIES
200 WEST MAIN STREET
ATTICA, INDIANA
RCRA-05-2007-0003, U.S. EPA ID NO.:
IND 000 810 754

Prepared for
C&D Technologies, Inc.
1400 Union Meeting Road
Blue Bell, Pennsylvania 19422-0858

February 22, 2010
URS Project Number: 20500205.00001

CORRECTIVE MEASURES PROPOSAL

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February 22, 2010

URS

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TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

LIST OF ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
BERA	Baseline Ecological Risk Assessment
C&D	C&D Technologies
CMP	Corrective Measures Proposal
COEI	Chemicals of Ecological Interest
COPCs	Chemicals of Potential Concern
DNR	Department of Natural Resources
EPC	Exposure Point Concentration
HAPs	Hazardous Air Pollutants
IDEM	Indiana Department of Environmental Management
iwc	inches water column
µg/kg	micrograms per kilogram
O&M	Operations and Maintenance
OHWM	Ordinary High Water Mark
PCE	Tetrachloroethene
PID	Photoionization Detector
PVC	Poly Vinyl Chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SCFM	Standard Cubic Feet per Minute
SV	Screening Value
SVE	Soil Vapor Extraction
TCE	Trichloroethene
TSP	Triple Super Phosphate
URS	URS Corporation
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

Executive Summary

C&D Technologies (C&D) has conducted a RCRA Facility Investigation (RFI) at their Attica, Indiana facility (the Site) to fulfill requirements set forth in the United States Environmental Protection Agency (U.S. EPA) Region 5 Administrative Order of Consent under Section 3008 (h) of RCRA (RCRA-05-2007-0003, U.S. EPA ID NO.: IND 000 810 754) signed January 18th, 2007.

Through human health and ecological risk evaluations performed on the RFI data collected in 2008 and 2009, two areas at the Site have been identified for which remedial action has been recommended to reduce potential risks to acceptable levels. One of these areas is inside the plant and is referred to as Area 9, which is centered on an abandoned rail spur between two manufacturing areas. Chlorinated solvents trichloroethene (TCE) and tetrachloroethene (PCE) were found in shallow (top 5 feet) soils in Area 9, and pose a potential risk for migration to groundwater in the event that concrete covering this area was removed in the future, for example during renovation or redevelopment work.

The second area is outside the plant fence, along the bank of the Wabash River (Riverbank Area), where metal impacted surficial (top 1 foot) soils were found in a localized area formerly used as a historic disposal site for area residents. Here, lead concentrations pose an ecological risk to potential receptors (birds and small mammals).

The potential risks present at these sites can be reduced to acceptable levels by application of generally accepted remedies (presumptive remedies) which have been pre-approved by the U.S. EPA. C&D has retained URS Corporation (URS) to develop a Corrective Measures Proposal (CMP) to identify and evaluate remedial alternatives, and to recommend a preferred remedy.

For Area 9, the presumptive remedy is the application of soil vapor extraction (SVE), which applies a vacuum on the subsurface, causing the volatile constituents (TCE and PCE) to vaporize and be removed from the soil.

For the Riverbank Area, the presumptive remedy is the application of a rock cover in the affected area, to prevent the direct exposure of birds and small animals from the lead impacted surface soil.

C&D Technologies (C&D) has retained URS Corporation (URS) to develop a Corrective Measures Proposal (CMP) for C&D's Attica Indiana Facility (the Facility or Site) located at 200 West Main Street, Attica, Fountain County, Indiana (see **Figure 1-1**). The intent of the CMP is to fulfill CMP requirements set forth in the United States Environmental Protection Agency (U.S. EPA) Region 5 Administrative Order of Consent (Order) under Section 3008 (h) of RCRA (RCRA-05-2007-0003, U.S. EPA ID NO.: IND 000 810 754) signed January 18th, 2007.

The CMP will evaluate potential remedial options for two impacted areas (Area 9 and Riverbank Area) identified at the site during previous RCRA Facility Investigations (RFI) conducted between December 2007 and June 2008. A presumptive corrective measure will be selected for each area from the potential remedial options based on effectiveness, applicability, and efficiency at achieving the corrective measure goals as outlined in the following sections.

1.1 PROJECT BACKGROUND

C&D Technologies has conducted an RFI at their Attica, Indiana facility. A total of 16 SWMUs/AOCs (Areas) were previously identified for investigation in the Current Conditions Report (Clayton 2007) (See **Figure 1-2**). Four new areas were also added during the RFI including the Wabash River, Riverbank Area, Residential Area, and Background.

1.1.1 Initial RFI Investigation

During the initial investigation, soil, groundwater, sediment and surface water samples were collected between December 2007 and June 2008. The analytical results were evaluated and the findings submitted in the October 2008 RFI, Part 1 Report (URS, 2008).

Analytical data collected during the RFI were evaluated to further characterize the release or potential for release from specific Areas to soil, groundwater, surface water and sediment and to assess the potential for adverse effects to human health and the environment. The findings of the RFI are presented below.

No Further Action was recommended for the following Areas:

- Area 1 – Wastewater Treatment Plant;
- Area 4 – Stormwater Sewers (with the exception of surface soil at one location);
- Area 5 – Exterior Former Hazardous Waste Materials Storage;
- Area 6 - Exterior Former Drum Storage Area and Transfer Pad;
- Area 8 – Former Drive-Up Disposal Area;
- Area 10 – Southwest Former Container Storage;
- Area 12 – Central Vacuum System/Baghouses;
- Area 13 – Former Oxide Mill;
- Area 14 – Former Onsite Filling Station (based on information provided with RFI Work Plan), and;
- Area 16 – DC Generator Area.

Based on the human health risk screening, no further action was also recommended for surface water and sediment associated with the Wabash River, and surface soils of the Riverbank Area.

For some Areas where soil is covered with pavement or concrete, there were no risks indicated under current exposure conditions (i.e., industrial worker). However, should excavation beneath the surface occur in these Areas in the future, the exposure route to soils may potentially be complete for the construction or utility worker. Thus, further evaluation of data was recommended for potential exposure of construction workers to specific chemicals of potential concern (COPCs) in soil in the following areas

- Areas 2 and 3 (grouped) – Arsenic
- Area 7 – Arsenic
- Area 11 – Lead
- Area 15 – Arsenic

Additional soil sampling was also recommended for two industrial areas and off-site residential:

- Areas 4 and 9 (grouped as Area 9) – Surface soil sampling to determine the extent of TCE contamination at one location.
- Off-Site Residential –Additional soil samples to be collected and analyzed for arsenic and lead.

Lead concentrations detected at select Riverbank Area soil sample locations were also evaluated as part of the baseline ecological risk assessment (BERA) discussed in following sections.

1.1.2 Additional Risk Evaluation and Soil Investigations

As reported in the RFI, Part 2A Report (URS, 2009a), potential exposure of residents to arsenic in surface soil was found to be equivalent to background and, therefore, not Site-related. Potential risks to utility workers from exposure to lead in surface and subsurface soil in the residential area were found to be acceptable. Potential exposure of construction workers to arsenic and lead in soils located under Site building foundations or other concrete was evaluated in the event that excavation was necessary. No unacceptable risks to construction workers were found for either exposure to arsenic under Areas 2, 3, 7 and 15 or exposure to lead under Area 11. Analytical data of groundwater samples collected during subsequent groundwater investigations were consistent with groundwater quality as previously described in the Part 1 Report (URS, 2008).

The extent of TCE impacted soil in the vicinity of Area 9 was delineated through four additional sampling events: December 16, 2008, January 12, February 9, and April 8, 2009. Analytical data of soil samples collected during the additional investigations indicate TCE and PCE concentrations in subsurface soils exceeded Indiana Department of Environmental Management (IDEM) screening levels for vapor intrusion and migration to groundwater. A vapor intrusion evaluation conducted in September 2009 (URS, 2009e) determined vapor intrusion was not a complete exposure pathway. A more complete discussion of the Area 9 subsurface investigations and vapor intrusion evaluation are presented in Section 2.

1.1.3 Baseline Ecological Risk Evaluation (BERA)

The *Baseline Ecological Risk Assessment Report* was submitted to U.S. EPA on August 10, 2009 (URS 2009b). Comments on the BERA were provided by U.S. EPA Region 5 on October 15, 2009. As a result of these comments and conference calls with U.S. EPA, a refinement of the BERA was presented in an Addendum that was submitted on October 26, 2009 (URS, 2009d).

The results of the BERA indicated potential risks to ecological receptors from exposure to lead. Risk to receptors in the Riverbank Area were primarily associated with one of the fourteen soil samples (CD-SB-59). Analytical data from CD-SB-59 was shown to be a statistical outlier with regard to the other Riverbank samples. Samples adjacent to CD-SB-59 (within 75 ft) did not show the same magnitude of constituent concentrations, indicating a highly localized area of surface contamination.

In a memo dated October 15, 2009, Region 5 U.S. EPA agreed with the conclusions drawn in the BERA. However, highly conservative oral toxicity reference values (TRVs) were used in estimating risk in the BERA. At the recommendation of U.S. EPA, alternative TRVs for lead were applied to refine potential risks associated with lead. Subsequently, the BERA was re-evaluated using the new TRVs and the results presented in the Addendum to the BERA dated October 26, 2009. The findings of the BERA using the alternative TRVs indicate that by removing or otherwise isolating CD-SB-59, the exposure risk to ecological receptors is reduced to acceptable levels (URS, 2009d). Additional information regarding the Riverbank Area investigation and BERA is presented in Section 2.

1.2 CMP OBJECTIVES

The overall objective of the CMP is to evaluate remedial alternatives for each area and to select the most effective alternative that protects human health and environment. The evaluations will consider the following: short term effectiveness, long term effectiveness, toxicity, mobility and volume reduction, implementability, cost, community acceptance and state acceptance.

2.1 AREA 9

2.1.1 Area 9 Characteristics

Area 9 was identified as a SWMU based on a 1948 fire insurance map which identified the room as a “waste and dust storage room.” This room is currently utilized as a compressor room. An outdoor alleyway separates the compressor room from an adjacent manufacturing and assembly area. The compressor room and adjacent manufacturing area were both constructed on concrete slabs (on-grade). According to field notes recorded during previous Area 9 investigations, the concrete slab is approximately 6 inches thick in the compressor room and 8 to 9 inches thick in the adjacent manufacturing area.

The alleyway is currently covered with concrete. Field notes recorded during the RFI Part 1 activities indicate the concrete in the alleyway ranges from 6 inches to 1.0 ft in thickness. A rail spur is present in the outdoor alleyway but is no longer in use. Several underground utilities are present beneath the alleyway including electrical, gas, water, and a primary stormwater sewer line. For the purpose of this CMP, the soils impacted by TCE and PCE beneath the compressor room, outside alleyway, and adjacent manufacturing areas will be referred to as Area 9, unless otherwise specified (see **Figure 2-1**).

2.1.2 Local Geology

According to boring logs recorded during subsurface investigations, shallow sub-surface soils (0 to 10 ft below ground surface (bgs)) in the general vicinity of Area 9 consist primarily of fine sand grading to course sand and gravel with localized interspersed silty sand. Localized areas of fill material were also encountered consisting of brick fragments and wood chips. Select boring logs from Area 9 are included in **Appendix A**.

For purposes of this CMP, a somewhat conservative (i.e., low) saturated hydraulic conductivity value of 6×10^{-3} centimeters per second (cm/s) was assumed for the TCE and PCE impacted soil zone up to 5 ft below the concrete. This conductivity value is based on the soil descriptions in the boring logs included as **Appendix A** and representative values of hydraulic conductivity for a typical clean sand, grading to silty sand (Freeze and Cherry, 1979).

A more complete interpretation of Site characteristics is presented in the *RCRA Facility Investigation Work Plan, C&D Technologies, Attica, Indiana* (URS, 2007a). Investigation activities for soils and groundwater previously conducted at the Facility are addressed in greater detail in the *RCRA Facility Investigation, Part 1 Report, C&D Technologies, Attica, Indiana* (URS, 2008) and the *RCRA Facility Investigation, Part 2A Report: Additional Sampling and Analysis* (URS, 2009a).

2.1.3 Area 9 Soil Investigation

Analytical results of a soil sample collected in the general vicinity of Area 9 during December 2007 indicated TCE was detected at 6,000 µg/kg. The soil sample was collected just beneath the concrete slab from 0 to 1 ft bgs. TCE concentrations were below the laboratory detection limit in soil samples collected from 4 to 5 ft bgs and 9 to 10 ft bgs at the same soil boring location.

At the request of the U.S. EPA Region 5, a confirmation soil sample was collected in June 2008. The soil sample was collected from 0 to 1 ft bgs from a soil boring (CD-SB-21B) installed approximately one foot from the original CD-SB-21 location. Analytical data indicated TCE was detected at 31,000 µg/kg.

Four additional soil sampling events were conducted between December 2008 and April 2009 to delineate the vertical and horizontal extent of TCE, PCE and other volatile organic compounds (VOC) concentrations in soils in Area 9. The maximum soil concentrations for TCE (31,000 µg/kg) and PCE (23,000 µg/kg) exceeded their respective industrial direct closure levels for migration to groundwater (350 µg/kg and 640 µg/kg, respectively) published by IDEM in the upper (0-5 ft) soil interval. Based on the analytical results, PCE and TCE were identified as chemicals of potential concern (COPCs) associated with Area 9 (URS, 2009a). Analytical data from the Area 9 soil investigations are presented in **Table 2-1** and shown on **Figure 2-2**.

2.1.4 Area 9 Vapor Intrusion Evaluation

In a conference call with the U.S. EPA Region 5 on June 25, 2009 to discuss Site conditions, U.S. EPA recommended further investigation of the vapor intrusion pathway, prior to the selection of a final corrective measure for Area 9 soils. During the week of September 20, 2009, URS collected three sub-slab soil gas, two indoor ambient air, and two outdoor ambient air samples from predetermined locations based on previous shallow soil analytical data in Area 9. One of the outdoor ambient air samples was collected upwind of the facility to establish background air concentrations.

Analytical data indicated TCE and PCE concentrations in sub-slab soil gas samples exceeded applicable IDEM screening levels for vapor intrusion. However, TCE and PCE were not detected in indoor ambient air and outdoor ambient air samples collected from locations adjacent to sub-slab sample locations. Analytical data are presented in **Table 2-2** and shown on **Figure 2-3**.

Although TCE and PCE concentrations exceeded applicable screening levels in sub-slab soil gas samples, the absence of these constituents in ambient air samples indicates the concrete slab currently in place across Area 9 provides an adequate barrier to prevent vapor intrusion. The concrete slab in each area appeared to be in good condition with no visible cracks or damage that would create a preferential pathway for vapor migration. Based on current analytical data and current site conditions, vapor intrusion is not considered a complete pathway for potential worker exposure to TCE and PCE vapors (URS, 2009e).

2.2 RIVERBANK AREA

2.2.1 Riverbank Characteristics

The Riverbank Area is a narrow (30-100 ft) riparian habitat adjacent to the Wabash River encompassing approximately 2 acres. Common vegetation includes mature cottonwood trees, box elder, silver maple, mulberry and sycamore, with a sparse understory of herbaceous vegetation (primarily grasses). The Riverbank Area abuts the former city drive-up disposal area. As a result, discarded building material, metal debris and other household rubble may be present in the soil substrate in the Riverbank Area. Soil boring CD-SB-59 is located in a relatively flat, terraced area of the riverbank. The general topography slopes gently approximately five to ten feet north of the soil boring location before sloping sharply to the Wabash River.

Rapid changes in river elevation frequently inundate the Riverbank Area which limits development of a robust vegetative understory and soil invertebrate community. Frequent inundation and the presence of large canopy trees are two important factors in the paucity of understory vegetation and low overall plant species diversity. Because of the nature of the substrate and frequency of flooding, habitat is limited with respect to providing shelter and forage. The area may be important as a travel corridor but the Riverbank Area does not appear to support a diverse ecosystem (URS, 2009b).

During the RFI activities, URS observed large metal debris (i.e., refrigerator, washer, and dryer carcasses, sheet metal, etc) in the Riverbank Area. URS also observed surface debris including smaller metallic items and broken glass from items previously disposed in the area. The area was also littered with miscellaneous debris left over from flood events.

2.2.2 Riverbank Area Investigation

In response to the RFI Work Plan Addendum (URS, 2007b), five soil borings (CD-SB-55 through CD-SB-59) were installed in the Riverbank Area. The soil borings were advanced to a terminating depth of one-foot bgs. Analytical results indicated that lead concentrations exceeding the residential screening value (SV) of 400 mg/kg were detected at soil borings CD-SB-55 (1,050 mg/kg) and CD-SB-59 (6,260 mg/kg). To further delineate the horizontal extent of metal contaminants detected in the Riverbank Area, additional soil samples (CD-SB-87 through CD-SB-95) were collected on April 9, 2008 (see **Figure 2-4**)

A tiered risk-based approach was used to evaluate potential human health risks associated with lead concentrations detected in the Riverbank Area assuming recreational use. Because the residential SV was exceeded, a Tier 2 human health risk assessment was performed based on the mean concentration of lead in Riverbank surface soil (558 mg/kg). Based on typical recreational receptors, the Tier 2 assessment indicated lead concentrations detected in surface soil samples collected from Riverbank soils did not pose an adverse impact to human health (URS, 2008). Potential exposure to ecological receptors is discussed in the following section.

2.2.3 Baseline Ecological Risk Assessment

The BERA identified two areas of interest relevant to the ecological risk evaluation for the Site: (1) the Wabash River, and (2) the Riverbank Area adjacent to the Wabash River. Based on analytical results, arsenic, cadmium, copper, lead, thallium, tin and zinc were identified as constituents of ecological interest (COEIs) in surface soils of the Riverbank Area. Through the BERA process, no site-related COEIs were identified in surface water or sediment in the Wabash River or in groundwater with the potential to discharge to the Wabash River. Therefore, the focus of the BERA was on potential risks associated with exposure to lead impacted surface soils in the Riverbank Area (URS, 2009b).

As stated in the BERA, potential ecological risks were primarily associated with sample location CD-SB-59 which was shown to be a statistical outlier with regard to the other Riverbank samples. Samples adjacent to CD-SB-59 (within 75 ft) did not show the same magnitude of COEI concentrations, indicating a highly localized area of concern. With the exception of lead, risk estimates were acceptable when outlier COEI data were not included in the risk calculation (URS, 2009b). Based on the risk estimates presented in the Addendum to the BERA, lead exposure risks to ecological receptor populations potentially using the Riverbank Area were considered low (URS, 2009d). BERA conclusions were as follows:

- Risks to receptors in the Riverbank Area are localized to soils associated with one sample location (CD-SB-59)
- The exclusion of the data from CD-SB-59 from the risk estimates resulted in a significant reduction of risk to ecological receptors, with
  - acceptable risks levels for the small mammal population, and
  - a low level of risk to the bird population
- Consideration of the frequent inaccessibility of Riverbank habitat due to inundation by the Wabash River is likely to further lower potential risks to the bird population.

Potential risks were described in the context of the proposed remedial action (protective barrier). Based on the results of the amended BERA, removal or otherwise isolating CD-SB-59 and immediately adjacent soils with lead concentrations greater than the exposure point concentration (EPC) of 965 mg/kg (URS, 2009d) would be successful in reducing lead exposure risks to acceptable levels for potential ecological receptors.

As requested by the U.S. EPA, the remedial alternatives were selected for evaluation using U.S. EPA guidance *Users Guide to the VOCs in Soils Presumptive Remedy* (U.S. EPA, 1996) and *Presumptive Remedy for Metals-in-Soil* Sites (U.S. EPA, 1999). Remedial alternatives for both areas will be evaluated according to the following threshold, balancing, and modifying criteria as identified in 40 CFR 300.430, *Remedial Investigation/Feasibility Study and Selection of Remedy* (40 CFR, 2004).

- Protection of Human Health and Environment – Does the remedial alternative provide adequate overall protection of human health and environment?
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) – Does the remedial alternative meet media cleanup objectives (IDEM closure levels, etc.)?
- Long-Term Effectiveness – Does the remedial alternative maintain long-term protection after cleanup objectives have been meet?
- Reduction of Toxicity, Mobility, and Volume – Does the remedial alternative perform as well as anticipated in reducing toxicity, mobility, and volume of contaminant(s) and impacted media?
- Short-Term Effectiveness – How quickly does the remedial alternative perform? This criterion also considers potential effects on human health and environment during construction and implementation of the remedial alternative.
- Implementability – Evaluates if the remedial alternative can be implemented including availability of materials and services.
- Cost – Evaluates the overall cost of the remedial alternative including implementation, operation, and maintenance.
- Community Acceptance – Evaluation of the general public response to the remedial alternative (public comment period).
- State Acceptance – Evaluation on whether IDEM agrees with, opposes, or has no comment on the remedial alternative.

3.1 REMEDIAL ALTERNATIVES – AREA 9

Currently, PCE and TCE concentrations in subsurface soil exceed the IDEM closure levels for migration to groundwater of 640 µg/kg and 350 µg/kg (see **Figure 2-2** and **Table 2-1)**. The vertical and horizontal extent of PCE and TCE impacts in Area 9 has been delineated during previous subsurface soil delineation events. PCE and TCE impacted soils in Area 9 are covered with 6 to 12 inches of concrete and extend beneath active manufacturing areas of the C&D facility. Previous soil investigations indicate impacted soils are unsaturated and are located within the first several feet beneath the concrete, which serves as an effective vapor barrier and cap that prevents downward migration of surface water (i.e., rain water) through the impacted subsurface soils and into shallow groundwater.

The source for PCE and TCE impacted soil in Area 9 has not been identified. Facility personnel have indicated these chemical constituents are not currently and have not in recent history been used at the site. There is no remaining primary source of these constituents; only the secondary source (residual impacted shallow soils) exists.

The following remedial alternatives have been identified for Area 9:

1. No Further Action;
2. Institutional Controls;
3. Excavation and Off-Site Disposal;
4. Soil Vapor Extraction (SVE) and Capping, and;
5. Excavation and SVE.

Each remedial alternative is discussed and evaluated in the following sections. A summary of the remedial alternatives for Area 9 are presented in **Table 3-1**. A cost comparison for each remedial alternative for Area 9 is presented in **Table 3-2**.

3.1.1 Alternative 1 – No Further Action

For this alternative, no remedial action is required and the concrete slab covering Area 9 will be left in place. Routine maintenance will be conducted in Area 9 as needed. Because no intrusive or removal activities are being conducted, there will be no waste (i.e., soil, concrete, etc.) generated for disposal. The No Further Action alternative can be implemented immediately at no cost to C&D other than typical facility maintenance.

This alternative is potentially not protective of human health and environment. Although the RFI, Part 2A Report (URS, 2009a) indicates there are no human health risks from potential exposure to TCE and PCE impacted soils in Area 9 during subsurface construction activities; should the integrity of the concrete become compromised (cracking, future removal) there is a potential for PCE and TCE in soil to be leached downward and impact the shallow aquifer. Therefore, this alternative is not protective of the environment. In addition, PCE and TCE concentrations exceed IDEM closure levels for migration to groundwater.

This alternative will not reduce the toxicity, mobility, or volume of impacted media present in this area since the impacted media will be left in place. This alternative provides short term effectiveness in that the concrete slab is in good condition and provides an adequate cap to prevent downward migration of surface water. However, the long-term effectiveness of this alternative will be dependent on the condition of the concrete slab and whether the slab is damaged (removed) or deteriorates (cracks, etc.) over time.

This alternative can be implemented immediately and as a no action alternative, there are no attendant capital or maintenance costs. Since no additional investigation or monitoring of potential PCE and TCE migration will be performed, potential community concerns over the status of the impacted soil would not be addressed. The degree to which other community concerns are addressed would be considered during the public participate review process. IDEM input to this remedial alternative would also be addressed during the agency review process.

3.1.2 Alternative 2 – Institutional Controls

Similar to Alternative 1, no remedial action will be conducted to address PCE and TCE impacted soils in Area 9 with this alternative. Instead, institutional controls such as signage, access restrictions (i.e., no digging or intrusive activities outside of necessary maintenance), and deed restrictions regarding future land use will be used to prohibit improper use of this area. Area 9 will be identified by signs posted at the area boundaries. An operations and maintenance plan will be developed to address routine maintenance of the concrete pad in Area 9 to prevent preferential pathways (cracks, etc.) for downward migration from forming.

Alternative 2 results in an overall protection of human health and environment. There are no human exposure risks associated with Area 9. Routine maintenance of the concrete pad and Area 9 use restrictions will reduce the risk of potential downward migration of PCE and TCE to the shallow aquifer. PCE and TCE impacted soil exceeding IDEM closure levels will remain in place.

Similar to Alternative 1, this alternative will not reduce the toxicity, mobility, or volume of impacted media present in this area. The intent of this alternative is to prevent the downward migration of PCE and TCE to the shallow aquifer. This alternative will be effective short-term and long-term so long as the concrete slab is maintained properly. Institutional controls can be implemented quickly with the development of an operations and maintenance plan for the concrete slab.

The estimated cost to implement this alternative is approximately $5,000. This cost includes having a deed restriction placed on the property and posting Area 9 use restriction signs. Because the slab is in good condition, annual maintenance costs are expected to be minimal and will be included in the building maintenance budget.

Since no additional investigation or monitoring of potential PCE and TCE migration will be performed, potential community concerns over the status of the impacted soil would not be addressed. The degree to which other community concerns are addressed would be considered during the public participate review process. IDEM input to this remedial alternative will also be addressed during the agency review process.

3.1.3 Alternative 3 – Excavation and Off-Site Disposal

This alternative involves excavation and removal of PCE and TCE impacted soil from Area 9. The excavation footprint will be based on analytical results of previous subsurface soil investigations and the interpreted areas of PCE and TCE impacts (see **Figure 3-1**). Impacted soils present beneath active manufacturing areas will be left in place. The proposed excavation area is presented on **Figure 3-2** and consists of approximately 1,250 square feet. Accessible soils will be excavated to a depth of five feet below ground surface (bgs) using both mechanical (tracked or wheeled loader) and physical/manual means (hand shovel). Underground utilities located in Area 9 will be located to the extent possible using results from a previous geophysical survey, engineering prints, and personal knowledge.

The estimated volume of soil to be removed will be approximately 231 cubic yards. Excavated soil will be placed in a roll-off box for off-site disposal at an approved landfill. Waste characterization samples will be collected from the roll-off box to determine proper disposal. Based on current analytical results, it is anticipated the impacted soil will be disposed as a special waste. The estimated cost for excavation and disposal is **$**91,500 as shown in **Table 3-2**. This alternative can be implemented upon selection of a contractor to perform the excavation. Because much of the excavation will be conducted by physical/manual means, it is anticipated excavation may take up to two weeks to complete.

Upon completion, the excavation will be backfilled with a self-compacting material, i.e., gravel or flowable fill. The excavation area will be restored to previous site conditions (i.e., capped with concrete slab) to the extent possible. No free-standing structures associated with manufacturing processes will be moved or disturbed during the excavation.

Because there are no human exposure risks associated with Area 9 and impacted soil is being remediated to acceptable IDEM closure levels for migration to groundwater in the outdoor alleyway, Alternative 3 is protective of human health and environment for the excavated portion of Area 9 only. PCE and TCE impacted soils will not be excavated from beneath active manufacturing areas. Although these areas are under roof and are in active portions of the facility, there is still potential for PCE and TCE impact to the shallow aquifer from the residual impacted soil. PCE and TCE concentrations in soil remaining in these areas are above applicable IDEM closure levels.

Excavation of accessible impacted soils provides an effective short term and long term solution and will be effective at reducing toxicity, mobility, and volume of impacted soil. But this alternative applies to accessible area only and excludes PCE and TCE impacted soil present beneath active manufacturing areas, limiting the overall short term and long term effectiveness for Area 9.

Alternative 3 can be implemented easily since the scope of work can be accomplished with traditional excavation equipment. The estimated cost to complete this scope of work is $91,500, as shown in **Table 3-2**. This cost estimate includes contractor costs and disposal fees. Community and IDEM acceptance of this alternative will be considered in the public participation program to be coordinated by U.S. EPA.

3.1.4 Alternative 4 – Soil Vapor Extraction (SVE) and Capping

This alternative involves in-situ remediation technology that reduces PCE and TCE concentrations adsorbed to subsurface soils. A typical SVE system applies a vacuum to the soil matrix to create a negative pressure gradient (relative to atmosphere) that, in turn causes desorption and movement of PCE and TCE vapors in soil gas towards extraction wells. The extracted vapors may be treated (if necessary based on the nature, concentration, and total mass discharged over time) with an appropriate vapor treatment system (activated carbon) and discharged to the atmosphere. Site specific air emission concentrations for permitting and treatment purposes were calculated using a conservative emissions scenario. Calculated air emissions did not exceed permitting thresholds (**Appendix B**).

The process and methods used to conceptually design the SVE system were based on analytical data collected during the previous subsurface soil investigations and vapor intrusion evaluation. Analytical data indicates that, based on average and maximum estimated concentrations in soil, approximately 2.4 to 5 pounds of PCE and 8 to 16 pounds of TCE are present in the subsurface soils in Area 9 (see **Appendix B**). The interpreted extent of PCE and TCE impacts that will be treated using SVE is presented on **Figure 3-1**. The SVE system will utilize three extraction wells screened across the shallow impacted zone (typically to 5 ft below top of concrete) to maximize soil vapor collection. Extraction well placement may be modified from that shown on **Figure 3-3**, depending on site specific conditions.

The extraction wells will be connected to a skid-mounted SVE system. With the exception of well installation, the concrete slab in place in Area 9 will not be modified and will continue to serve as the cap.

Unlike Alternative 3, SVE implementation will not be limited to the outdoor alleyway. High permeability soils in Area 9 (see Section 2.1.2) will allow for an increased radius of influence including impacted soils beneath the active manufacturing areas. The concrete slab in Area 9 will not be modified and will continue to serve as an effective vapor barrier and cap. Implementation of Alternative 4 will effectively reduce contaminant concentrations and will be protective of human health and environment. Implementation of Alternative 4 would reduce PCE and TCE concentrations and result in compliance with IDEM direct closure levels for migration to groundwater.

Alternative 4 would permanently reduce toxicity, mobility, and volume of PCE and TCE in subsurface soils. Therefore, SVE is considered effective on a short-and long-term basis. During system operation, influent soil gas vapor concentrations will be monitored on a routine basis. PCE and TCE removed from subsurface soils will decrease overtime and the system will be operated until asymptotic conditions are reached and it is determined that further operation will not effectively reduce residual PCE and TCE concentrations.

Implementation of Alternative 4 is technically feasible. Area 9 is accessible and located in an area of relatively low traffic. Extraction wells will be connected to the SVE system via above ground PVC piping. It will be necessary to coordinate with C&D site personnel during the SVE installation.

It is assumed, based on system design, current analytical data, and anticipated performance of the SVE system, that applicable closure levels can be achieved within one year of system startup. The anticipated cost for implementation and operation and maintenance for a one year period are estimated to range between $52,000 and $59,500, depending if off-gas treatment is necessary, as shown on **Table 3-2**. Therefore, the total cost for the SVE system with closure testing and reporting is expected to range between $95,000 and $105,000.

The public and IDEM acceptance of Alternative 4 will be considered during the public participation program.

3.1.5 Alternative 5 – Excavation and Off-Site Disposal and SVE

This alternative combines Alternatives 3 and 4, excavation and SVE implementation, to remediate PCE and TCE impacted soils in Area 9. Impacted soil would be excavated from the outdoor alleyway as described in Alternative 3 and disposed off-site at an approved landfill. The excavated area would be backfilled and restored to the pre-excavation condition to the extent possible.

Upon completion of the excavation and restoration, a modified SVE system (two extraction wells instead of three) would be used to treat PCE and TCE impacted soils not excavated from beneath the active manufacturing areas. The design of the SVE system would be based on analytical data collected during the previous subsurface soil investigations and vapor intrusion evaluation for each of these areas (adjacent manufacturing area and compressor room). Approximate locations of the extraction wells are presented on **Figure 3-4**. The volume of PCE and TCE impacted soil to be treated is unknown since the majority of the impacted soil would be removed during excavation.

Alternative 5 would be protective of human health and environment as well as effective in reducing toxicity, mobility, and volume since the majority of the impacted soil would be excavated for off-site disposal and residual impacted soil would be remediated through application of SVE. Implementation of Alternative 5 is technically feasible and would likely achieve compliance with IDEM closure levels for migration to groundwater. Therefore, Alternative 5 is considered an effective short-and long-term remedial alternative.

The same cost assumptions identified in Alternatives 3 and 4 would apply to Alternative 5. The cost for the modified SVE system (two extraction wells verses three) implementation will not change significantly since there would be no significant changes to the SVE system or operations. Cost estimates for excavation and off-site disposal and SVE implementation are estimated to range from $154,500 for no off-gas treatment to $165,000 for activated carbon off-gas treatment **Table 3-2.** These costs include excavation and SVE implementation as well as closure testing and reporting.

3.2 REMEDIAL ALTERNATIVES – RIVERBANK AREA

The potential ecological risks in the Riverbank Area are associated with exposure to lead impacted surface soils by receptor organisms (birds and small mammals).

As stated in the BERA, potential risks are primarily associated with one sample location (CD-SB-59). Samples adjacent to CD-SB-59 (within 75 ft) did not show the same magnitude of constituent concentrations, indicating a highly localized area of concern (see **Figure 3-5**). Ecological risks were acceptable if lead impacted soils exceeding the EPC of 965 mg/kg near CD-SB-59 were removed or otherwise isolated from the potential receptor populations.

The following remedial alternatives were identified for the Riverbank Area:

- No Further Action;
- Institutional Controls;
- Immobilization and Exposure Barrier;
- On-Site Treatment, Off-Site Disposal, and Exposure Barrier, and;
- Containment (Exposure Barrier).

Each remedial alternative is discussed and evaluated in the following sections. A summary of the remedial alternatives for Riverbank Area are presented in **Table 3-3**. A cost comparison for each remedial alternative for Area 9 is presented in **Table 3-4**.

As previously discussed in Section 2.2.1, the proposed work area (CD-SB-59) is located in a relatively flat, terraced area of the riverbank. The general topography slopes gently approximately five to ten feet north of the soil boring location before sloping sharply to the Wabash River. Mature trees are in the immediate vicinity of the central portion of the work area and near the base of the work area along the Wabash River. The mature trees help to stabilize the riverbank and act as natural erosion control during flood events. Removal of these trees could lead to stream bank destabilization and accelerated erosion. The United States Fish and Wildlife Service (U.S. FWS) has also identified the mature trees along the riverbank as potential roosting habitat for the Indiana Bat. The U.S. FWS has requested that damage or removal of the mature trees be limited or avoided during implementation of the selected remedial alternative in this area minimize degradation of habit (Teleconference, 2009).

3.2.1 Alternative 1 – No Further Action

The No Further Action alternative is included as a baseline to assess the effectiveness of the other remedial alternatives evaluated for the Riverbank Area. For this alternative, no remedial action will be taken to mitigate potential lead exposure to ecological receptors. As indicated in the Tier 2 human health risk assessment, there are no unacceptable exposure risks under the recreational use scenario. Access to the Riverbank Area (primarily from Wabash River) will not be modified and residual surficial metallic debris will be left in place.

Because potential exposure risks to ecological acceptors will not be mitigated, this alternative is not protective of human health and environment and does not isolate or remove lead concentrations associated with CD-SB-59. The No Further Action alternative is not effective for the short or long term duration and does not reduce toxicity, mobility, or volume of lead-impacted soil. As this is a no action alternative, there are no attendant capital or maintenance costs. Community and IDEM concerns regarding implementation of the No Further Action alternative and potential exposure to ecological receptors will be considered during the public participation program.

3.2.2 Alternative 2 – Institutional Controls

Alternative 2 involves implementing institutional controls to reduce the potential for lead exposure to ecological receptors. Similar to Alternative 1, no remedial action will be taken to mitigate potential lead exposure to ecological receptors. For this alternative, C&D will post signs in the area indicating the presence of lead-impacted soils. A deed restriction will also be filed limiting future use of the Riverbank Area. Metallic surficial debris will not be removed with this alternative.

Institutional controls are primarily designed to limit human exposure to potential risks and are typically ineffective at reducing exposure risks to ecological receptors. This alternative does not prevent potential exposure to ecological receptors or isolate lead concentrations associated with CD-SB-59. Lead impacted soils in the general vicinity of CD-SB-59 will remain accessible to small mammals and terrestrial birds foraging in the area. This alternative does not reduce toxicity, mobility, or volume of lead-impacted soil and will not be effective in the short- or long-term at reducing exposure risks.

Implementation of institutional controls is technically feasible since the primary aspect of the alternative is posting warning signs in the area and filing a deed restriction at the local registrar's office. The cost for implementation is estimated to be $5,000 as shown on **Table 3-4**. Routine maintenance for the signs (i.e. replacement) will be included in general facility maintenance. Public and IDEM acceptance of this alternative will be evaluated in the public participation program.

3.2.3 Alternative 3 – Immobilization and Exposure Barrier

Alternative 3 involves excavation of lead impacted soil and on-site treatment (immobilization) with Triple Super Phosphate (TSP). Treated soil will be placed back in the excavation footprint and covered with an exposure barrier. The excavation footprint will be based on analytical results of previous subsurface soil investigations and the EPC of 965 mg/kg lead for potential ecological receptors. The proposed excavation area consists of approximately 800 square feet (see **Figure 3-6**). Impacted soils in the excavation footprint will be excavated to a total depth of one foot below bgs using both mechanical (tracked excavator) and physical/manual means (hand shovel).

Prior to excavation, localized clearing and grubbing of understory vegetation will be completed. Clearing will involve removal of up to five mature growth trees located in the central portion of the excavation footprint to allow adequate space for the excavator to work and mix excavated soil and TSP. Mature trees located closest to the Wabash River will be left in place. Care will be taken during clearing and excavation to minimize damage of the roots of these trees.

The estimated volume of soil to be treated is approximately 30 cubic yards. Soil excavated from the area will be stockpiled on thick mil plastic located adjacent to the excavation area. The excavated soil will be treated with TSP to immobilize lead compounds present in the soil. The amount of TSP used will be based on the lead concentration detected at CD-SB-59 during the Phase I RFI. The soil and TSP will be mixed in place using the excavator bucket. Potable water will be applied during the mixing process to ensure granulated TSP is adequately dissolved to maximize treatment effectiveness.

Subsequent to mixing, the treated soil will be placed back into the excavation footprint and graded (compacted) to pre-excavation conditions to the extent possible. An exposure barrier will be constructed over the excavation area for bank stabilization and erosion control. The exposure barrier will be constructed of permeable geotextile fabric and covered with appropriately sized riprap.

Surficial metal debris will be removed from the Riverbank Area during the excavation. Only metallic debris observed on the ground surface will be removed. Excavation depth will be limited to what is necessary for removal of surficial debris only. Metallic debris removed from the Riverbank Area will be placed into roll off boxes for either metal reclamation or disposal at an approved landfill. Open holes or pits resulting in removal of large surface debris will be backfilled with soil borrowed from the Riverbank Area or approved fill material from an off-site source.

Implementation of this alternative will immobilize lead compounds in soil. According to Brown et al. (2004), bioavailability of lead in soils treated with TSP is reduced, effectively eliminating potential exposure risks for ecological receptors and reducing toxicity and mobility of the lead-impacted media. Volume of media is not reduced. Alternative 3 is considered an effective short- and long-term remedial alternative for the Riverbank Area.

Implementation of Alternative 3 is technically feasible since the scope of work can be accomplished with traditional excavation equipment and manual labor. The potential for stream destabilization and erosion of the excavation area will be mitigated by the construction of the cap. However, there is the potential for excess phosphate from the treatment process to leach into the Wabash River. Excess phosphorus concentrations in surface water can stimulate growth of aquatic plant life resulting in depleted dissolved oxygen concentrations in water (Brown, et al., 2004). Depletion of dissolved oxygen would have an adverse affect on the local ecology of the river.

The estimated cost to implement Alternative 3 is $76,500 and includes the first year maintenance cost of $5,000, as shown in **Table 3-4**. Community and IDEM acceptance of this alternative will be considered in the public participation program to be coordinated by U.S. EPA.

3.2.4 Alternative 4 – On-Site Treatment and Off-Site Disposal with Exposure Barrier

Alternative 4 involves excavation of lead impacted soil, on-site treatment (immobilization), and off-site disposal at an approved landfill. Similar to Alternative 3, the excavation footprint will be based on analytical results of previous subsurface soil investigations and the EPC of 965 mg/kg for lead. The proposed excavation area consists of approximately 800 square feet (see **Figure 3-6**). Impacted soils present in the excavation footprint will be excavated to a total depth of one foot bgs using both mechanical and physical means.

Prior to excavation, localized clearing and grubbing of understory vegetation will be completed. Clearing may include removal of up to five mature growth trees located in the central portion of the excavation footprint to allow adequate space for the excavator to work and mix TSP with excavated soil. Mature trees located closest to the Wabash River will be left in place. Care will be taken during clearing and excavation to minimize damage to the roots of these trees.

The estimated volume of soil to be removed is approximately 30 cubic yards. Excavated soil will be stockpiled on thick mil plastic located adjacent to the excavation area and treated with TSP to immobilize lead compounds present in the soil. The soil and TSP will be mixed in place with potable water using the excavator bucket. Subsequent to mixing, the treated soil will be transferred to roll-off boxes for off-site disposal.

Backfill from an approved off-site source will be placed into the excavation footprint and graded (compacted) to pre-excavation conditions to the extent possible. An exposure barrier will be constructed over the excavation area for bank stabilization and erosion control. The exposure barrier will be constructed of permeable geotextile fabric and covered with appropriately sized riprap.

Routine maintenance of the exposure barrier (i.e., visual inspection of the exposure barrier after flood events) will be conducted as directed in a maintenance schedule. It may be necessary to replace riprap displaced from the exposure barrier during flood events to ensure the integrity and effectiveness of the exposure barrier.

Surficial metal debris will be removed from the Riverbank Area during the excavation. Only metallic debris observed on the ground surface will be removed. Excavation depth will be limited to what is necessary for removal of surficial debris only. Metallic debris removed from the Riverbank Area will be placed into roll off boxes for either metal reclamation or disposal at an approved landfill. Open holes or pits resulting in removal of large surface debris will be backfilled with soil borrowed from the Riverbank Area or approved fill material from an off-site source.

Implementation of this alternative would mitigate potential exposure risks for ecological receptors and reduce toxicity, mobility, and volume of the lead-impacted soil. Because the lead-impacted soil would be removed from the area, the alternative is also considered to be an effective short- and long-term alternative.

Alternative 3 is technically feasible since the scope of work can be accomplished with traditional excavation equipment and manual labor. The potential for stream destabilization and erosion of the excavation area will be mitigated by the construction of the cap. The estimated cost to implement this alternative is $88,000 and includes the first year maintenance cost of $5,000, as shown in **Table 3-4**. Community and IDEM acceptance of this alternative will be considered in the public participation program to be coordinated by U.S. EPA.

3.2.5 Alternative 5 – Containment (Exposure Barrier)

Alternative 5 involves construction of an exposure barrier to contain and isolate lead-impacted soils associated with CD-SB-59. The exposure barrier will be constructed to cover the excavation footprint proposed in Alternatives 3 and 4. The proposed exposure barrier will cover approximately 800 square feet (see **Figure 3-6**) and will not disturb native soils in the Riverbank Area. The cap will be constructed of a permeable geotextile fabric overlain with riprap.

Prior to construction of the exposure barrier, localized clearing and grubbing of understory vegetation will be completed. Clearing may include removal of up to five mature growth trees located in the central portion of the work area to allow for staging, temporary storage of riprap, and subcontractor access. Mature trees located closest to the Wabash River will be left in place.

Surficial metal debris will be removed from the Riverbank Area during the excavation. Only metallic debris observed on ground surface will be removed. Excavation depth will be limited to what is necessary for removal of surficial debris only. Metallic debris removed from the Riverbank Area will be placed into roll off boxes for either metal reclamation or disposal at an approved landfill. Open holes or pits resulting in removal of large surface debris will be backfilled with soil borrowed from the Riverbank Area or approved fill material from an off-site source.

The first panel of geotextile fabric will be installed on the lower end of the work area (work area closest to Wabash River). Subsequent panels of fabric will be placed in an overlapping fashion moving away from the river towards the upper end of the work area. Each layer of geotextile will be covered with the appropriate size riprap before the next layer is put in place. Geotextile will be cut and fitted around the base of mature trees remaining in the work area and will extend approximately one foot up the base of the trees. The edges of the geotextile will be secured to prevent unraveling of the fabric.

Routine maintenance of the exposure barrier (i.e., visual inspection of the exposure barrier after flood events) will be conducted as directed in a maintenance schedule. It may be necessary to replace riprap displaced from the exposure barrier during flood events to ensure the integrity and effectiveness of the exposure barrier.

Alternative 5 will effectively isolate lead-impacted soils associated with CD-SB-59, reducing average lead concentrations in soil in the Riverbank Area to below the EPC for selected receptors. Construction of the exposure barrier would also effectively reduce toxicity and mobility of the lead-impacted media, but not the volume. Because the lead-impacted soil will be isolated and capped, the alternative is also considered to be effective in both the short- and long-term in protecting human health and environment.

Alternative 5 is technically feasible since the scope of work can be accomplished with traditional excavation equipment and manual labor. The potential for additional stream destabilization and erosion of the excavation area will be reduced by the construction of the exposure barrier. The estimated cost to implement Alternative 5 is $61,500. Maintenance costs for the exposure barrier are estimated to be $5,000 per year. The annual maintenance cost is included in the estimated implementation cost for the first year as shown on **Table 3-4**. Annual maintenance is expected for a period of 20 years. Community and IDEM acceptance of this alternative will be considered in the public participation program to be coordinated by U.S. EPA.

3.3 PRESUMPTIVE REMEDY

The following presumptive remedies have been selected for each area based on the threshold, balancing, and modifying criteria evaluations.

3.3.1 Presumptive Remedy – Area 9

The presumptive remedy for Area 9 is SVE and Capping. Of the five remedial alternatives, only Alternative 4 – SVE and Capping and Alternative 5 – SVE and Excavation satisfied each of the criteria evaluation. Alternative 4 was selected due to cost and ease of implementation. In addition the U.S. EPA *User's Guide to the VOCs in Soils Presumptive Remedy* recommends SVE as the preferred presumptive remedy for sites where volatile organic compounds (VOCs) (including PCE and TCE) are present in soil and treatment is warranted (U.S. EPA, 1996).

The proposed SVE system for Area 9 is discussed in Section 4.

3.3.2 Presumptive Remedy – Riverbank Area

The presumptive remedy for the Riverbank Area is construction of an exposure barrier. Of the five remedial alternatives evaluated only Alternative 4 – On-Site Treatment and Off-Site Disposal and Alternative 5 – Containment (Exposure Barrier) satisfied the evaluation criteria. Alternative 5 was chosen due to cost of implementation and minimal impact to the Riverbank Area. Construction of the exposure barrier will have minimal impact to the native soils and will help stabilize the stream bank and prevent erosion. Alternative 5 isolates the lead-impacted area exceeding the EPC and creates an effective exposure barrier for potential ecological receptors. In addition, the U.S. EPA *Presumptive Remedy for Metals-in-Soil Sites* recommends containment as the presumptive remedy where metals in soils not targeted for treatment are present (U.S. EPA, 1999)

The proposed exposure barrier for the Riverbank Area is discussed in Section 5.

The SVE system design basis; construction and start-up; operations and maintenance; permit requirements; performance criteria; and reporting requirements are discussed in the following sections.

4.1 SVE SYSTEM DESIGN BASIS

The process and methods used to conceptually design the SVE system are based on analytical data collected during the previous subsurface soil investigations and the interpreted PCE and TCE impacts in subsurface soil (see **Figure 3-1**). The SVE system will utilize three extraction wells screened across the shallow impacted zone (typically to 5 ft below the concrete) to maximize soil vapor collection (see **Figure 3-3**). Extraction well placement may be modified from that shown on **Figure 3-3**, depending on site-specific conditions.

Assumptions and calculations presented in **Appendix B** were incorporated into the SVE system design, which is summarized as follows:

- A 20-ft effective radius of influence (ROI) is estimated around each SVE well. This estimate is based on URS experience with similar subsurface conditions, as depicted in the boring logs presented in **Appendix A**,
- An initial contaminant mass recovery rate (for both PCE and TCE) is estimated at 0.58 pounds per hour. It is important to note this initial recovery rate will likely decrease rapidly, typically after several days, as PCE and TCE desorption limiting conditions are established within the impacted soil matrix,
- The initial contaminant mass recovery rate was calculated based on estimated contaminant vapor concentrations in the soil gas that is in equilibrium with the average soil contaminant concentration for PCE and TCE within each impacted area indicated on **Figure 3-1**,
- Estimated soil gas flow rates from each of the three wells range from approximately 21 to 30 standard cubic feet per minute (SCFM) at well casing vacuum pressures of 61 to 88 inches water column (iwc),
- The operating conditions described above suggest application of a 3.5 horsepower “high-vacuum” regenerative blower having an operating curve similar to that shown for the machine described in **Appendix B**.

The extraction wells will be connected to a skid-mounted SVE system (condensate knockout tank, controls, flow and vacuum measurement instrumentation, etc.) via PVC conveyance piping with each extraction well having an individual valve to control flow. Two of the extraction wells will be installed in the outside alleyway while the remaining extraction well will be installed in the compressor room. The concrete surface in each area will be inspected for cracks, breaks, or other potential features that could affect vacuum influence. If identified, these areas will be sealed prior to system start-up.

4.1.1 SVE System Construction and Start-up

At system start-up, extracted soil gas samples will be collected from the influent at the manifold using a photoionization detector (PID) and summa canister. The PID readings will be used to measure total VOCs. The soil gas sample collected using the summa canister will be analyzed for a standard VOC scan according to U.S. EPA Method TO-15. The scan includes approximately 60 VOC compounds including TCE and PCE. Analytical data from the PID and summa canister samples will be used to establish background or start-up conditions for assessing the performance of the SVE system during subsequent performance monitoring.

Analytical data from these soil gas samples will also be used to confirm that threshold air permit conditions are not exceeded. As indicated in Section 4.1, initial recovery rates will likely decrease rapidly over a period of days as desorption-limiting conditions are established in the soil matrix. Projected emission rates are presented in **Table 4-1** based on mass recovery rates presented in **Appendix B**.

Soil gas samples collected using the summa canister will be collected using laboratory prepared stainless steel summa canisters. The samples will be collected in general accordance with field sampling procedures outlined in the *RCRA Facility Investigation Vapor Intrusion Evaluation Work Plan* dated August 31, 2009 (URS, 2009c). Soil gas samples will be collected over a five minute period or until the internal summa canister pressure reaches equilibrium with general outdoor atmospheric pressure.

4.1.2 Operations and Maintenance

URS will submit an Operations and Maintenance (O&M) Manual to U.S.EPA within 30 days of system start-up. The O&M Manual will contain as-built SVE system construction diagrams and schematics, operation and maintenance plans, and system monitoring requirements. A copy of the O&M Manual will remain on Site during the SVE operating period. The O&M Manual will also be included in the Final Remedy Construction Completion Report.

Sampling and monitoring activities performed during the construction, operation, and closeout performance testing of the SVE system will include air monitoring, soil gas sampling, and subsurface soil sampling. In addition, system data (i.e., flowrates, vacuum, influent and effluent concentrations) will be regularly monitored to optimize system operations. The SVE process will employ real time monitoring using field equipment and periodic laboratory testing to measure VOC concentrations in soil gas to evaluate remediation progress. The Sampling and Analysis Plan will be included in the O&M Manual.

4.1.3 Required Permits

Since PCE and TCE are considered hazardous air pollutants (HAPs) under the Clean Air Act, a review of air permit requirements to operate the SVE system was performed. As discussed in Section 4.1.1, air emissions are expected to be higher at start-up and are anticipated to decrease quickly as the system operates. Air emission concentrations for permitting purposes were calculated using a conservative emissions scenario assuming that air emissions generated at start-up would be consistent throughout the SVE system operation. Using this conservative approach, calculated air emissions did not exceed permitting thresholds. Air emission calculations are presented in **Table 4-1**.

Other necessary permits (e.g., local construction permits) required for the implementation of the CMP will be obtained prior to operating the SVE system. C&D will notify IDEM and U.S. EPA prior to SVE system start-up.

4.2 PERFORMANCE CRITERIA

The intent of the CMP is to reduce PCE and TCE concentrations in sub-surface soils to concentrations below the IDEM industrial direct soil closure levels for migration to groundwater of 640 µg/kg and 350 µg/kg, respectively. Periodic monitoring of the influent from the extraction wells will be conducted to monitor the system's effectiveness in removing contaminant mass. At start-up, influent soil gas samples will be collected and analyzed to establish baseline total VOC and PCE and TCE concentrations. Subsequently, performance monitoring will be conducted bi-weekly for the first month of operation and then monthly during the first year of operation. During routine performance monitoring, soil gas samples will be collected and field screened using a PID.

During operation, the SVE system configuration may be modified to increase flow to extraction wells with higher vapor concentrations by reducing or terminating vapor extraction from extraction wells with low vapor concentrations. It may also be necessary to operate one extraction well at a time. The SVE system will be operated until asymptotic concentrations in extracted vapor concentrations are reached (as determined by field screening using PID) and it is determined that further operation will not effectively reduce residual VOC concentrations.

4.2.1 Rebound Test

Once periodic monitoring indicates the vapor concentrations have reached asymptotic levels based on PID readings, a rebound test will be performed. The rebound test will be performed to (1) evaluate potential VOC rebound effects during a periodic shut down of the SVE system, and (2) confirm that remediation efforts have reached asymptotic levels. During the rebound test, the SVE system will be shut down for a period of one month to allow the subsurface environment to return to equilibrium.

Prior to shutting down the SVE system, soil gas samples will be collected from the influent using the PID and summa canister. Soil gas samples will again be collected from the influent at start-up after the one month period has expired. Analytical data from each soil gas sampling event will be evaluated to determine if VOC concentrations rebounded during the system shut down. If insignificant rebound is observed, or if it can be determined that soil concentrations are below screening levels, the SVE system may be shut down. If not, the SVE system may be operated at full capacity or in a modified set-up to remove residual contaminant mass.

4.2.2 Confirmation Sub-Slab Soil Gas Sample Collection

If sub-slab soil gas samples collected from the influent prior to start-up during the rebound test indicate contaminant mass has been remediated to an acceptable level, additional confirmation sub-slab soil gas samples may be collected from each extraction well head to obtain area specific sub-slab soil gas data. Sub-slab soil gas samples will be collected from sample ports at each well head using laboratory prepared stainless steel summa canisters. Sub-slab soil gas samples will be collected as described in Section 4.1.1.

4.2.3 Confirmation Soil Sampling

To confirm PCE and TCE concentrations in sub-slab soil have been remediated to below applicable IDEM screening levels for migration to groundwater, soil samples will be collected from locations adjacent to the original soil boring locations where elevated TCE and PCE concentrations were previously detected. Soil samples will be collected using stainless steel hand augers in general accordance with the September 2007 RFI Work Plan (URS, 2007a).

4.3 REPORTING REQUIREMENTS

The following reports documenting the implementation and completion of the Final Remedy will be submitted to U.S. EPA.

4.3.1 SVE Construction Completion Report

C&D will submit the SVE Construction Completion Report to document the construction and implementation of the SVE system for Area 9 remediation. URS proposes to submit the Final Remedy Construction Completion Report within 30 days of SVE system start-up. Because ongoing monitoring and operation and maintenance will be required after construction, a copy of the O&M Manual will be included with this report.

4.3.2 Final SVE Completion Report

C&D will submit a Final SVE Completion Report when sub-slab soil gas and confirmatory subsurface soil samples indicate that remedial goals have been met. The Final Remedy Report will be prepared in general accordance with the Order and will contain, at a minimum, the following items:

- Detailed discussion of the SVE system operation;
- A site map illustrating extraction wells and subsurface soil sample locations;
- Copies of all original laboratory reports, including chain-of-custody forms;
- Copies of field notebooks documenting field activities, and;
- Conclusions and recommendations.

C&D proposes to submit the Final Remedy Completion Report within 60 days of final system shut-down.

The exposure barrier design basis; construction, routine maintenance, required permits, and reporting requirements are discussed in the following sections.

5.1 EXPOSURE BARRIER DESIGN BASIS

The placement of the exposure barrier is based on the location of CD-SB-59 and analytical data collected from delineation soil borings installed in the immediate vicinity of CD-SB-59. Analytical data from soil borings CD-SB-88 and CD-SB-89 (See **Figure 3-5**) installed during the RFI field activities indicated lead concentrations did not exceed ecological toxicity values. These soil boring locations will not be included in the exposure barrier footprint.

On November 13, 2009, URS collected additional delineation soil samples from the areas adjacent to CD-SB-59 to design the footprint of the exposure barrier (see **Figure 3-6**). Prior to delineation, a sample grid was constructed at five-foot intervals in each of the four cardinal directions from CD-SB-59. Soil samples were collected for chemical analysis based on visual observations (i.e., absence of metallic and other debris at surface and in sample media). If debris was observed, no soil sample was collected. URS moved to the next outward sample location to repeat the process. Where soil borings were collected for chemical analysis, an additional sample was collected at the subsequent five-foot interval. The first soil sample was submitted for lead analysis and the second soil sample was held at the laboratory pending analytical data of the first sample. Soil samples were collected using a stainless steel hand auger in general accordance with the Phase I RFI Work Plan (URS, 2007a). Internal data validation of these samples was not required since the analytical data were used for screening purposes only.

Analytical data indicates the highest lead concentration detected in delineation soil samples was 600 mg/kg. This represents a ten-fold reduction in lead concentrations previously detected at CD-SB-59 (6,260 mg/kg). The average lead concentration of the six soil samples was 317 mg/kg. No additional delineation soil samples were analyzed. Based on analytical data, the exposure barrier will extend to the delineation soil boring locations; effectively isolating lead-impacted soils associated with CD-SB-59. Analytical data are presented on **Figure 3-5**. The analytical data report is presented in **Appendix B**. The proposed exposure barrier footprint is presented on **Figure 3-6**.

5.2 EXPOSURE BARRIER CONSTRUCTION

Prior to construction, the understory vegetation and visible surface debris will be removed from the work area. If limited excavation is necessary to free surface debris, the excavation area will be regraded and compacted to a density approximating the surrounding undisturbed area. Once clearing and debris removal is complete, the first panel of geotextile will be installed. Since mature trees are present within the footprint of the exposure barrier, the geotextile will be cut and fitted around the base of the tree(s). The geotextile will also be cut to extend approximately one-foot up the base of the tree(s). The edges of the geotextile will be secured to prevent unraveling of the fabric.

After the first panel of geotextile fabric is in place, riprap of the appropriate size will be placed over the fabric. Riprap will be sized based on the velocity of the Wabash River during flood stage. Riprap may be placed by hand or dumped and placed with an excavator. Care will be taken during placement of the riprap not to damage the fabric or underlying exposed tree roots. Riprap will be placed to a minimum thickness of one foot.

Additional geotextile will be added with a minimum two-foot overlap and covered in the same manner until installation is completed. It is important the geotextile fabric is placed under the riprap to prevent water from removing the underlying soil material through voids in the riprap cover. During installation, the riprap will be keyed in (trenched) along the hillside at the base of the work area to provide a base and reduce the potential for erosion during flood events. In addition, riprap on the upstream and downstream sides of the exposure barrier will also be keyed in to prevent dislodging.

5.2.1 Routine Maintenance

Routine inspections of the exposure barrier should be made to ensure the integrity of the barrier has not been compromised during heavy rain or flood events. The exposure barrier should be inspected after the first rainfall subsequent to completion. Thereafter, the barrier should be inspected after flood events that inundate the Riverbank Area. Riprap displaced from the barrier should be replaced as soon as possible. If evidence of erosion around the exposure barrier is observed, corrective action to repair the erosion will be required.

5.3 REQUIRED PERMITS

Because the proposed work area is located adjacent to the Wabash River, C&D may be required to obtain one or more of the following permits:

- Section 404 (Nationwide 38 Permit);
- Section 401 Water Quality Certification, and;
- Construction in Floodway Permit.

The Section 404 permit is administered by the United States Army Corps of Engineers (USACE). The Section 404 Permit regulates the discharge of dredged or fill material into the waters of the Unites States. Using riprap to construct the exposure barrier may be considered fill material. If a Section 404 permit is required, a Section 401 Water Quality Certification will be required by Indiana Department of Environmental Management (IDEM), Office of Water Quality. A Construction in Floodway Permit administered through the Indiana Department of Natural Resources, Division of Water (DNR) may also be required if the proposed work area is located in a flood zone. These permits are applicable if the work area or a portion of the work area is located below the ordinary high water mark (OHWM) or within the jurisdiction of the USACE (i.e., jurisdictional wetland or navigable water of the United States as defined by the Clean Water Act). Discussion with these agencies is ongoing.

C&D and URS will work with the USACE, IDEM, and DNR to ensure the appropriate permits are secured prior to implementation of the CMP. C&D will notify IDEM and U.S. EPA prior to construction.

5.4 REPORTING REQUIREMENT

C&D will submit the Exposure Barrier Construction Completion Report to document the design and implementation of the exposure barrier for the Riverbank Area remediation. The Final Remedy Construction Completion Report will be prepared in general accordance with the Order and will contain, at a minimum, the following items:

- Field work conducted prior to construction (delineation soil sampling activities) including analytical data reports;
- Exposure barrier construction details;
- Discussion of field activities conducted during the exposure barrier construction including metallic debris removed from the area for off-site disposal;
- Copies of field notebooks documenting field activities, and;
- Conclusions and recommendations.

URS proposes to submit the Final Remedy Construction Completion Report within 30 days of construction completion.

The project team for the CMP implementation in Area 9 and Riverbank Area will consist of the following:

- C&D Technologies;
- The consulting team led by URS, and;
- Various subcontractor(s)

The role of each of these entities is discussed in the following sections, and the lines of responsibility are shown on the Management Organization Chart on **Figure 6-1**.

Overall administrative control of the CMP will be the responsibility of the C&D Project Manager, Mr. Walt Kozlowski. Mr. Kozlowski will be the primary point of contact between C&D and U.S. EPA. In addition, he will act as the primary point of client contact for URS. In this role, he will be responsible for final C&D approval of the CMP and technical and administrative procedures, as well as for ensuring that the necessary arrangements are made to facilitate the implementation of the CMP.

C&D contacts, which are listed in the Management Organization Chart (**Figure 6-1**), will provide the C&D Project Manager with additional technical support. These contacts include the following:

- Mr. Jim Dodson – Environmental Health and Safety Manager, C&D Technologies; and
- Ms. Aria Klees – Deputy General Counsel, C&D Technologies.

The URS Project Manager will be Mr. Jack Waggener who will oversee the implementation of the CMP. He will directly manage budgets and project milestones as well as be the main point of contact with C&D. Dr. Jay White will be the Senior Remediation Engineer who will assist Mr. Waggener in implementing the various tasks under the Order. The CMP implementation and field activities will be supported by the URS project team and selected subcontractors.

C&D has developed the proposed project schedule presented in **Figure** 7-**1**. C&D has developed a conservative project schedule to include a review period for U.S. EPA, C&D response to comments, and a public review period. It is possible the review process may be shorter than anticipated. If so, the project schedule will be modified accordingly.

The actual schedule for CMP implementation will be determined by the issuance of U.S. EPA's Statement of Basis for the Presumptive Remedy Implementation. C&D anticipates implementation of the presumptive remedy for the Riverbank Area will begin within 30 days of receipt of U.S. EPA's approval. The SVE construction and implementation in Area 9 will be on a more delayed schedule to allow for the acquisition of the SVE equipment. Assembly of the SVE system will not begin until after C&D receives approval to proceed with the presumptive remedy. C&D expects it will take up to 10 weeks for the SVE system to be assembled and delivered to the site.

C&D will submit a Presumptive Remedy Construction Completion Report within 30 days of successful implementation of the approved Presumptive Remedy for each area. For scheduling purposes, C&D assumes an SVE operation period of one year. In the event it is necessary to operate the SVE system longer (or shorter) than one year, C&D will notify U.S. EPA and submit a revised schedule. C&D will notify U.S. EPA a minimum of 10 days prior to initiation of field efforts. The proposed project schedules for the Area 9 and Riverbank Area are presented in **Figure 7-1**.

Brown, Chaney, Hallfrisch, A. Ryan, R. Berti. 2004. In Situ Soil Treatments to Reduce the Phyto- and Bioavailability of Lead, Zinc and Cadmium. Journal of Environmental Quality. 33:522-531. 2004.3

Clayton Group Services, INC. Current Conditions Report, C&D Technologies, Inc, Attica, Indiana Facility. Arch 1, 2007.

Code of Federal Regulations. 2004. Remedial Investigation/Feasibility Study and Selection of Remedy. 7-1-04 Edition. 40-CFR §300.430.

Freeze, R.A. and Cherry, J.A. 1979. Groundwater. Prentice-Hall, Inc., Englewood Cliffs, NJ. 1979.

URS Corporation (URS). 2007a. RCRA Facility Investigation Work Plan, C&D Technologies, Attica, Indiana. September, 2007.

Teleconference between C&D, URS, U.S. EPA regarding Indiana Bat habitat along Wabash River. September 1, 2009.

URS. 2007b. RCRA Facility Investigation Work Plan Addendum, C&D Technologies, Attica, Indiana. December 2007

URS. 2008. RCRA Facility Investigation, Part 1 Report, C&D Technologies, Attica, Indiana. October 30, 2008.

URS. 2009a. RCRA Facility Investigation Part 2A Report: Additional Sampling and Analysis, C&D Technologies, Attica, Indiana. June 5, 2009.

URS. 2009b. RCRA Facility Investigation, Baseline Ecological Risk Assessment.

URS. 2009c. RCRA Facility Investigation Vapor Intrusion Evaluation Work Plan, C&D Technologies, Attica, Indiana. August 31, 2009. C&D Technologies, Attica, Indiana. July 28, 2009

URS. 2009d. RCRA Facility Investigation, Baseline Ecological Risk Assessment ADDENDUM. C&D Technologies, Attica, Indiana. October 26, 2009.

URS. 2009e. RCRA Facility Investigation Vapor Intrusion Evaluation Report. C&D Technologies, Attica, Indiana. November 2, 2009.

United States Environmental Protection Agency (U.S. EPA). 1996. Users Guide to VOCs in Soils Presumptive Remedy. July, 1996. EPA-540/F-96/008.

U.S. EPA. 1999. Presumptive Remedy for Metals-in-Soil Sites. September, 1999. EPA 540-F-98-054.

TABLES

Table 2-1
C & D Technologies
Attica, IN
Area 9 TCE & PCE Soil Data

SAMPLE ID		Tetrachloroethene		Trichloroethene	
CD-SB-21 (0-1)	12/13/2007	130	J	6000	
CD-SB-21 (4-5)	12/13/2007	1	*	3.6	J
CD-SB-21 (9-10)	12/13/2007				
CD-SB-21B (0-1)	6/4/2008	250	J	31000	
CD-SB-105 (0-1)	12/16/2008	7300		28000	
CD-SB-105 (2-3)	12/16/2008	270		1100	
CD-SB-106 (0-1)	12/16/2008	13	J	1700	
CD-SB-106 (2-3)	12/16/2008	94	J	2800	
CD-SB-107 (0-1)	12/16/2008	39	J	990	
CD-SB-107 (2-3)	12/16/2008	26	J	570	
CD-SB-108 (0-1)	12/16/2008			310	
CD-SB-108 (0-1) DUP	12/16/2008	1.9	J	42	
CD-SB-108 (2-3)	12/16/2008			3.4	J
CD-SB-109 (0-1)	12/16/2008			20	
CD-SB-109 (2-3)	12/16/2008	44	J	670	J
CD-SB-110 (0-1)	12/16/2008	110	J	14000	
CD-SB-110 (2-3)	12/16/2008	34	J	3900	
CD-SB-111 (0-1)	12/16/2008	160	J	15000	
CD-SB-111 (0-1) DUP	12/16/2008	200	J	20000	
CD-SB-111 (2-3)	12/16/2008	1	*	27000	
CD-SB-111 (4-5)	1/12/2009	1	*	1.4	J
CD-SB-111 (9-10)	1/12/2009			7.1	
CD-SB-113 (1-2)	1/12/2009	210		1300	
CD-SB-113B (1-2)	1/12/2009			29000	
CD-SB-113B (2-3)	1/12/2009	1	*	3100	
CD-SB-113B (4-5)	1/12/2009	1	*	1200	
CD-SB-114 (0.5-1.0)	1/12/2009			14000	
CD-SB-114 (2-3)	1/12/2009			1.8	J
CD-SB-114 (4-5)	1/12/2009			1900	
CD-SB-114 (9-10)	4/8/2009			0.6	J
CD-SB-115 (1-2)	1/12/2009	7100		12000	
CD-SB-115 (2-3)	1/12/2009	3	J	21	
CD-SB-115 (4-5)	1/12/2009	210	J	240	
CD-SB-116 (1-2)	1/12/2009	1200	J	17000	J
CD-SB-116 (2-3)	1/12/2009	1	*	240	
CD-SB-116 (4-5)	1/12/2009	59	J	910	
CD-SB-117 (1-2)	1/12/2009	3700		2600	
CD-SB-117 (2-3)	1/12/2009	2300		2500	
CD-SB-117 (4-5)	1/12/2009	3.8	J	5	
CD-SB-118 (1-2)	1/12/2009	23000		1700	
CD-SB-118 (2-3)	1/12/2009	4500		490	
CD-SB-118 (4-5)	1/12/2009	730		300	
CD-SB-119 (1-2)	1/12/2009	3700		100	J
CD-SB-119 (2-3)	1/12/2009	1700		46	J
CD-SB-119 (4-5)	1/12/2009	4		3.5	J
CD-SB-120 (0-1)	2/19/2009	4	J	1.9	J
CD-SB-120 (4-5)	2/19/2009	7.7		9.4	
CD-SB-121 (0-1)	2/19/2009	1200		3100	
CD-SB-121 (4-5)	2/19/2009	1700		10000	
CD-SB-121 (9-10)	4/8/2009	2.1	J	18	
CD-SB-122 (0-1)	2/19/2009	2600		25000	
CD-SB-122 (0-1) DUP	2/19/2009	2500		8200	
CD-SB-122 (4-5)	2/19/2009	31		180	
CD-SB-123 (0-1)	2/19/2009	28		3.3	J
CD-SB-123 (4-5)	2/19/2009	4.8	J	2.8	J
CD-SB-123 (9)	2/19/2009	46	J		
CD-SB-124 (0-1)	2/19/2009	1.1	J		
CD-SB-124 (2-3)	2/19/2009				
CD-SB-125 (0-1)	2/19/2009	210	J	13000	

Table 2-1
C & D Technologies
Attica, IN
Area 9 TCE & PCE Soil Data

SAMPLE ID		Tetrachloroethene		Trichloroethene	
CD-SB-125 (4-5)	2/19/2009			0.32	J
CD-SB-126 (0-1)	2/19/2009	1.3	J	9.6	
CD-SB-126 (4-5)	2/19/2009			1	J
CD-SB-127 (0-1)	2/19/2009	360		100	J
CD-SB-127 (4-5)	2/19/2009	2.3	J	3	J
CD-SB-128 (0-1)	2/19/2009				
CD-SB-128 (0-1) DUP	2/19/2009				
CD-SB-128 (3-4)	2/19/2009				
CD-SB-129 (1-2)	4/8/2009			0.86	J
CD-SB-129 (4-5)	4/8/2009				
CD-SB-129 (9-10)	4/8/2009				
CD-SB-130 (1-2)	4/8/2009	6.2	J		
CD-SB-130 (2-3)	4/8/2009	12	J	3.3	J
CD-SB-130 (4-5)	4/8/2009	1.3	J	0.84	J
CD-SB-131 (1-2)	4/8/2009	2	J	12	
CD-SB-131 (2-3)	4/8/2009			4.2	J
CD-SB-131 (4-5)	4/8/2009			0.6	J
CD-SB-133 (1-2)	4/8/2009				
CD-SB-133 (2-3)	4/8/2009				
CD-SB-133 (4-5)	4/8/2009				
CD-SB-134 (1-2)	4/8/2009	45	J	420	
CD-SB-134 (2-3)	4/8/2009	3.5	J	20	
CD-SB-134 (4-5)	4/8/2009			1.3	J
CD-SB-135 (1-2)	4/8/2009	6.7	J	3.1	J
CD-SB-135 (2-3)	4/8/2009	4.5	J	1.9	J
CD-SB-135 (4-5)	4/8/2009	1.7	J	1	J
CD-SB-136 (1-2)	4/8/2009	3.7	J	1.2	J
CD-SB-136 (2-3)	4/8/2009	5.2		1.2	J
CD-SB-136 (4-5)	4/8/2009	1.8	J	0.45	J
	Sum of Max's =	**50,308**		**255,289**	
	No. of Samples =	**9**		**21**	
	Average of Max =	**5,590**		**12,157**	
	Sum of Avgs =	**61,293**		**276,845**	
	No. of Samples =	**22**		**48**	
	Average of Avgs =	**2,786**		**5,768**	

NOTE:

A value of 1 ug/kg was assigned for non-detect entries, where needed for calculation purposes.

[yellow] = Maximum sample concentration in each boring used to calculate upper end estimate of TCE and PCE mass in soil.

[blue] = 0 to 5 ft samples used to calculate average TCE and PCE mass estimates.

Table 2-2
Area 9 Vapor Intrusion Evaluation Analytical Results
CD Technologies, Inc.
Attica, Indiana

Analytical Parameter	Screening Levels			Sample Identification / Analytical Result									
				CD-SS-9/22/09-R-001		CD-IA-9/22/09-R-002		CD-SS-9/22/09-R-003		CD-IA-9/22/09-R-004		CD-IA-9/22/09-D-004	
	Region 3 RSL (µg/m^3)	IDEM (µg/m^3)	OSHA PEL (ppm)	(µg/m3)	(ppm)	(µg/m3)	(ppm)	(µg/m3)	(ppm)	(µg/m3)	(ppm)	(µg/m3)	(ppm)
Trichloroethene (TCE)	61	9.9	100	**4500**	0.838	ND	ND	**14000**	2.61	ND	ND	ND	ND
Tetrachloroethene (PCE)	21	8.5	100	**140**	0.021	ND	ND	**2600**	0.388	ND	ND	ND	ND
1,1,1-Trichloroethane (1,1,1-TCA)	2200	3200	-	ND	ND	ND	ND	1800	0.33018	ND	ND	ND	ND
Ethanol	-	-	-	ND	ND	21	0.01115	ND	ND	9.4	0.00499	9.2	0.00489
Acetone	14000	4600	1000	ND	ND	100	0.04213	ND	ND	26	0.01095	24	0.01011
2-Propanol	-	-	-	ND	ND	93	0.03787	ND	ND	15	0.00611	18	0.00733
Carbon Disulfide	310	1000	20	ND	ND	3.2	0.00103	ND	ND	26	0.00836	25	0.00803
Toluene	2200	7200	200	ND	ND	5.8	0.00154	ND	ND	ND	ND	ND	ND
2-Butanone (Methyl Ethyl Ketone)	2200	7200	200	ND	ND	ND	ND	ND	ND	3.2	0.00109	4.0	0.00136
m,p-Xylene	310	150	-	ND	ND	9.9	0.00228	ND	ND	ND	ND	ND	ND

Analytical Parameter	Screening Levels			Sample Identification / Analytical Result									
				CD-SS-9/22/09-R-005		CD-AA-9/22/09-R-006		CD-AA-9/22/09-R-007					
	Region 3 RSL (µg/m^3)	IDEM (µg/m^3)	OSHA PEL (ppm)	(µg/m3)	(ppm)	(µg/m3)	(ppm)	(µg/m3)	(ppm)				
Trichloroethene (TCE)	61	9.9	100	**89000**	16.58	ND	ND	ND	ND				
Tetrachloroethene (PCE)	21	8.5	100	**10000**	1.49	ND	ND	ND	ND				
1,1,1-Trichloroethane (1,1,1-TCA)	2200	3200	-	ND	ND	ND	ND	ND	ND				
Ethanol	-	-	-	ND	ND	ND	ND	ND	ND				
Acetone	14000	4600	1000	ND	ND	3400	1.43249	15	0.00632				
2-Propanol	-	-	-	ND	ND	ND	ND	ND	ND				
Carbon Disulfide	310	1000	20	ND	ND	ND	ND	ND	ND				
Toluene	2200	7200	200	ND	ND	ND	ND	ND	ND				
2-Butanone (Methyl Ethyl Ketone)	2200	7200	200	ND	ND	ND	ND	3.1	0.00105				
m,p-Xylene	310	150	-	ND	ND	ND	ND	ND	ND				

Notes:
With the exception of the OSHA PEL, screening levels are based on carcinogenic risk of 1.0E-5
IDEM Indoor Ambient Air Action Levels - Commercial - for chronic exposure (20 yrs)
U.S. EPA Region 3 Regional Screening Levels for industrial soil and ambient indoor industrial air
ND = Constituent not detected at concentrations exceeding laboratory reporting limit
- = Screening levels not available
SS = Sub Slab Soil Gas Sample; IA = Indoor Ambient Air; AA = Outdoor Ambient Air; R = Routine Sample; D = Duplicate Sample
Bold = Analytical result exceeds RSL and IDEM screening levels

Table 3-1 – Summary of Remedial Alternatives for Area 9
C&D Technologies, Attica, Indiana

Evaluation Criteria for Remedial Alternatives	Alternative 1 No Further Action		Alternative 2 Institutional Controls		Alternative 3 Excavation and Off-site Disposal		Alternative 4 Soil Vapor Extraction (SVE) and Capping		Alternative 5 Excavation and Off-site Disposal and SVE	
	Description	Y/N	Description	Y/N	Description	Y/N	Description	Y/N	Description	Y/N
Protection of Human Health and Environment	No remedial action will be taken and concrete slab currently covering Area 9 will be left in place. Potential for PCE and TCE in soil to be leached downward and impact shallow groundwater.	N	No remedial action will be taken. Instead implementation of institutional controls (i.e., signage, access restrictions, deed restrictions). Routine maintenance of concrete slab according to O&M plan to prevent deterioration of concrete slab.	Y	Excavation and removal of PCE and TCE impacted soil from Area 9. Impacted soil beneath active manufacturing areas will be left in place since they are not accessible using conventional excavation techniques.	N	SVE is an In-situ remediation technology that reduces PCE and TCE concentrations by applying a vacuum to the subsurface soil to created a negative pressure gradient causing desorption and movement of PCE and TCE vapors towards extraction wells. Implementation will effectively reduce contaminant concentrations throughout Area 9.	Y	Alternative 5 combines Alternatives 3 and 4, excavation and SV E implementation. Excavation will remove PCE and TCE impacted soil from the outdoor alleyway for off-site disposal. Modified SVE system will be used to remediate PCE and TCE impacted soils beneath the active manufacturing area not removed during the excavation.	Y
Compliance with ARARs (applicable guidance)	PCE and TCE concentrations exceeding IDEM closure levels left in place.	N	PCE and TCE concentrations exceeding IDEM closure levels left in place.	N	Alternative 3 is effective at reducing PCE and TCE concentrations in the excavated portion of Area 9. PCE and TCE impacted soil exceeding IDEM closure levels will be left in place beneath active manufacturing areas.	N	Implementation of SVE will reduce PCE and TCE concentrations in Area 9 to IDEM direct closure levels for migration to groundwater.	Y	Alternative 5 will reduce PCE and TCE concentrations in Area 9 to IDEM direct closure levels for migration to groundwater through excavation and SVE implementation.	Y
Long-Term Effectiveness	Dependent on condition of concrete slab.	N	Dependent on condition of concrete slab according to O&M plan.	Y	Limited effectiveness for excavation area only.	N	Will permanently reduce PCE and TCE concentrations in subsurface soils.	Y	Will permanently reduce PCE and TCE concentrations in subsurface soils.	Y
Reduction of Toxicity, Mobility, or Volume	Impacted soil left in place with potential for downward migration and impacts to shallow groundwater.	N	Impacted soil left in place with potential for downward migration and impacts to shallow groundwater.	N	Limited reduction of toxicity, mobility, and volume in excavation area only.	N	Will permanently reduce toxicity, mobility, and volume of PCE and TCE in subsurface soils.	Y	Will permanently reduce toxicity, mobility, and volume of PCE and TCE in subsurface soils.	Y
Short-Term Effectiveness	Concrete slab is currently in good condition and provides adequate cap to prevent downward migration of groundwater.	Y	Dependent on condition of concrete slab according to O&M plan.	Y	Limited effectiveness for excavation area only.	N	Will permanently reduce PCE and TCE concentrations in subsurface soils.	Y	Will permanently reduce PCE and TCE concentrations in subsurface soils.	Y
Implementability	Can be implemented at any time.	Y	Can be implemented at any time.	Y	Technically feasible since excavation will be conducted with traditional excavation equipment.	Y	Implementation is technically feasible. Area 9 is accessible and located in an area of low plant traffic. PCE and TCE impacted soil is isolated to shallow, unsaturated soil.	Y	Alternative 5 is technically feasible and would be implemented in stages with excavation occurring first followed by SVE implementation.	Y

Table 3-1 – Summary of Remedial Alternatives for Area 9
C&D Technologies, Attica, Indiana

Cost	Since this is a no action alternative, no attendant costs. Total cost = $0.00	-	Estimated cost for implementation is approximately $5,000.	-	Estimated cost for implementation is approximately $91,500.	-	Estimated costs range from $95,000 to $105,000 depending on need for off-gas treatment.	-	Estimated costs range from $154,500 to $165,000 depending on need for off-gas treatment.	-
State Acceptance	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-
Community Acceptance	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-

Notes:
1) Y/N determines if the remedial alternative meets the evaluation criteria; Y = yes, N = no.
2) Remedial alternatives that received an N, or no response, for any of the evaluation criteria were not considered a viable remedial alternative for the designated area.
3) To qualify for implementation, a remedial option must meet each evaluation criteria as designated by a Y, or yes response.
4) For qualifying remedial alternatives, cost was the deciding factor for implementation.

Table 3-2
Cost Comparison - Remedial Alternatives - Area 9
CD Technologies, Attica, Indiana

Area 9 - Remedial Alternative	Remedial Alternative Description	Cost
Alternative 1 - No Further Action	No remedial action alternative for baseline comparison.	
	Implementation Costs:	$0
	Operations and Maintenance (estimated annual costs)	$0
	Total Estimated Cost:	**$0**
Alternative 2 - Institutional Controls	No remedial action; implementation of institutional controls (signage, access restriction, and deed restriction).	
	Implementation Costs:	$5,000
	Operations and Maintenance (estimated annual costs)	$0
	Total Estimated Cost:	**$5,000**
Alternative 3 - Excavation and Off-Site Disposal	Excavation of PCE and TCE impacted soils present in outdoor alleyway. Impacted soils beneath active manufacturing areas will be left in place.	
	Implementation Costs:	$91,500
	Operations and Maintenance (estimated annual costs):	$0
	Total Estimated Cost:	**$91,500**
Alternative 4a - Soil Vapor Extraction (SVE) and Capping (No Off-Gas Treatment)	Implementation of soil vapor extraction system to treat PCE and TCE impacted soils associated with Area 9.	
	Implementation Costs:	$52,000
	Operations and Maintenance (estimated annual costs) and closure reporting. Assumes SVE system will operate for a one-year period.	$43,500
	Total Estimated Cost:	**$95,000**
Alternative 4b - SVE and Capping (With Off-Gas Treatment - Activated Carbon)	Implementation of soil vapor extraction system to treat PCE and TCE impacted soils associated with Area 9.	
	Implementation Costs:	$59,500
	Operations and Maintenance (estimated annual costs) and closure reporting. Assumes SVE system will operate for a one-year period.	$45,500
	Total Estimated Cost:	**$105,000**
Alternative 5a - Excavation and Off-Site Disposal and SVE (No Off-Gas Treatment)	Excavation of PCE and TCE impacted soils present in outdoor alleyway. Impacted soils beneath active manufacturing areas will be treated using modified SVE system.	
	Implementation Costs:	$111,000
	Operations and Maintenance (estimated annual costs) and closure reporting. Assumes SVE system will operate for a one-year period.	$43,500
	Total Estimated Cost:	**$154,500**
Alternative 5b - Excavation and Off-Site Disposal and SVE (With Off-Gas Treatment - Activated Carbon)	Excavation of PCE and TCE impacted soils present in outdoor alleyway. Impacted soils beneath active manufacturing areas will be treated using modified SVE system.	
	Implementation Costs:	$119,500
	Operations and Maintenance (estimated annual costs) and closure reporting. Assumes SVE system will operate for a one-year period.	$45,500
	Total Estimated Cost:	**$165,000**

Table 3-3 – Summary of Remedial Alternatives for Riverbank Area
C&D Technologies, Attica, Indiana

Evaluation Criteria for Remedial Alternatives	Alternative 1 No Further Action		Alternative 2 Institutional Controls		Alternative 3 Immobilization and Exposure Barrier		Alternative 4 On-site Treatment, Off-Site Disposal, and Exposure Barrier		Alternative 5 Containment (Exposure Barrier)	
	Description	Y/N	Description	Y/N	Description	Y/N	Description	Y/N	Description	Y/N
Protection of Human Health and Environment	No remedial action will be taken to mitigate potential lead exposure to ecological receptors.	N	No remedial action will be taken. Instead, implementation of institutional controls (i.e., signage, access restrictions, deed restrictions) will be used.	N	Alternative 3 involves excavation of lead-impacted soil and on-site treatment (immobilization) with TSP. Treated soil will be placed back in excavation and covered with an exposure barrier. Immobilization and construction of the exposure barrier will effectively reduce potential ecological exposure risks. Excess phosphate from soil treatment process may leach into Wabash River. Implementation of Alternative 3 may result in loss of mature trees in Riverbank Area.	Y	Alternative 4 involves excavation of lead-impacted soil, on-site treatment (TSP) and off-site disposal. Excavation area will be backfilled and covered with an exposure barrier. Removal of lead-impacted soil through excavation and off-site disposal will eliminate potential ecological exposure risks. Construction of exposure barrier will help stabilize bank and reduce erosion. Implementation of Alternative 3 may result in loss of mature trees in Riverbank Area.	Y	Alternative 5 involves construction of an exposure barrier to contain and isolate lead-impacted soils associated with CD-SB-59. Alternative 5 will effectively isolate lead-impacted soils reducing average lead concentrations to below to below EPC of 965 mg/kg. Implementation of Alternative 3 may result in loss of mature trees in Riverbank Area.	Y
Compliance with ARARs (applicable guidance)	Lead-impacted soils exceeding the exposure point concentration (EPC) of 965 mg/kg will be left in place.	N	Lead-impacted soils exceeding the EPC of 965 mg/kg will be left in place.	N	Immobilization will reduce bioavailability in receptor species and result in an overall reduction of lead concentrations in the Riverbank Area to below EPC of 965 mg/kg	Y	Removal of lead-impacted soil for off-site disposal will result in an overall reduction of lead concentrations in the Riverbank Area to below EPC of 965 mg/kg.	Y	Alternative 5 will effectively isolate lead-impacted soils reducing average lead concentrations to below the EPC for selected receptors.	Y
Long-Term Effectiveness	Does not isolate or remove lead-impacted soils associated with CD-SB-59.	N	Does isolate or remove lead-impacted soils associated with CD-SB-59.	N	Ecological risk exposures are effectively eliminated through immobilization and exposure barrier construction.	Y	Ecological risk exposures are effectively eliminated through excavation and off-site disposal of lead-impacted soil.	Y	Ecological risk exposures are effectively eliminated through isolation of lead-impacted soil.	Y
Reduction of Toxicity, Mobility, or Volume	Does not reduce toxicity, mobility, or volume of lead-impacted soil.	N	Does not reduce toxicity, mobility, or volume of lead-impacted soil.	N	Bioavailability of lead in soils treated with TSP is reduced; therefore, reducing toxicity, mobility, and volume of lead-impacted soil.	Y	Alternative 4 effectively reduces toxicity, mobility, and volume of lead-impacted soil in the Riverbank Area through removal and off-site disposal.	Y	Alternative 5 effectively reduces toxicity and mobility of lead impacts through isolation of contaminants. Volume of lead impacted soil will remain unchanged although isolated from potential exposure to small mammals and terrestrial birds foraging in the area.	Y
Short-Term Effectiveness	Does isolate or remove lead-impacted soils associated with CD-SB-59.	N	Does isolate or remove lead-impacted soils associated with CD-SB-59.	N	Ecological risk exposures are effectively eliminated through immobilization and exposure barrier construction.	Y	Ecological risk exposures are effectively eliminated through excavation and off-site disposal of lead-impacted soil.	Y	Ecological risk exposures are effectively eliminated through isolation of lead-impacted soil.	Y

Table 3-3 – Summary of Remedial Alternatives for Riverbank Area
C&D Technologies, Attica, Indiana

Evaluation Criteria for Remedial Alternatives	Alternative 1 No Further Action		Alternative 2 Institutional Controls		Alternative 3 Immobilization and Exposure Barrier		Alternative 4 On-site Treatment, Off-Site Disposal, and Exposure Barrier		Alternative 5 Containment (Exposure Barrier)	
	Description	Y/N	Description	Y/N	Description	Y/N	Description	Y/N	Description	Y/N
Implementability	Can be implemented at any time.	Y	Implementation of Institutional Controls is technically feasible and can be implemented at any time. Institutional controls are primarily designed to limit human exposure and are typically ineffective at reducing ecological exposure risks.	Y	Alternative is technically feasible since excavation will be conducted with traditional excavation equipment.	Y	Alternative 4 is technically feasible since excavation will be conducted with traditional excavation equipment. Will require periodic inspections and repair according to an O&M plan.	Y	Alternative 5 is technically feasible since the scope of work can be accomplished with traditional excavation equipment and manual labor. Will require periodic inspections and repair according to an O&M plan.	Y
Cost	Since this is a no action alternative, no attendant costs. Total cost = $0.00	-	Estimated cost for implementation is approximately $5,000.	-	Estimated cost for implementation is approximately $76,500 with first year maintenance fee of $5,000.	-	Estimated cost for implementation is approximately $88,000 with first year maintenance fee of $5,000.	-	Estimated cost for implementation is approximately $61,500 with first year maintenance fee of $5,000.	-
State Acceptance	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-
Community Acceptance	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-	Pending public review period.	-

Notes:
1) Y/N determines if the remedial alternative meets the evaluation criteria; Y = yes, N = no.
2) Remedial alternatives that received an N, or no response, for any of the evaluation criteria were not considered a viable remedial alternative for the designated area.
3) To qualify for implementation, a remedial option must meet each evaluation criteria as designated by a Y, or yes response.
4) For qualifying remedial alternatives, cost was the deciding factor for implementation.

Table 3-4
Cost Comparison - Remedial Alternatives - Riverbank Area
CD Technologies, Attica, Indiana

Riverbank Area - Remedial Alternatives	Remedial Alternative Description	Cost
Alternative 1 - No Further Action	No remedial action alternative for baseline comparison.	
	Implementation Costs:	$0
	Operations and Maintenance (estimated annual costs)	$0
	Total Estimated Cost:	**$0**
Alternative 2 - Institutional Controls	No remedial action; implementation of institutional controls (signage, access restriction, and deed restriction).	
	Implementation Costs:	$5,000
	Operations and Maintenance (estimated annual costs)	$0
	Total Estimated Cost:	**$5,000**
Alternative 3 - Immobilization and Capping	Excavation of lead-impacted soil, treatment with Triple Super Phosphate (TSP) to immobilize lead compounds and cover with exposure barrier constructed of geotextile fabric and riprap.	
	Implementation Costs:	$71,500
	Operations and Maintenance (estimated annual costs):	$5,000
	Total Estimated Cost (Implementation and first year O&M):	**$76,500**
Alternative 4 - On-Site Treatment and Off-Site Disposal with Capping	Excavation of lead-impacted soil, treatment with TSP to immobilize lead compounds and place in roll-off boxes for off-site disposal. Cover excavation area with exposure barrier constructed of geotextile fabric and riprap.	
	Implementation Costs:	$83,000
	Operations and Maintenance (estimated annual cost) and closure reporting.	$5,000
	Total Estimated Cost (Implementation and first year O&M):	**$88,000**
Alternative 5 - Containment (Exposure Barrier)	Cover lead-impacted area with exposure barrier constructed of geotextile fabric and riprap. Lead-impacted soil will be left in place.	
	Implementation Costs:	$56,500
	Operations and Maintenance (estimated annual costs) and closure reporting.	$5,000
	Total Estimated Cost (Implementation and first year O&M):	**$61,500**

Table 4-1
Preliminary Area 9 SVE System Daily Air Emission Estimates and Threshold Comparison
C&D Technologies, Inc.
Attica, Indiana

		TCE	PCE	Total HAP	Unit
Permitting Threshold *	Hourly Permitting Threshold	2.28	2.28	5.71	lb/hr
	Daily Permitting Threshold	54.8	54.8	137	lb/day
	Annual Permitting Threshold	10	10	25	ton/yr
		TCE	**PCE**	**Total HAP**	**Unit**
Projected Emissions (At start-up)**	Hourly Emission Rate:	0.44	0.14	0.58	lb/hr
	Daily Emission Rate:	10.56	3.36	13.92	lb/day
	Annual Emission Rate:	3854	1226.4	5081	lb/yr
	Annual Emission Rate:	1.927	0.6132	2.540	ton/yr

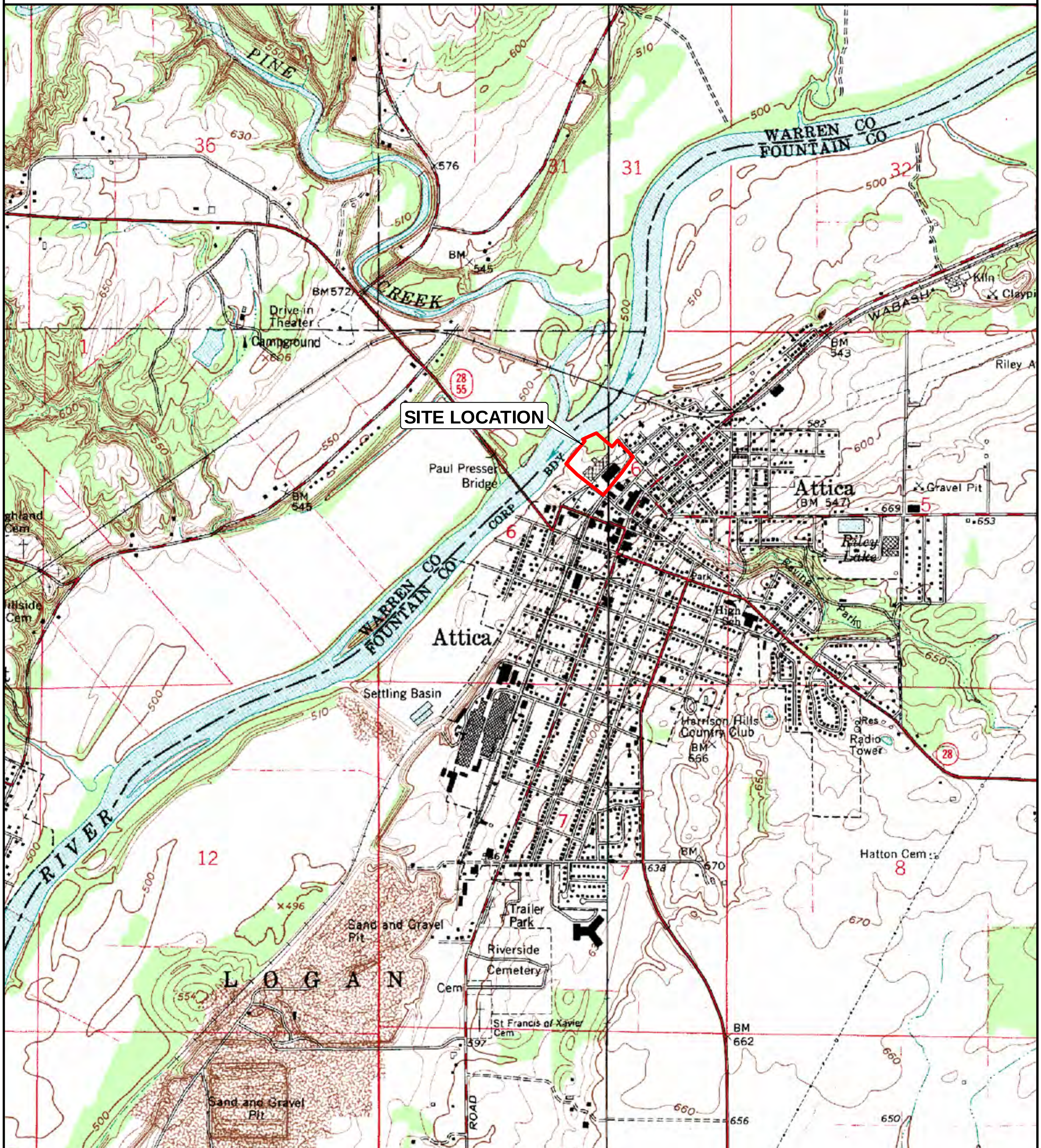
* Per 326 IAC 2-1.1-3(d)(4), a new source "with the potential to emit less than 10 tons per year of a single HAP…, or 25 tons per year of any combination of HAPs" is not required to submit an application for a permit or registration. Daily and hourly threshold rates are based on 24/365 operating schedule.

** Start-up emissions based on estimated initial (first hour of operation) TCE and PCE mass recovery rates as presented in Appendix B.

FIGURES

UNITED STATES DEPARTMENT
OF THE INTERIOR
GEOLOGICAL SURVEY

ATTICA AND WILLIAMSPORT
7.5 MINUTE QUADRANGLES



C & D TECHNOLOGIES, INC.
200 West Main Street
Attica, Indiana

URS
Franklin, Tennessee

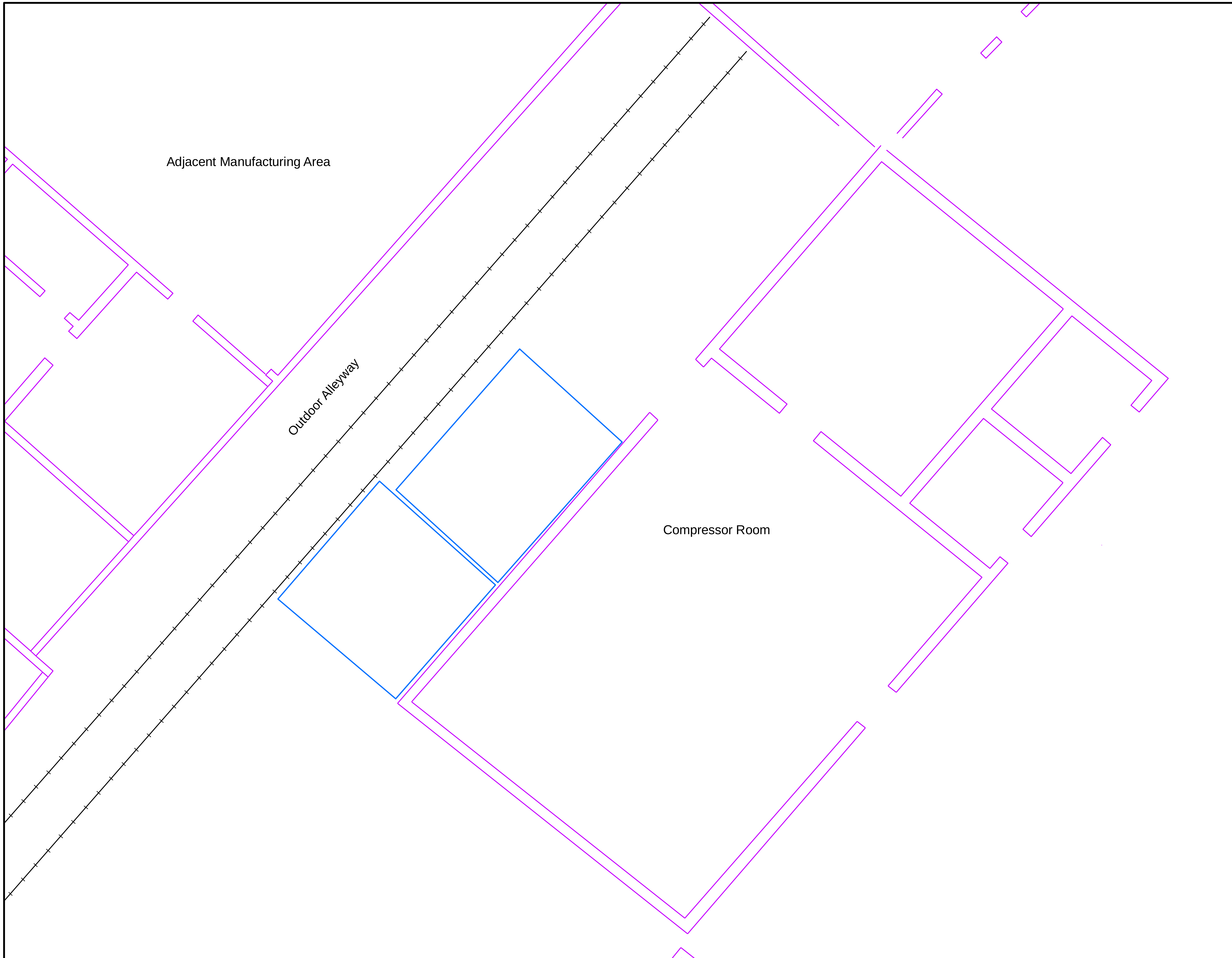
SCALE:	DRAWN BY: RL	DATE: 06/25/08
1:24,000	CHECKED BY: JW	DATE: 06/25/08

G:/C_D_Technologies/deliverables/EI Report/8x11-SiteLocation.mxd

SITE LOCATION MAP

PROJECT NO: 20500205 .00001

FIGURE NO: 1-1



Legend

- Abandoned Railroad
- Outside Equipment
- Building/Wall

Note(s):
1.) Map does not show all utilities within the area depicted.

N

1" = 8'

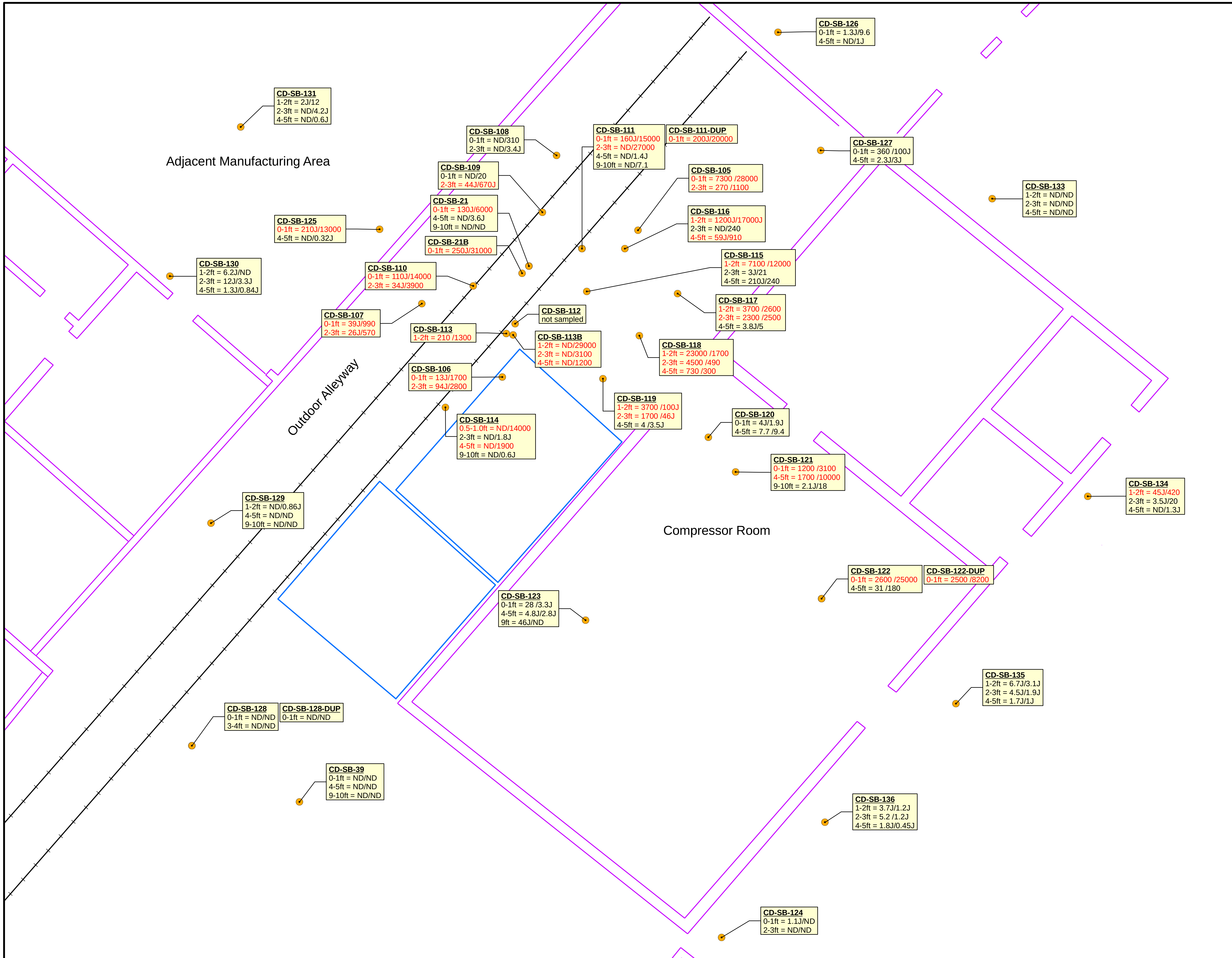
0 4 8 Feet

URS
Franklin, Tennessee

Figure 2-1
Area 9 Site Layout

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By:	Projection:
RL	UTM, Zone 16N, NAD83, Meters
Checked By:	Source(s):
JW	URS Corporation



Legend

3.7/0.1 = PCE/TCE (ug/kg)

- Soil Sample Location
- Abandoned Railroad
- Outside Equipment
- Building/Wall

Note(s):
1.) Sample locations are approximate.
2.) ND = not detected
3.) Red text denotes PCE concentrations exceeding 640 ug/kg and/or TCE concentrations exceeding 350 ug/kg. (IDEM Direct Closure Levels for Migration to Groundwater).

CD-SS-DATE-R-005:
CD = C&D Technologies
SS = Sub-Slab
IA = Indoor Air
AA = Ambient Air (outside)
DATE = Sample Collection Date
R = Routine
005 = Sample Number

N

1" = 8'

0 4 8 Feet

URS
Franklin, Tennessee

Figure 2-2
Area 9 Soil Data

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By:	Projection:
RL	UTM, Zone 16N, NAD83, Meters
Checked By: JW	Source(s): URS Corporation

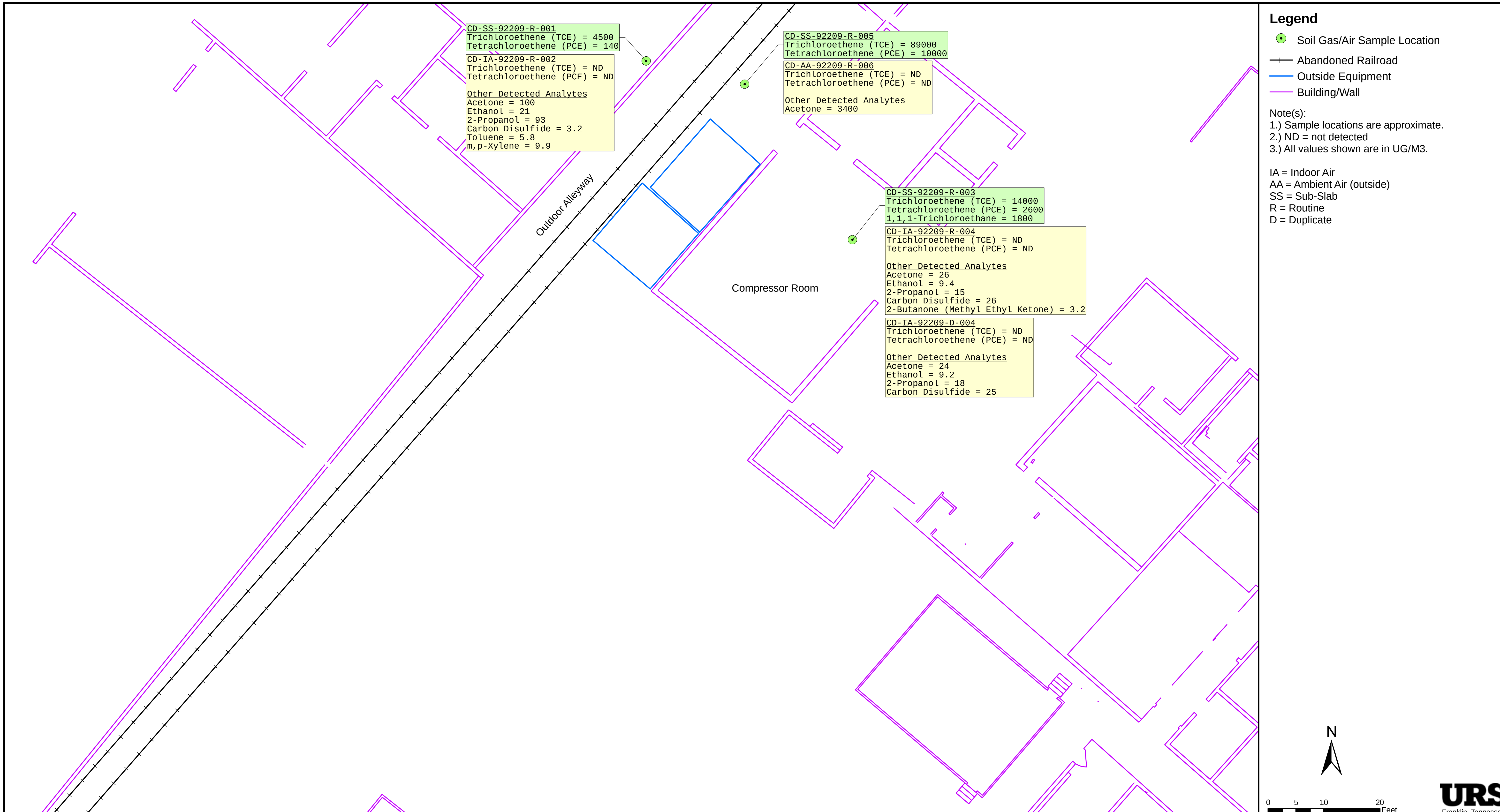
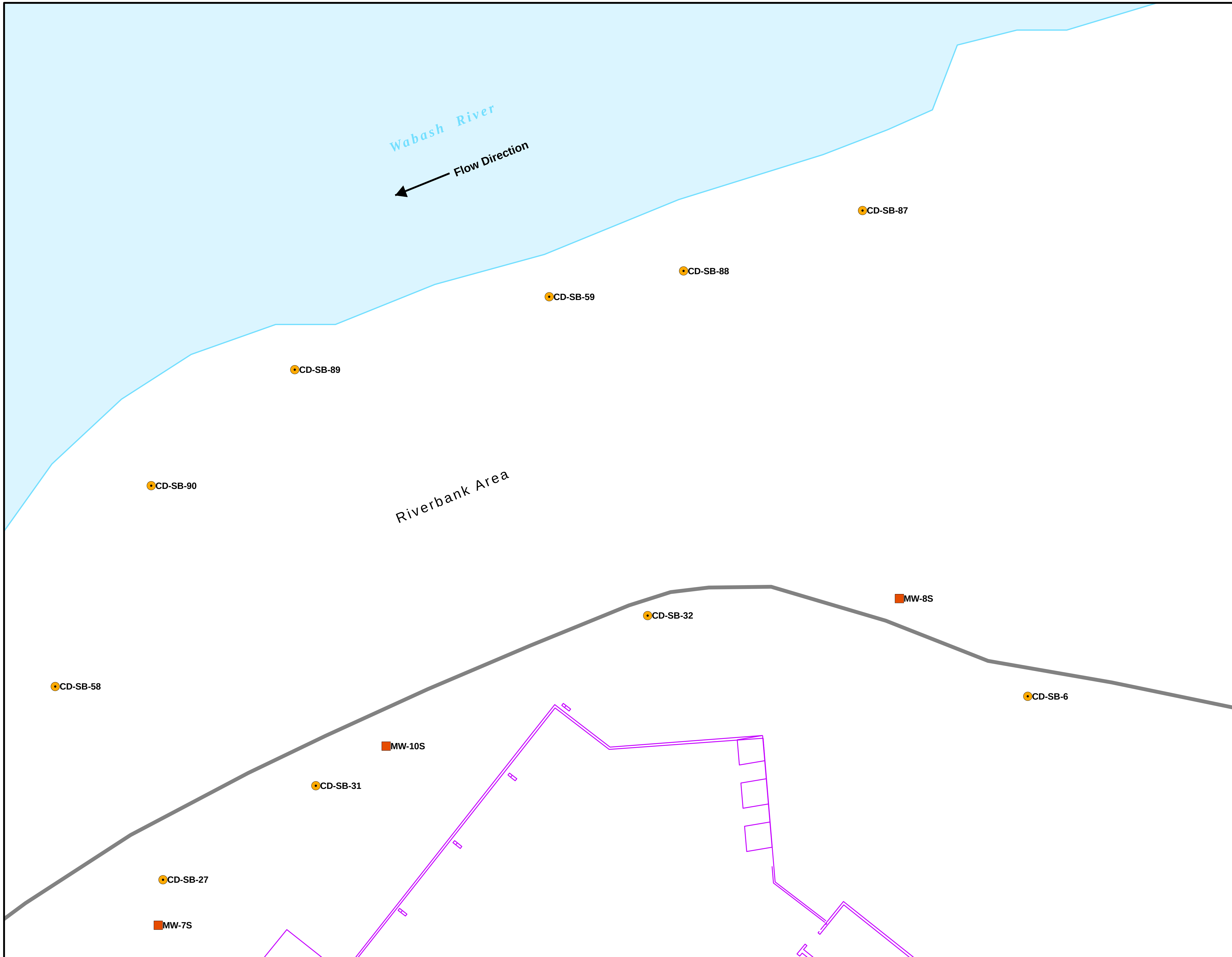


Figure 2-3
Area 9 Sub-Slab and Ambient Air Sample Results

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By: RL	Projection: UTM, Zone 16N, NAD83, Meters
Checked By: JW	Source(s): URS Corporation



Legend

- Monitoring Well Location
- Soil Boring Location
- Edge of Pavement
- River Bank
- Water
- Building/Wall

Note(s):
1.) Sample locations are approximate.

N

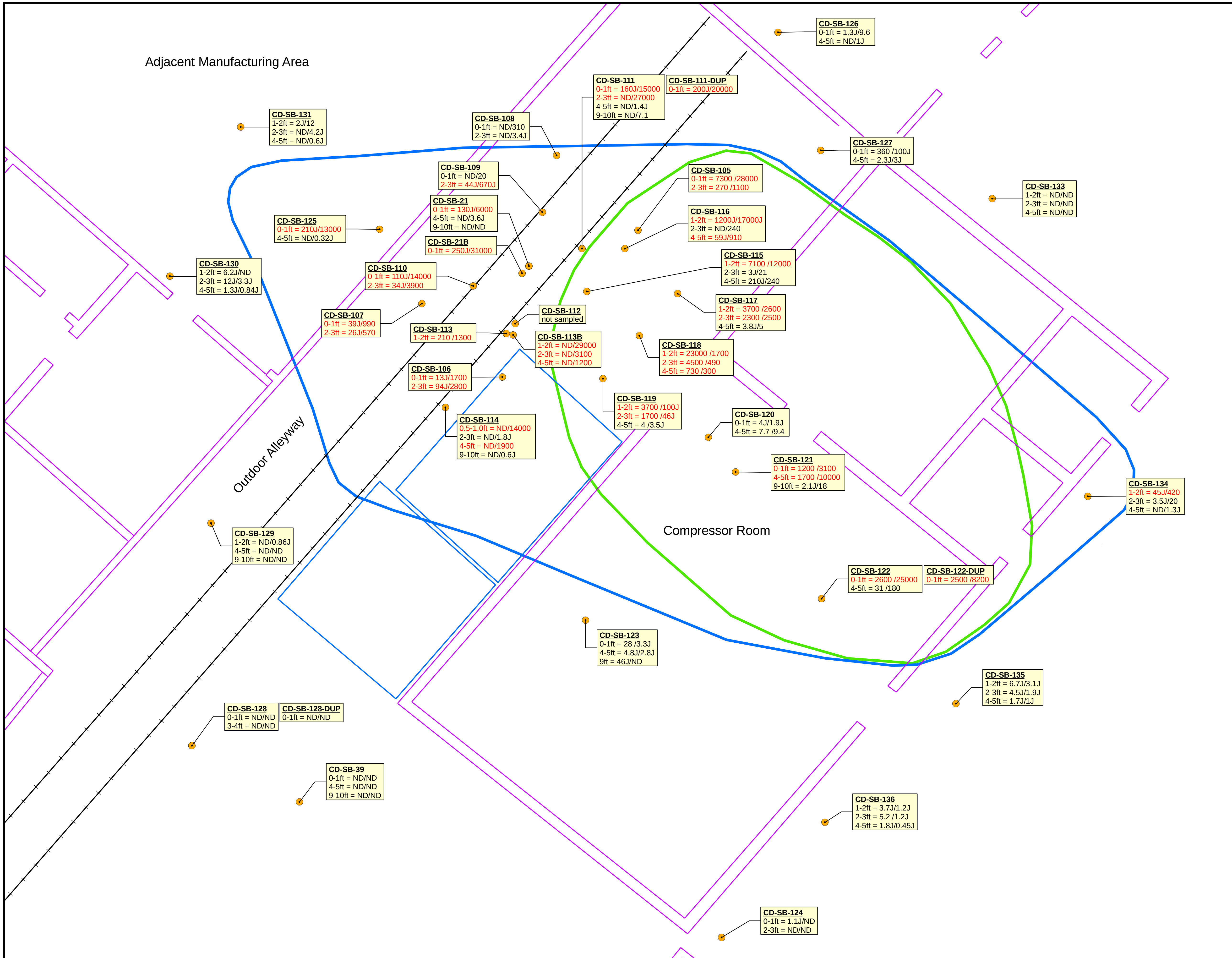
0 5 10 20 Feet

URS
Franklin, Tennessee

Figure 2-4
Riverbank Area
(CD-SB-59)

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By:	Projection:
RL	StatePlane Indiana West, NAD83, Feet
Checked By:	Source(s):
JW	URS Corporation



Legend

3.7/0.1 = PCE/TCE (ug/kg)

- Soil Sample Location
- Abandoned Railroad
- Outside Equipment
- Building/Wall
- Area with TCE > 350 ug/kg
- Area with PCE > 640 ug/kg

Note(s):
1.) Sample locations are approximate.
2.) ND = not detected
3.) Red text denotes PCE concentrations exceeding 640 ug/kg and/or TCE concentrations exceeding 350 ug/kg. (IDEM Direct Closure Levels for Migration to Groundwater).

CD-SS-DATE-R-005:
CD = C&D Technologies
SS = Sub-Slab
IA = Indoor Air
AA = Ambient Air (outside)
DATE = Sample Collection Date
R = Routine
005 = Sample Number

N

1" = 8'

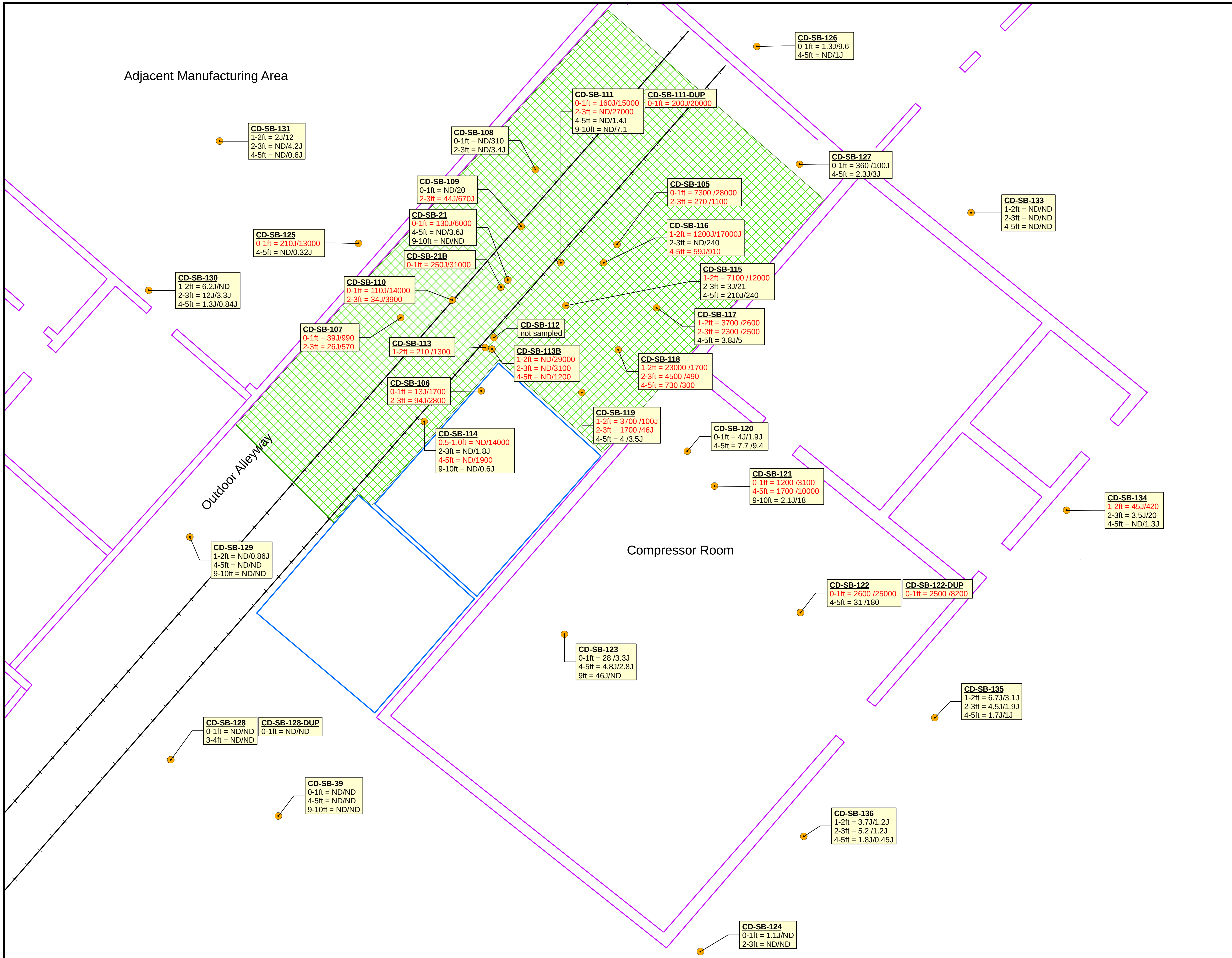
0 4 8 Feet

URS
Franklin, Tennessee

Figure 3-1
Interpreted Areas of
PCE and TCE Soil Impacts

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By:	Projection:
RL	UTM, Zone 16N, NAD83, Meters
Checked By: JW	Source(s): URS Corporation



Legend

3.7/0.1 = PCE/TCE (ug/kg)

- Soil Sample Location
- Abandoned Railroad
- Outside Equipment
- Building/Wall
- Proposed Excavation Area

Note(s):
1.) Sample locations are approximate.
2.) ND = not detected
3.) Red text denotes PCE concentrations exceeding 640 ug/kg and/or TCE concentrations exceeding 350 ug/kg. (IDEM Direct Closure Levels for Migration to Groundwater).

CD-SS-DATE-R-005:
CD = C&D Technologies
SS = Sub-Slab
IA = Indoor Air
AA = Ambient Air (outside)
DATE = Sample Collection Date
R = Routine
005 = Sample Number

N

1" = 8'

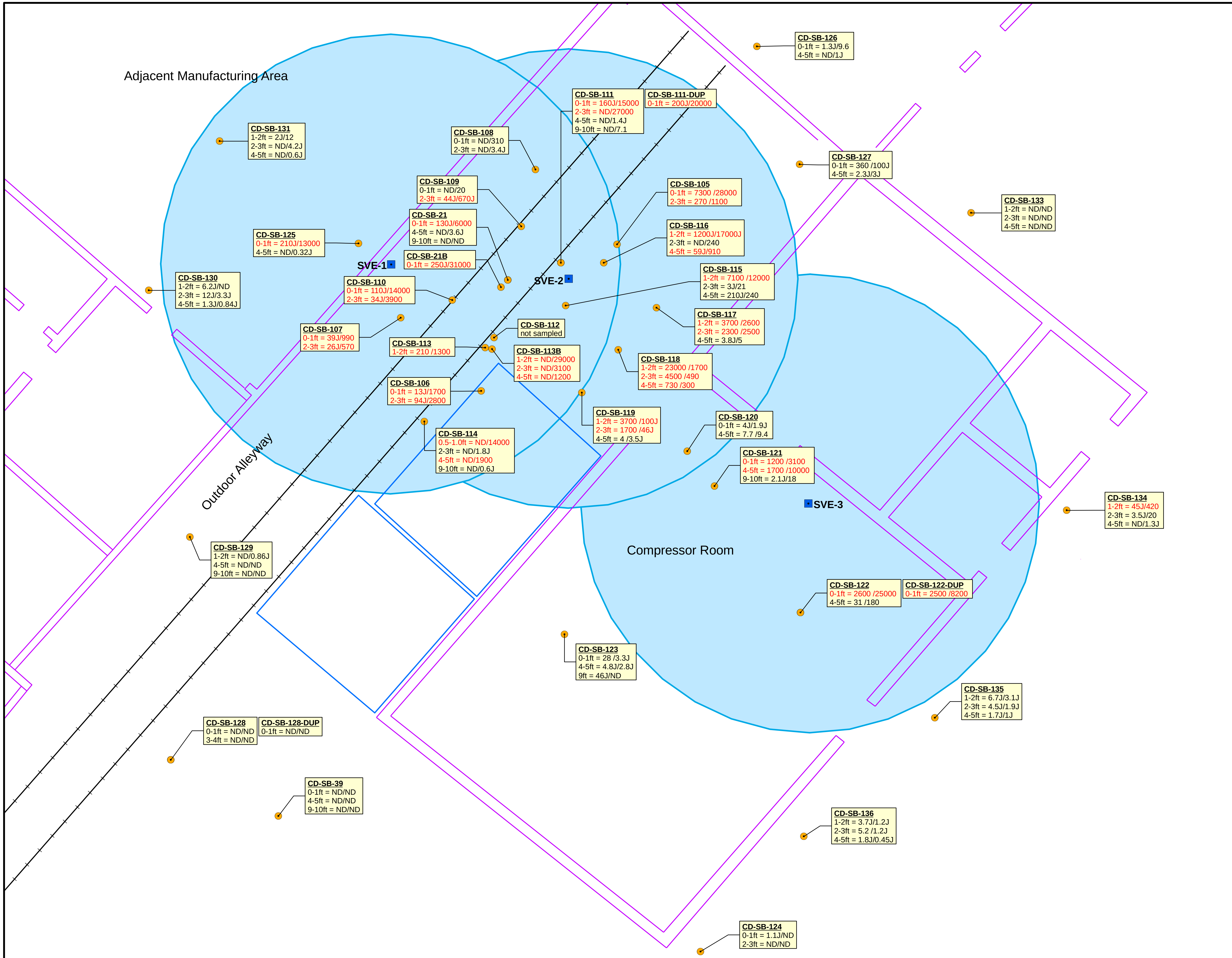
0 4 8 Feet

URS
Franklin, Tennessee

Figure 3-2
Alternative 3 - Area 9
Excavation & Off-Site Disposal

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By: RL	Projection: UTM, Zone 16N, NAD83, Meters
Checked By: JW	Source(s): URS Corporation



Legend

3.7/0.1 = PCE/TCE (ug/kg)

- Proposed SVE Well Location
- Soil Sample Location
- Abandoned Railroad
- Outside Equipment
- Building/Wall
- Interpreted SVE Radius of Influence

Note(s):
1.) Sample locations are approximate.
2.) ND = not detected
3.) Red text denotes PCE concentrations exceeding 640 ug/kg and/or TCE concentrations exceeding 350 ug/kg. (IDEM Direct Closure Levels for Migration to Groundwater).

CD-SS-DATE-R-005:
CD = C&D Technologies
SS = Sub-Slab
IA = Indoor Air
AA = Ambient Air (outside)
DATE = Sample Collection Date
R = Routine
005 = Sample Number

N

1" = 8'

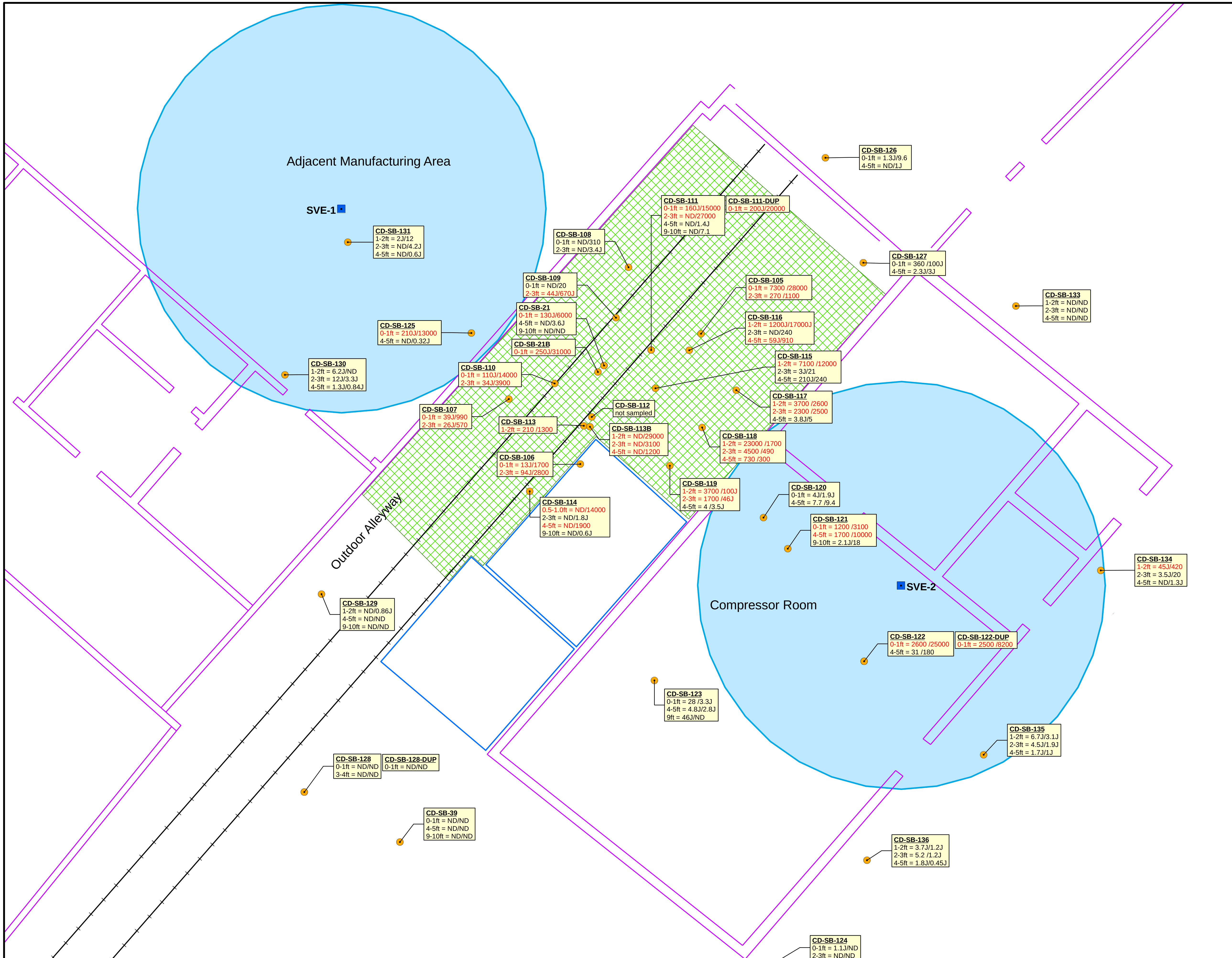
0 4 8 Feet

URS
Franklin, Tennessee

Figure 3-3
Alternative 4 -
Area 9 SVE & Capping

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By: RL	Projection: UTM, Zone 16N, NAD83, Meters
Checked By: JW	Source(s): URS Corporation



Legend

3.7/0.1 = PCE/TCE (ug/kg)

- Proposed SVE Well Location
- Soil Sample Location
- Abandoned Railroad
- Outside Equipment
- Building/Wall
- Interpreted SVE Radius of Influence
- Proposed Excavation Area

Note(s):
1.) Sample locations are approximate.
2.) ND = not detected
3.) Red text denotes PCE concentrations exceeding 640 ug/kg and/or TCE concentrations exceeding 350 ug/kg. (IDEM Direct Closure Levels for Migration to Groundwater).

CD-SS-DATE-R-005:
CD = C&D Technologies
SS = Sub-Slab
IA = Indoor Air
AA = Ambient Air (outside)
DATE = Sample Collection Date
R = Routine
005 = Sample Number

N

1" = 9'

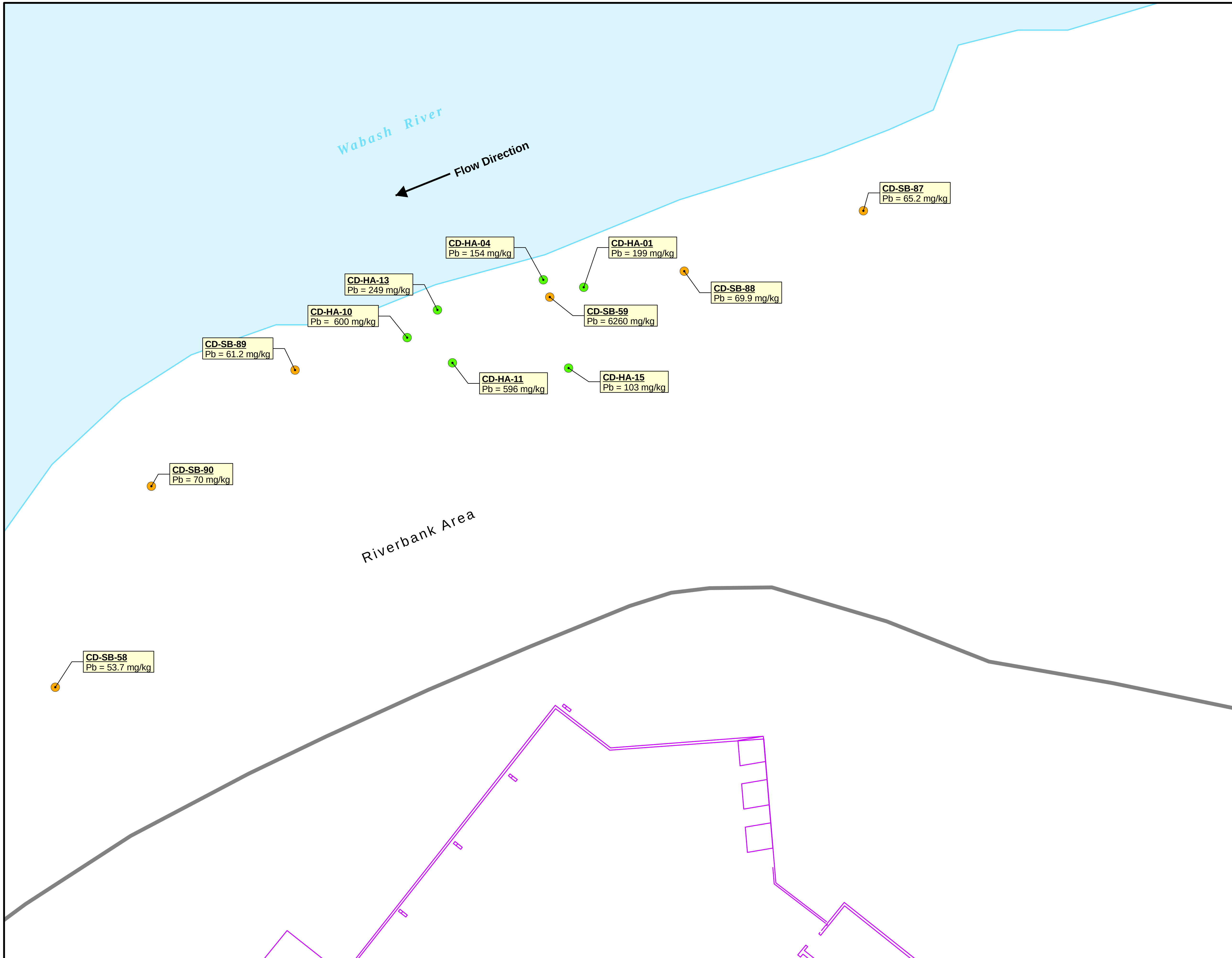
0 3 6 9 Feet

URS
Franklin, Tennessee

Figure 3-4
Alternative 5 - Area 9 Excavation & Off-Site Disposal and SVE

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By:	Projection:
RL	UTM, Zone 16N, NAD83, Meters
Checked By:	Source(s):
JW	URS Corporation



Legend

- Hand Auger Location
- Soil Boring Location
- Edge of Pavement
- River Bank
- Building/Wall
- Water

Note(s):
1.) Sample locations are approximate.
2.) All values shown are in mg/kg.
3.) All soil samples were collected at 0-1 ft bgs.

CD-HA-XX
CD-SB-XX
SB = Soil Boring
HA = Hand Auger
XX - Sample Number

N

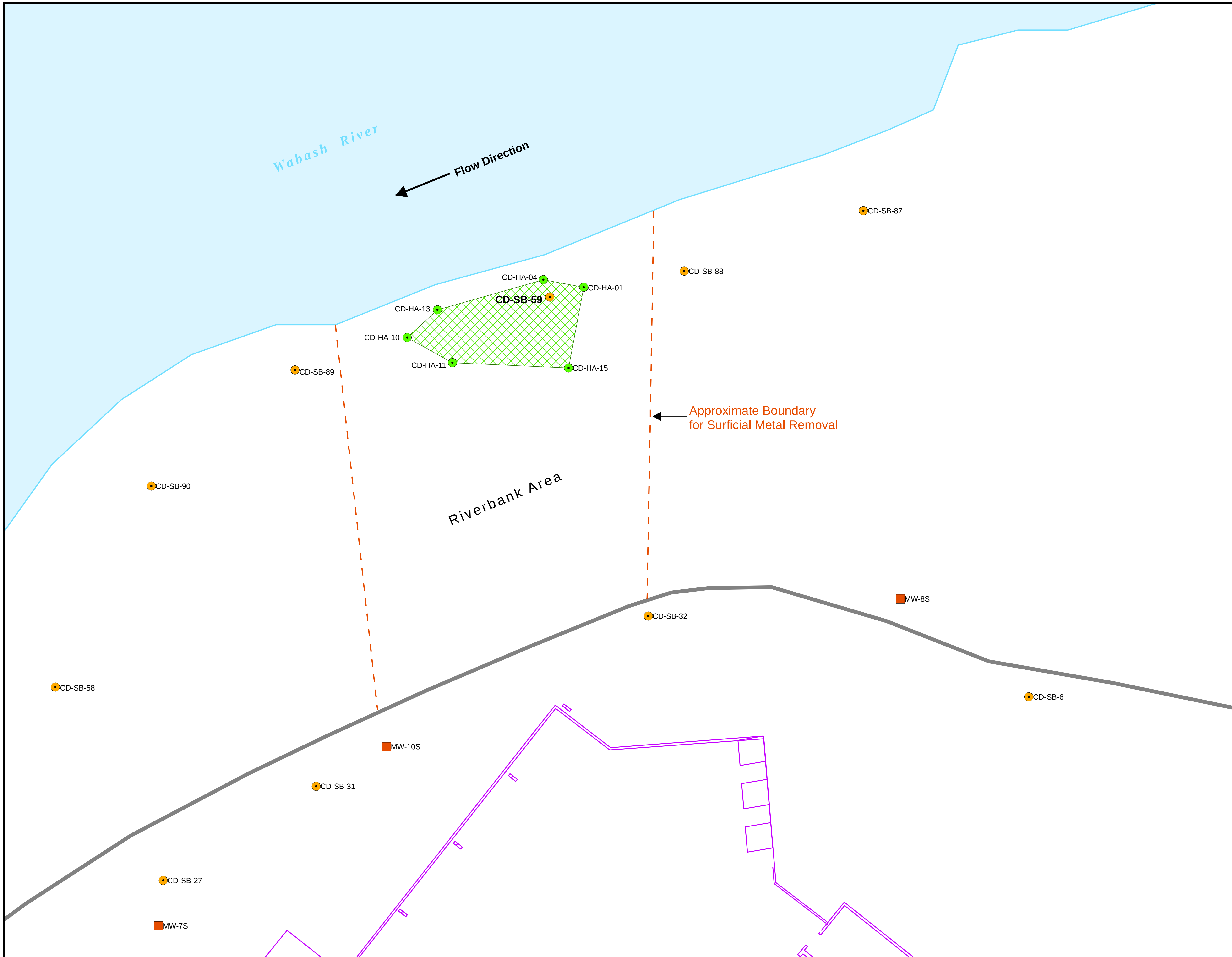
0 5 10 20 Feet

URS
Franklin, Tennessee

Figure 3-5
Lead Analytical Results
Riverbank Area (CD-SB-59)

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

Drawn By:	Projection:
RL	StatePlane Indiana West, NAD83, Feet
Checked By: JW	Source(s): URS Corporation



Legend

- Hand Auger Location
- Monitoring Well Location
- Soil Boring Location
- Edge of Pavement
- River Bank
- Building/Wall
- Water
- Proposed Excavation Area/Exposure Barrier

Note(s):
1.) Sample locations are approximate.

CD-HA-XX
CD-SB-XX
SB = Soil Boring
HA = Hand Auger
XX - Sample Number

N

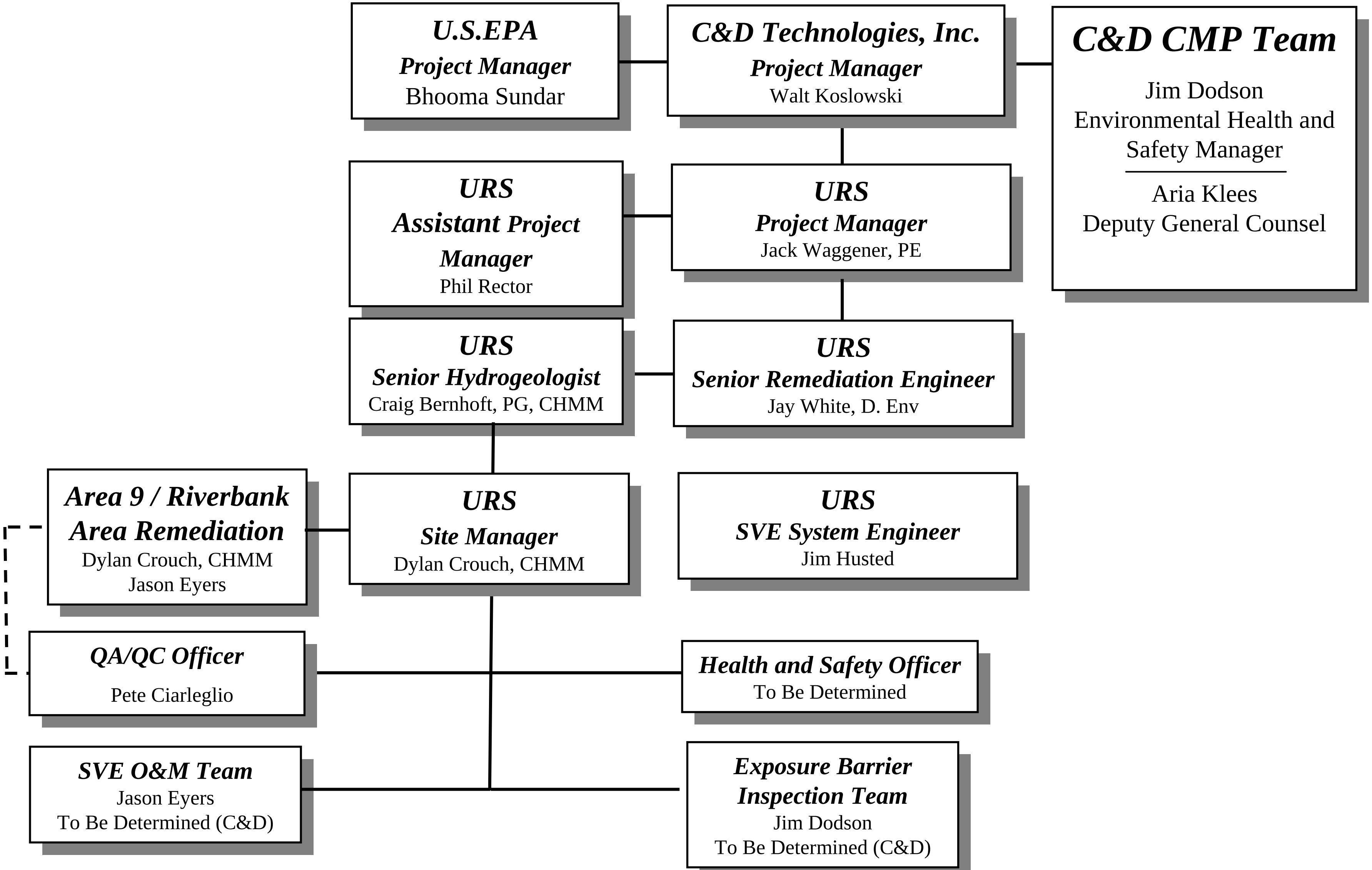
0 5 10 20 Feet

URS
Franklin, Tennessee

Figure 3-6
Proposed Excavation Area/ Exposure Barrier Riverbank Area (CD-SB-59)

C & D Technologies, Inc.
200 West Main Street
Attica, Indiana

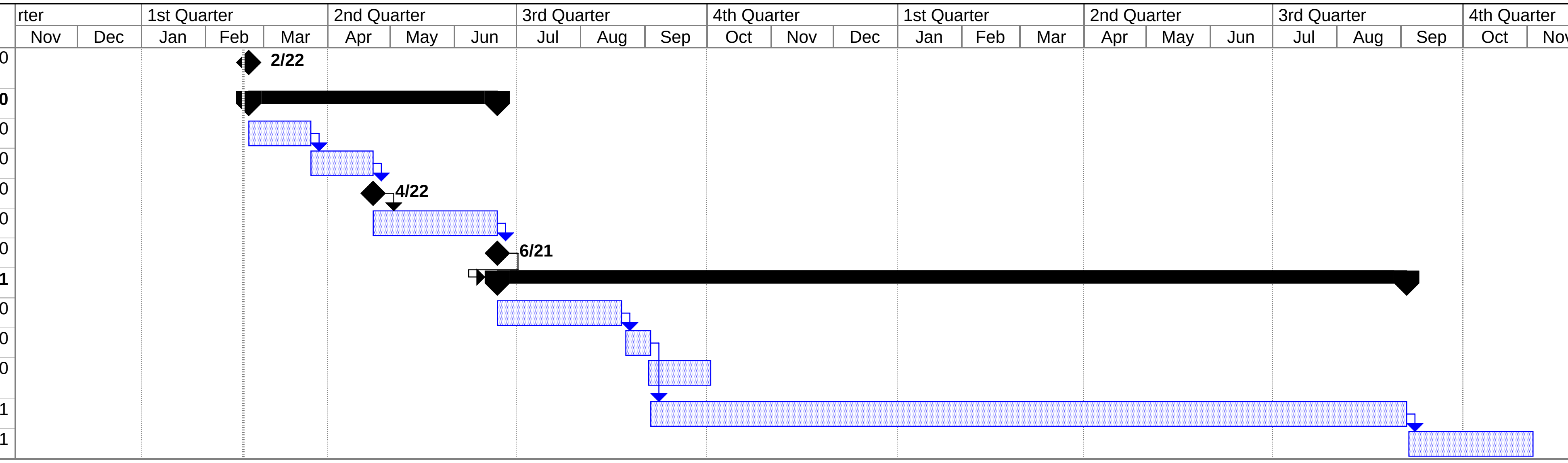
Drawn By:	Projection:
RL	StatePlane Indiana West, NAD83, Feet
Checked By: JW	Source(s): URS Corporation



CLIENT: C&D Technologies, Inc.		TITLE: CMP – Management Organization Chart	
PROJECT: RCRA Facility Investigation Work Plan, C&D, Attica, Indiana			
REVISION NO.:	DESIGNED BY:	URS	PROJ. NO.: 20200205
SCALE:	DRAWN BY: D. Crouch		TASK NO.: 00001
FILE: S:\2010\C&DTechnologies\Attica\CMP\Fig4-1_Org Chart.ppt	CHKD BY: J. White		FIGURE: 6-1

Figure 7-1
Corrective Measures Proposal - Area 9 - Soil Vapor Extraction
CD Technologies, Attica, Indiana

ID	Task Name	Start	Finish
1	**C&D Submittal of CMP for Area 9 to Region 5 U.S. EPA**	Mon 2/22/10	Mon 2/22/10
2	**Review and Approval**	**Mon 2/22/10**	**Mon 6/21/10**
3	Region 5 U.S. EPA Review Period	Mon 2/22/10	Tue 3/23/10
4	C&D Response to Comments	Wed 3/24/10	Thu 4/22/10
5	C&D Submittal to U.S. EPA	Thu 4/22/10	Thu 4/22/10
6	U.S. EPA Public Comment Period	Fri 4/23/10	Mon 6/21/10
7	U.S. EPA Approval	Mon 6/21/10	Mon 6/21/10
8	**CMP Implementation**	**Tue 6/22/10**	**Sat 9/3/11**
9	SVE Equipment Procurement	Tue 6/22/10	Fri 8/20/10
10	SVE System Construction	Mon 8/23/10	Fri 9/3/10
11	Final Remedy Construction Completion Report	Fri 9/3/10	Sat 10/2/10
12	SVE System Operation (Assumes 1 year operation)	Sat 9/4/10	Sat 9/3/11
13	**Final Remedy Completion Report**	Mon 9/5/11	Thu 11/3/11

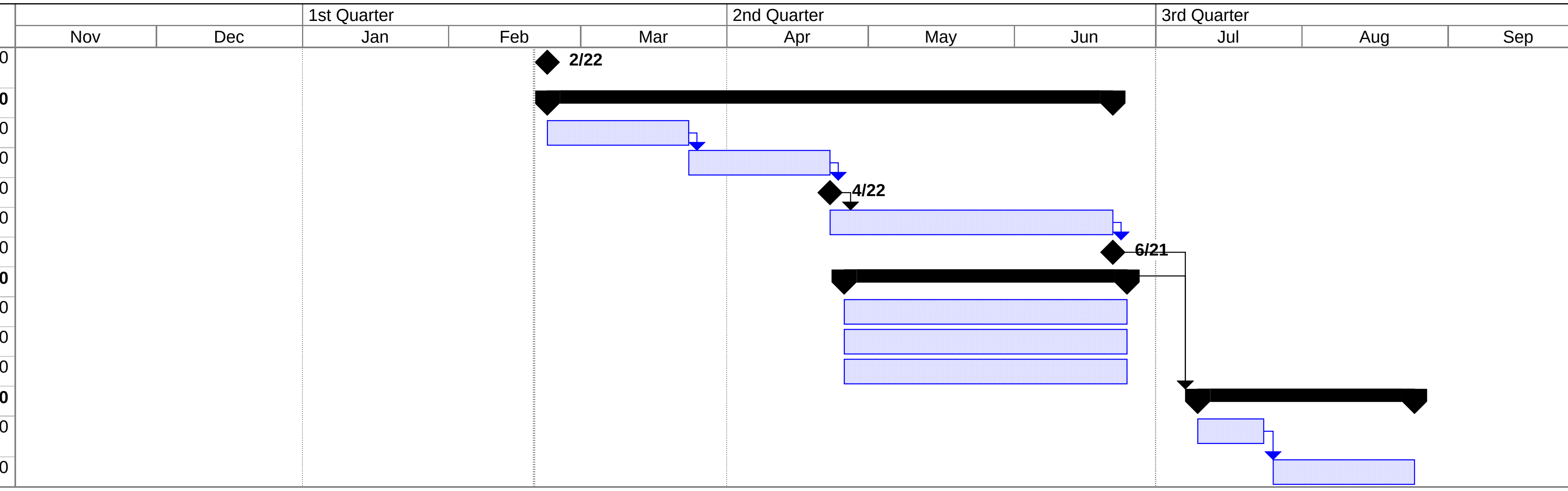


Proj: Prj_Schedule_021910_Area-9.m
Date: Fri 2/19/10

Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			

Figure 7-1
Corrective Measures Proposal - Riverbank Area (CD-SB-59)
CD Technologies, Attica, Indiana

ID	Task Name	Start	Finish
1	**C&D Submittal of CMP for Riverbank Area to Region 5 U.S. EPA**	Mon 2/22/10	Mon 2/22/10
2	**Review and Approval**	**Mon 2/22/10**	**Mon 6/21/10**
3	Region 5 U.S. EPA Review Period	Mon 2/22/10	Tue 3/23/10
4	C&D Response to Comments	Wed 3/24/10	Thu 4/22/10
5	C&D Submittal to U.S. EPA	Thu 4/22/10	Thu 4/22/10
6	U.S. EPA Public Comment Period	Fri 4/23/10	Mon 6/21/10
7	U.S. EPA Approval	Mon 6/21/10	Mon 6/21/10
8	**Permitting (Assuming Permits Apply)**	**Mon 4/26/10**	**Thu 6/24/10**
9	USACE Section 404	Mon 4/26/10	Thu 6/24/10
10	IDEM Water Quality Certification	Mon 4/26/10	Thu 6/24/10
11	DNR Floodway Construction Permit	Mon 4/26/10	Thu 6/24/10
12	**CMP Implementation**	**Sat 7/10/10**	**Tue 8/24/10**
13	Exposure Barrier Construction (Subject to River Conditions, i.e. Flooding)	Sat 7/10/10	Fri 7/23/10
14	Final Remedy Construction Completion Report	Mon 7/26/10	Tue 8/24/10



Proj: Prj_Schedule_021910_SB-59.m
Date: Fri 2/19/10

Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			

APPENDIX A
Select Area 9 Boring Logs

Log of Borehole: CD-SB-111

Client: C&D Technologies	***Project No:*** 20500205	***Date:*** 1/12/09
Project: C&D Technologies, Attica	***Drill Method:*** Geoprobe	***Start Time:*** 1535
Location: Attica, IN	***Logged by:*** J. Eyers	

SUBSURFACE PROFILE			SAMPLE		
Depth (ft)	Symbol	Description	PID	Sample Depth	Well Construction
0		Ground Surface			
		Concrete	0.1	0-1	
		Brown silty sand, fill.	0.7	2-3	
			0.1	4-5	
5		Brown fine sand, gray mottling, moist.			
		Brown coarse sand and gravel, moist.	0.1	9-10	
10		Boring terminated at 10'			
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

Checked by: Craig Bernhoft

URS
URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Log of Borehole: CD-SB-114

Client: C&D Technologies | ***Project No:*** 20500205 | ***Date:*** 4/9/09
Project: C&D Technologies, Attica | ***Drill Method:*** Hand Auger | ***Start Time:*** 9:50
Location: Attica, IN | ***Logged by:*** D. Ward/J. Eyers

Depth (ft)	Symbol	SUBSURFACE PROFILE Description	SAMPLE PID	Sample Depth	Well Construction
0		Ground Surface			
		Concrete	0.1	0.5-1.0	
		Dark brown-black fine sand and gravel dry.	0.1	2-3	
		Light brown fine sand dry, some light grey mottling.	0.2	4-5	
5		Boring terminated at 5'			
10					
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Checked by: Craig Bernhoft

Log of Borehole: CD-SB-121

Client: C&D Technologies
Project: C&D Technologies, Attica
Location: Attica, IN

Project No: 20500205
Drill Method: Hand Auger
Logged by: D. Ward

Date: 2/19/09
Start Time: 8:55

SUBSURFACE PROFILE			SAMPLE		Well Construction
Depth (ft)	Symbol	Description	PID	Sample Depth	
		Ground Surface			
0		Concrete	0.0	0-1	
		Dark brown clayey sand with gravel, moist.			
		Dark brown gravel fill with brick frag and wood chips.	0.0	4-5	
5		Boring terminated at 5'			
10					
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Checked by: Craig Bernoft

Log of Borehole: CD-SB-123

Client: C&D Technologies
Project No: 20500205
Date: 2/19/09
Project: C&D Technologies, Attica
Drill Method: Hand Auger
Start Time: 1215
Location: Attica, IN
Logged by: K. Pulley

SUBSURFACE PROFILE			SAMPLE		Well Construction
Depth (ft)	Symbol	Description	PID	Sample Depth	
		Ground Surface			
0		Concrete	0.1	0-1	
		Light brown fine gravel fill and coarse sand. Dark brown coarse sand with gravel, moist. Same with more large gravel at 3'			
5		Dark brown coarse sand with some clay.	0.0	4-5	
		Dark brown silty clay, moist with few rocks. Gray sility clay with gravel, wet. End boring at 9' due to auger refusal.	12.9	9	
10		Boring terminated at 9'			
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

Checked by: Craig Bernhoft

URS
URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Log of Borehole: CD-SB-125

Client: C&D Technologies	***Project No:*** 20500205	***Date:*** 2/19/09
Project: C&D Technologies, Attica	***Drill Method:*** Hand Auger	***Start Time:*** 1515
Location: Attica, IN	***Logged by:*** K. Pulley	

SUBSURFACE PROFILE			SAMPLE		
Depth (ft)	Symbol	Description	PID	Sample Depth	Well Construction
		Ground Surface			
0		Concrete	0.0	0-1	
		Dark brown clayey coarse sand with gravel.			
		Brown sandy clay (med. sand) moist			
5			0.0	4-5	
		Boring terminated at 5'			
10					
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

URS
URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Checked by: Craig Bernhoft

Sheet: 1 of 1

Log of Borehole: CD-SB-127

Client: C&D Technologies
Project No: 20500205
Date: 2/19/09
Project: C&D Technologies, Attica
Drill Method: Hand Auger
Start Time: 1635
Location: Attica, IN
Logged by: K. Pulley

SUBSURFACE PROFILE			SAMPLE		
Depth (ft)	Symbol	Description	PID	Sample Depth	Well Construction
		Ground Surface			
0		Concrete	0.0	0-1	
		Dark brown clayey sand and gravel, moist.			
		Becoming light brown silty clay from 3-4.			
5			0.0	4-5	
		Boring terminated at 5'			
10					
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

URS
URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Checked by: Craig Bernhoft

Log of Borehole: CD-SB-129

Client: C&D Technologies
Project: C&D Technologies, Attica
Location: Attica, IN
Project No: 20500205
Drill Method: Geoprobe
Logged by: D. Ward
Date: 4/9/09
Start Time: 1020

SUBSURFACE PROFILE			SAMPLE		Well Construction
Depth (ft)	Symbol	Description	PID	Sample Depth	
		Ground Surface			
0		Concrete	0.0	1-2	
		Gravel, black sand with clay.			
		No Recovery			
5		Fine sand and gravel.	0.0	4-5	
		No Recovery			
		Fine sand and gravel.			
10		Moist Reddish brown silty clay, some medium sand, moist.	0.0	9-10	
		Boring terminated at 10'.			
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

Checked by: Craig Bernhoft

URS
URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Log of Borehole: CD-SB-135

Client: C&D Technologies
Project: C&D Technologies, Attica
Location: Attica, IN
Project No: 20500205
Drill Method: Hand Auger
Logged by: J. Eyers
Date: 4/18/09
Start Time: 1335

SUBSURFACE PROFILE			SAMPLE		
Depth (ft)	Symbol	Description	PID	Sample Depth	Well Construction
		Ground Surface			
0		Concrete	0.0	1-2	
		Black coarse sand and gravel.	0.0	2-3	
		Light brown fine sand.	0.0	4-5	
5		Boring terminated at 5'.			
10					
15					
20					
25					
30					
35					
40					

Note: Descriptions are based on observations and hand testing of grab samples. Mechanical test were not performed unless otherwise stated.

Comments:

URS
URS Corporation
1000 Corporate Centre Drive
One Corporate Centre, Suite 250
Franklin, TN 37067

Checked by: Craig Bernhoft

APPENDIX B

Assumptions and Parameters Utilized for SVE Performance Estimation, Area 9

Assumptions and Parameters Utilized for SVE Performance Estimation
Area 9
C&D Technologies, Inc.
Attica, Indiana

COPC/Parameter/units	Value	
TCE		
Area impacted (sq ft)	2,240	
Assumed depth of impact (ft)	5.0	
Dry density (lb/cu ft)	120	
Assumed air-filled porosity (decimal percent)	0.3	
Average of Maximum TCE concs. (mg/kg)	12.16	
Average of TCE concs. within area (mg/kg)	5.77	
kg/lb conversion	0.454	
Mass of impacted soil (kg)	610,000	
Maximum estimated TCE mass in soil (kg), (lb)	7	16
Average estimated TCE mass in soil (kg), (lb)	3.5	8
Calculated average soil gas concentration (μg/M^3)	2,320,000	
PCE		
Area impacted (sq ft)	1,414	
Assumed depth of impact (ft)	5.0	
Dry density (lb/cu ft)	120	
Assumed air-filled porosity (decimal percent)	0.3	
Average of Maximum PCE concs. (mg/kg)	5.59	
Average of PCE concs. within area (mg/kg)	2.79	
kg/lb conversion	0.454	
Mass of impacted soil (kg)	385,000	
Maximum estimated PCE mass in soil (kg), (lb)	2.2	5
Average estimated PCE mass in soil (kg), (lb)	1.1	2.4
Calculated average soil gas concentration (μg/M^3)	736,000	

SVE FLOW/VACUUM EVALUATION SHEET
Area 9
C & D Technologies, Inc.
Attica, Indiana

PARAMETERS:				
K (Hydraulic Conductivity)	**0.006**	**cm/sec**		
P (Hydraulic Permeability)		gal/day ft2		
(k) Soil Permeability	*6.21118E-08*	*cm2*		
Darcy	6.21			
Screen Length	**5**	**feet**		
Well Diameter	**4**	**inches**	*5.08*	*cm (Rw)*
Assumed Rad. of Influence	**20**	**feet**	*609.6*	*cm (Ri)*

Flow per Well (SCFM)	Q*/H (SCFM/Ft. screen)	Q/H (ACFM/Ft. screen)	Q/H (Acm3/S/cm screen)	**Pw (" Hg Vac.)**	Pw (atm.)	Pw (Torr)	*Pw (g/cm-s2)*	**Pw ("w.c.)**
1.2	0.25	0.25	3.9	**0.25**	0.99	753.6	*1007511*	3.4
2.5	0.49	0.50	7.8	**0.5**	0.98	747.3	*999021.4*	6.8
3.7	0.74	0.75	11.7	**0.75**	0.97	740.9	*990532.1*	10.2
4.9	0.98	1.01	15.6	**1**	0.97	734.6	*982042.8*	13.6
7.3	1.45	1.53	23.7	**1.5**	0.95	721.9	*965064.2*	20.4
9.6	1.92	2.06	31.9	2	0.93	709.2	*948085.6*	27.2
11.9	2.38	2.60	40.2	2.5	0.92	696.5	*931107*	34
14.2	2.83	3.15	48.7	3	0.90	683.8	*914128.4*	40.8
16.4	3.27	3.71	57.4	3.5	0.88	671.1	*897149.8*	47.6
18.5	3.71	4.28	66.3	4	0.87	658.4	*880171.2*	54.4
20.7	**4.13**	**4.86**	**75.3**	**4.5**	**0.85**	**645.7**	***863192.6***	**61.2**
22.8	**4.55**	**5.46**	**84.6**	**5**	**0.83**	**633.0**	***846214***	**68**
24.8	**4.96**	**6.08**	**94.1**	**5.5**	**0.82**	**620.3**	***829235.4***	**74.8**
26.8	**5.36**	**6.71**	**103.8**	**6**	**0.80**	**607.6**	***812256.8***	**81.6**
28.8	**5.75**	**7.35**	**113.8**	**6.5**	**0.78**	**594.9**	***795278.2***	**88.4**
30.7	6.14	8.01	124.1	7	0.77	582.2	*778299.6*	95.2
32.6	6.52	8.69	134.6	**7.5**	0.75	569.5	*761321*	102
34.4	6.88	9.40	145.5	**8**	0.73	556.8	*744342.4*	108.8
41.4	8.27	12.42	192.4	**10**	0.67	506.0	*676427.9*	136
47.6	9.53	15.91	246.3	**12**	0.60	455.2	*608513.5*	163.2
53.3	10.65	20.02	310.0	**14**	0.53	404.4	*540599.1*	190.4
58.2	11.64	25.02	387.5	**16**	0.47	353.6	*472684.7*	217.6
62.5	12.50	31.37	485.8	**18**	0.40	302.8	*404770.3*	244.8
66.1	13.22	39.89	617.6	**20**	0.33	252.0	*336855.9*	272
69.1	13.82	52.20	808.2	**22**	0.26	201.2	*268941.5*	299.2
71.4	14.28	72.15	1117.2	**24**	0.20	150.4	*201027.1*	326.4
73.0	14.60	111.46	1725.8	**26**	0.13	99.6	*133112.7*	353.6
74.0	14.80	230.58	3570.3	**28**	0.06	48.8	*65198.26*	380.8

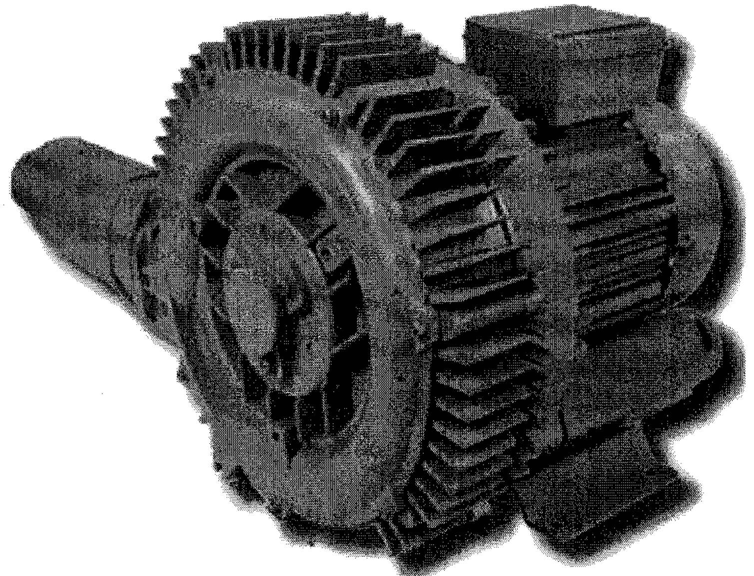
Estimated Initial COPC Mass Recovery Rate by SVE
Area 9
C & D Technologies, Inc.
Attica, Indiana

COPC Compounds	Molecular Weight (g/g-mol)	Vapor Pressure (mm Hg at temp. deg. C)	Boiling Point (deg. C)	Vapor Phase Concentration (ppbv) (Based on estimated COPC vapor concentration in soil gas that is in equilibrium with the average soil concentration for each COPC within each impacted area indicated on Figure 2-3)	Initial (first hour of operation) COPC Mass Recovery Rate* (lbs/hr)
Tetrachloroethene	166	15.8 @ 22	121.2	108,000	0.14
Trichloroethene	131.4	100 @ 32	86.7	432,000	0.44
TOTAL COPC Compounds				**540,000**	**0.58**

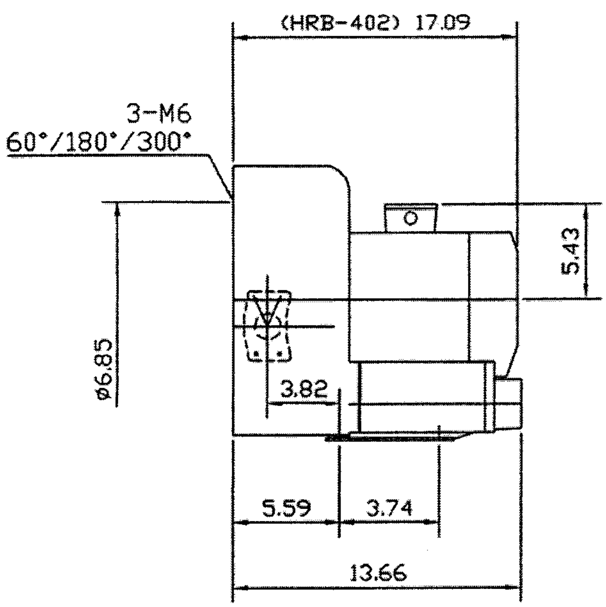
* Based on the initial 1 hour of operation at a flowrate of: 50 SCFM from two of three wells operating at 25 SCFM each.

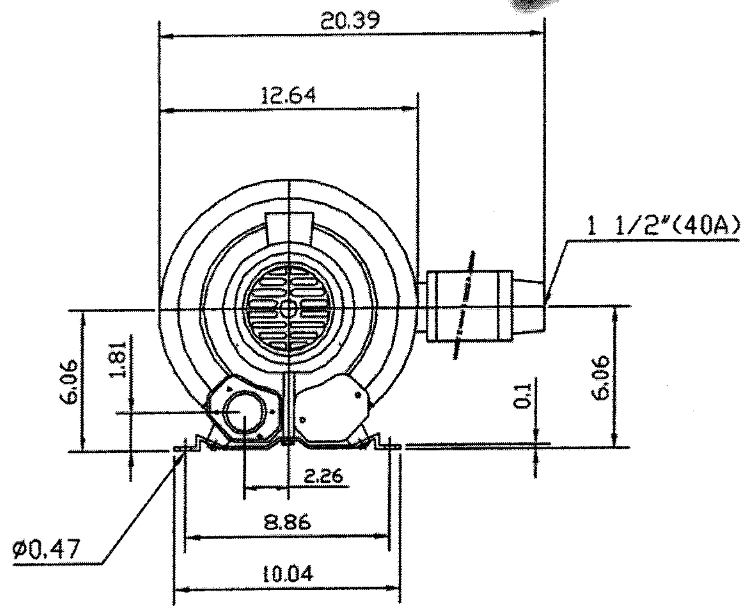
Republic Regenerative Blower HRB 402

REPUBLIC
Blower Systems®



Republic offers a complete line of regenerative blowers for high vacuum or compressed air applications in both horizontal and vertical mounted postions. TEFC motors are UL, cUL and CE certified. The impeller is directly connected to the motor shaft, providing powerful air force without undue friction. The bearings are outside the compression chamber, ensuring maximum operational reliability under high differential pressure. This low-maintenance, oil-free design provides continuous, dependable service to our customers.





Advantages

- ▲ Low noise 71dB
- ▲ Continuous, low-maintenance operation
- ▲ Saves space and electricity
- ▲ Trouble-free installation
- ▲ Easy replacement of parts
- ▲ Outboard bearings yielding longer life
- ▲ Dual voltage 220/440

Product Options

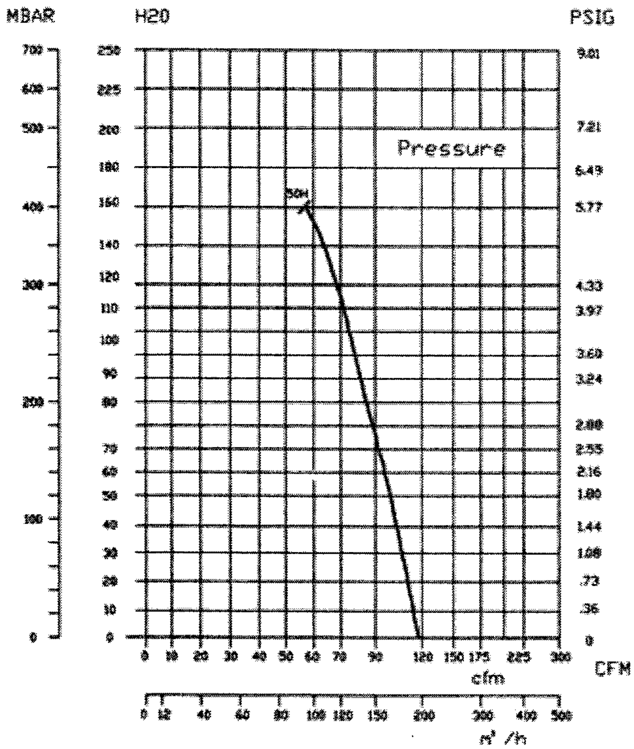
- ▲ 1-1/2" Relief Valve (recommended)
- ▲ Inlet Filter (recommended)
- ▲ Liquid filled gauge
- ▲ Check Valve
- ▲ Belt-driven bare shaft blowers are available
- ▲ Explosion proof motors available (Class 2/GroupB/Division 1 Certified)

Model	Phase	Motor (HP)	Current @220 V	Current @440 V	Sound Level (dB)	Rated Pressure (in. H_2O)	Rated Vacuum (in. H_2O)	Air flow (cfm)	Weight (lbs)
HRB402	3	3.5	9.5	4.8	71	158	118	113	83

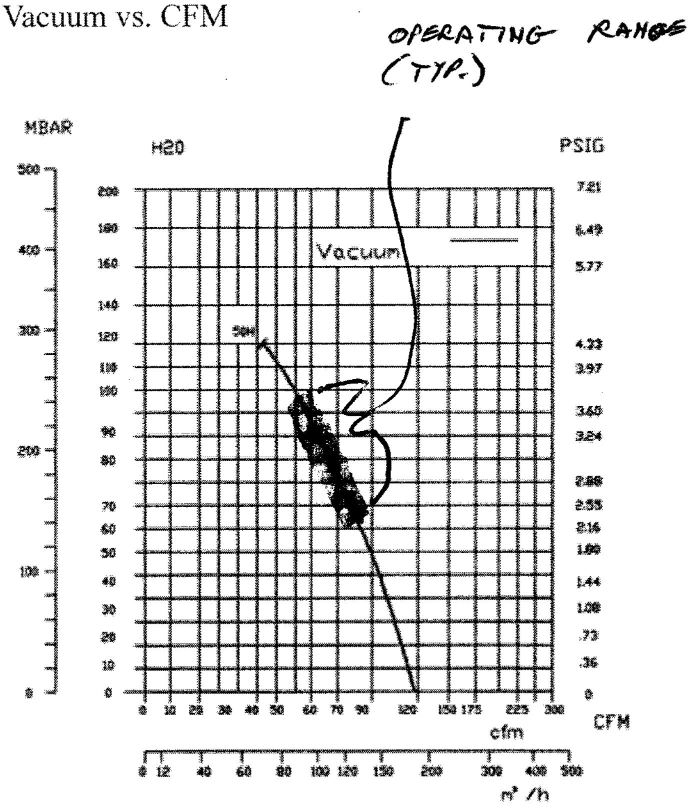
Republic Regenerative Blower HRB 402

REPUBLIC
Blower Systems®

Pressure vs. CFM



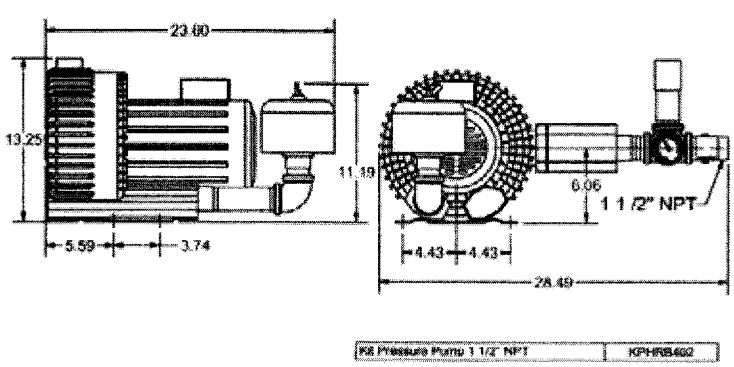
Vacuum vs. CFM



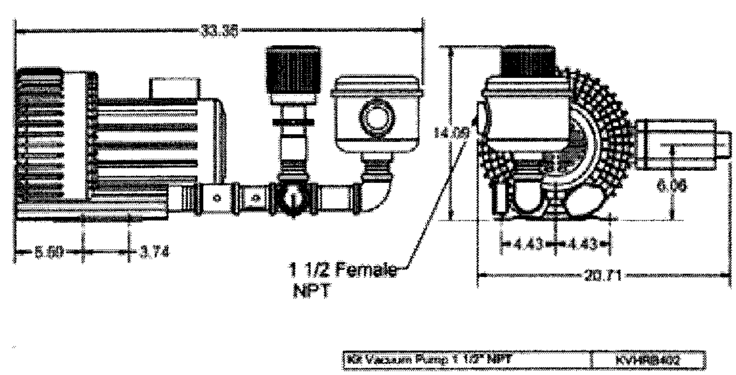
Performance for all blowers is 60 Hz. Ask for information on 50 Hz.

All Republic Regenerative Blowers are available in preassembled kits for either pressure or vacuum applications. These kits include an inlet filter and relief valve, and have been tested prior to shipment. Optional items for these kits include check valve and gauge.

KPHRB402 - Pressure Kit Drawing



KVHRB402 - Vacuum Kit Drawing



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APPENDIX C

TestAmerica, Inc. Laboratory Report – Delineation Soil Samples

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

November 17, 2009 2:42:15PM

Client: URS Corporation (6171)
1000 Corporate Center, Suite 250
Franklin, TN 37067
Attn: Dylan Crouch

Work Order: NSK1312
Project Name: IN Site
Project Nbr: [none]
P/O Nbr:
Date Received: 11/13/09

SAMPLE IDENTIFICATION	LAB NUMBER	COLLECTION DATE AND TIME
CD-HA-01(0-1)	NSK1312-01	11/13/09 08:40
CD-HA-04(0-1)	NSK1312-02	11/13/09 09:15
CD-HA-13(0-1)	NSK1312-03	11/13/09 10:38
CD-HA-15(0-1)	NSK1312-04	11/13/09 10:00
CD-HA-15(0-1)Dup	NSK1312-05	11/13/09 10:00
CD-HA-11(0-1)	NSK1312-06	11/13/09 11:20
CD-HA-10(0-1)	NSK1312-07	11/13/09 11:10

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-800-765-0980. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

The Chain(s) of Custody, 3 pages, are included and are an integral part of this report.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of the laboratory.

All solids results are reported in wet weight unless specifically stated.
Estimated uncertainty is available upon request.
This report has been electronically signed.
Report Approved By:

Jennifer Gambill

Jennifer Gambill

Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	URS Corporation (6171) 1000 Corporate Center, Suite 250 Franklin, TN 37067	Work Order: Project Name: Project Number:	NSK1312 IN Site [none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

ANALYTICAL REPORT

Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NSK1312-01 (CD-HA-01(0-1) - Soil) Sampled: 11/13/09 08:40								
Total Metals by EPA Method 6010B								
Lead	**199**		mg/kg	0.992	1	11/16/09 22:05	SW846 6010B	9112239
Sample ID: NSK1312-02 (CD-HA-04(0-1) - Soil) Sampled: 11/13/09 09:15								
Total Metals by EPA Method 6010B								
Lead	**154**		mg/kg	0.982	1	11/16/09 22:09	SW846 6010B	9112239
Sample ID: NSK1312-03 (CD-HA-13(0-1) - Soil) Sampled: 11/13/09 10:38								
Total Metals by EPA Method 6010B								
Lead	**249**		mg/kg	0.977	1	11/16/09 22:12	SW846 6010B	9112239
Sample ID: NSK1312-04 (CD-HA-15(0-1) - Soil) Sampled: 11/13/09 10:00								
Total Metals by EPA Method 6010B								
Lead	**103**		mg/kg	0.994	1	11/16/09 22:15	SW846 6010B	9112239
Sample ID: NSK1312-05 (CD-HA-15(0-1)Dup - Soil) Sampled: 11/13/09 10:00								
Total Metals by EPA Method 6010B								
Lead	**215**		mg/kg	0.969	1	11/16/09 22:19	SW846 6010B	9112239
Sample ID: NSK1312-06 (CD-HA-11(0-1) - Soil) Sampled: 11/13/09 11:20								
Total Metals by EPA Method 6010B								
Lead	**596**		mg/kg	4.96	5	11/17/09 09:54	SW846 6010B	9112239
Sample ID: NSK1312-07 (CD-HA-10(0-1) - Soil) Sampled: 11/13/09 11:10								
Total Metals by EPA Method 6010B								
Lead	**600**	MHA	mg/kg	9.82	10	11/17/09 09:57	SW846 6010B	9112239

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	URS Corporation (6171)	Work Order:	NSK1312
	1000 Corporate Center, Suite 250	Project Name:	IN Site
	Franklin, TN 37067	Project Number:	[none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
Total Metals by EPA Method 6010B							
SW846 6010B	9112239	NSK1312-01	0.50	100.00	11/16/09 15:00	LCB	EPA 3051A/6010
SW846 6010B	9112239	NSK1312-02	0.51	100.00	11/16/09 15:00	LCB	EPA 3051A/6010
SW846 6010B	9112239	NSK1312-03	0.51	100.00	11/16/09 15:00	LCB	EPA 3051A/6010
SW846 6010B	9112239	NSK1312-04	0.50	100.00	11/16/09 15:00	LCB	EPA 3051A/6010
SW846 6010B	9112239	NSK1312-05	0.52	100.00	11/16/09 15:00	LCB	EPA 3051A/6010
SW846 6010B	9112239	NSK1312-06	0.50	100.00	11/16/09 15:00	LCB	EPA 3051A/6010
SW846 6010B	9112239	NSK1312-07	0.51	100.00	11/16/09 15:00	LCB	EPA 3051A/6010

THE LEADER IN ENVIRONMENTAL TESTING

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	URS Corporation (6171)	Work Order:	NSK1312
	1000 Corporate Center, Suite 250	Project Name:	IN Site
	Franklin, TN 37067	Project Number:	[none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

PROJECT QUALITY CONTROL DATA
Blank

Analyte	Blank Value	Q	Units	Q.C. Batch	Lab Number	Analyzed Date/Time
Total Metals by EPA Method 6010B						
9112239-BLK1						
Lead	<0.399		mg/kg	9112239	9112239-BLK1	11/16/09 21:26

Client	URS Corporation (6171)	Work Order:	NSK1312
	1000 Corporate Center, Suite 250	Project Name:	IN Site
	Franklin, TN 37067	Project Number:	[none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

PROJECT QUALITY CONTROL DATA
LCS

Analyte	Known Val.	Analyzed Val	Q	Units	% Rec.	Target Range	Batch	Analyzed Date/Time
Total Metals by EPA Method 6010B								
9112239-BS1								
Lead	20.0	19.2	MHA	mg/kg	96%	80 - 120	9112239	11/16/09 21:29

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	URS Corporation (6171)	Work Order:	NSK1312
	1000 Corporate Center, Suite 250	Project Name:	IN Site
	Franklin, TN 37067	Project Number:	[none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

PROJECT QUALITY CONTROL DATA
Matrix Spike

Analyte	Orig. Val.	MS Val	Q	Units	Spike Conc	% Rec.	Target Range	Batch	Sample Spiked	Analyzed Date/Time
Total Metals by EPA Method 6010B										
9112239-MS1										
Lead	600	654	MHA	mg/kg	19.6	274%	75 - 125	9112239	NSK1312-07	11/16/09 22:43

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	URS Corporation (6171) 1000 Corporate Center, Suite 250 Franklin, TN 37067	Work Order: Project Name: Project Number:	NSK1312 IN Site [none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

PROJECT QUALITY CONTROL DATA

Matrix Spike Dup

Analyte	Orig. Val.	Duplicate	Q	Units	Spike Conc	% Rec.	Target Range	RPD	Limit	Batch	Sample Duplicated	Analyzed Date/Time
Total Metals by EPA Method 6010B												
9112239-MSD1												
Lead	600	728	MHA	mg/kg	19.6	650%	75 - 125	11	20	9112239	NSK1312-07	11/16/09 22:46

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

Client	URS Corporation (6171)	Work Order:	NSK1312
	1000 Corporate Center, Suite 250	Project Name:	IN Site
	Franklin, TN 37067	Project Number:	[none]
Attn	Dylan Crouch	Received:	11/13/09 19:15

DATA QUALIFIERS AND DEFINITIONS

MHA Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).

ND Not detected at the reporting limit (or method detection limit if shown)

METHOD MODIFICATION NOTES

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Nashville, TN

COOLER RECEI

NSK1312

Cooler Received/Opened On_11/13/09 @ 19:15
0

1. Tracking #________________________(last 4 digits, Fed.

Courier: ___WALK-IN IR Gun ID___97310166

2. Temperature of rep. sample or temp blank when opened: 13.3 *Degrees Celsius*
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA

   If yes, how many and where:________________________

5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) ________________

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

   Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #________

I certify that I unloaded the cooler and answered questions 7-14 (intial) ________________

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) ________________

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) ________________

I certify that I attached a label with the unique LIMS number to each container (intial) ________________

21. Were there Non-Conformance issues at login? YES...NO Was a PIPE generated? YES...NO.. #________

TestAmerica

NSK1312
11/17/09 23:59

Nashville Division
2960 Foster Creighton Drive * Nashville TN 37204
Phone: (800) 765-0980 / (615) 726-0177 Fax:(615) 726-3404

Client: URS Corporation (6171)
Address: 1000 Corporate Center, Suite 250
City, State, Zip: Franklin TN 37067
Client Invoice Contact: Accounts Payable
Client Project Mgr: Dylan Crouch
Client Telephone#: (615) 771-2480 Fax: (615) 771-2459
Sampler Name (Print) Derrick Ward
SamplerSignature: Derrick Ward

TA Account #: 1426041 PO #:
Invoice to: URS Corporation (6171)
Report to: Dylan Crouch
Project Name: IN Site
Facility ID: [none]
Site Address:
City,State,Zip: Attica Indiana
Regulatory District (CA):

Sample ID	Date Sampled	Time Sampled	# Containers Shipped	Grab	Composite	Field Filtered	Methanol	Sodium Bisulfate	(Blue Label) HCL	(Orange Label) NaOH	(Yellow Label) Plastic H2SO4	(Yellow Label) Glass H2SO4	(Red Label) HNO3	(Black Label) None	Groundwater	Wastewater	Drinking Water	Sludge	Soil	(specify) Other	Lead Total EPA 6010B	Hold		RUSH TAT (Pre Schedule) *
CD-HA-01(0-1)	11/13/09	840	1	X										X					X		X		1	X
CD-HA-04(0-1)	11/13/09	915	1	X										X					X		X		2	X
CD-HA-13(0-1)	11/13/09	1038	1	X										X					X		X		3	X
CD-HA-15(0-1)	11/13/09	1000	1	X										X					X		X		4	X
CD-HA-15(0-1)Dup	11/13/09	1000	1	X										X					X		X		5	X
CD-HA-11(0-1)	11/13/09	1120	1	X										X					X		X		6	X
CD-HA-10(0-1)	11/13/09	1110	1	X										X					X		X		7	X
CD-HA-10(0-1)MS/MSD	11/13/09	1110	1	X										X					X		X		7	X
CD-HA-02(0-1)	11/13/09	855	1	X										X					X		X	X	8	X
CD-HA-05(0-1)	11/13/09	905	1	X										X					X		X	X	9	X

COMMENTS: All turn around times are calculated from the time of receipt at TestAmerica.
* Pre-Arrangements must be made AT LEAST 48 Hours in ADVANCE to receive results with RUSH turn around time commitments;additional charges may be assessed.
There may be a charge assessed for TestAmerica disposing of sample remainders.

NOTES/SPECIAL INSTRUCTIONS: BO # 1230
24hr Turn around

Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Relinquished by:	Date:	Time:
Derrick Ward	11/13/09	1914	[signature]	11/13/09	1914			
Shipped Via:			Shipped Via:			QC Deliverables (Please Circle One) : Level 2 Level 3 Level 4 Site Specific (If site specific, please pre-schedule w/ TestAmerica Project Manager or attach specific instructions)	Date Due of Report:	
Received for TestAmerica by: [signature]	Date: 11/13/09	Time: 1915	Temperature Upon Receipt: 13.3 on ice	Sample Containers Intact? Y N / VOCs Free of Headspace? Y N				

TestAmerica

NSK1312

11/17/09 23:59

Nashville Division
2960 Foster Creighton Drive * Nashville TN 37204
Phone: (800) 765-0980 / (615) 726-0177 Fax: (615) 726-3404

Client Name:	URS Corporation (6171)	TA Account #:	1426041
		PO #:	
Address:	1000 Corporate Center, Suite 250	Invoice to:	URS Corporation (6171)
City, State, Zip:	Franklin TN 37067	Report to:	Dylan Crouch
Client Invoice Contact:	Accounts Payable	Project Name:	IN Site
Client Project Mgr:	Dylan Crouch	Facility ID:	[none]
Client Telephone#:	(615) 771-2480 Fax: (615) 771-2459	Site Address:	
Sampler Name (Print)	Derrick Ward	City,State,Zip:	Indiana
SamplerSignature:	Derrick Ward	Regulatory District (CA):	

Sample ID	Date Sampled	Time Sampled	# Containers Shipped	Grab	Composite	Field Filtered	Preservative: Methanol	Sodium Bisulfate	(Blue Label) HCL	(Orange Label) NaOH	(Yellow Label) Plastic H2SO4	(Yellow Label) Glass H2SO4	(Red Label) HNO3	(Black Label) None	Matrix: Groundwater	Wastewater	Drinking Water	Sludge	Soil	(specify) Other	Analyze for: Lead Total EPA 6010B	HOLD					RUSH TAT (Pre Schedule) *
CD-HA-05 ~~Dup~~ (0-1)	11/13/09	905	1	X										X					X		X	X	1	~~1~~	1	0	X
CD-HA-17 (0-1)	11/13/09	1020	1	X										X					X		X	X	1	~~2~~	1	1	X
CD-HA-14 (0-1)	11/13/09	1030	1	X										X					X		X	X	1	~~3~~	1	2	X
CD-HA-18 (0-1)	11/13/09	1138	1	X										X					X		X	X	1	~~4~~	1	3	X
CD-HA-21 (0-1)	11/13/09	1205	1	X										X					X		X	X	1	~~5~~	1	4	X

COMMENTS: All turn around times are calculated from the time of receipt at TestAmerica.

* Pre-Arrangements must be made AT LEAST 48 Hours in ADVANCE to receive results with RUSH turn around time commitments;additional charges may be assessed.

There may be a charge assessed for TestAmerica disposing of sample remainders.

NOTES/SPECIAL INSTRUCTIONS: BO # 17230

24hr Turn around

Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Relinquished by:	Date:	Time:
Derrick Ward	11/13/09	1915	[signature]	11/13/09	1915			

Shipped Via:	Shipped Via:		QC Deliverables (Please Circle One): Level 2 Level 3 Level 4 Site Specific (If site specific, please pre-schedule w/ TestAmerica Project Manager or attach specific instructions)	Date Due of Report:
Received for TestAmerica by: [signature] Date: 11/13/09 Time: 1915	Temperature Upon Receipt: 13.3	Sample Containers Intact? Y N VOCs Free of Headspace? Y N		