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Statement of Basis for the Proposed Remedy for the C&D Technologies, Inc., Attica, IN IND000810754

INTRODUCTION

This Statement of Basis (SB) presents the United States Environmental Protection Agency's (EPA) proposed remedy to address contaminated soil and its potential effects on surface water, ground water and soil gas at the C&D Technologies, Inc. (C&D or the Facility) and an adjacent area bordering the Wabash River in Attica, Indiana. This SB describes the nature and scope of the site investigation, identifies EPA selected remedies, and discusses the EPA proposed remedies with EPA's reasons for selecting the proposed remedies. EPA will select a final remedy after considering all the public comments received during the 30-day public comment period.

EPA is issuing this SB as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA). It summarizes information that can be found in greater detail in the RCRA Facility Investigation (RFI), Corrective Measures Study (CMS), and other pertinent documents contained in the Administrative Record. An Index to the Administrative Record is attached. EPA encourages the public to review these documents to gain a more comprehensive understanding of the RCRA corrective action activities conducted at the C&D Fcility over the last five years.

EPA may modify the proposed remedy or select another remedy based on new information or public comments. Therefore, EPA encourages the public to review and comment on the SB. All documents supporting this SB are contained in the Administrative Record located at the Attica Public Library, 305 South Perry, Attica, Indiana 47918 and at the EPA Offices, Region 5 Record Center (7th Floor), 77 W. Jackson Boulevard, Chicago, Illinois 60604.

PROPOSED REMEDIES

EPA proposes the following remedies to address contaminated soil and groundwater that pose a threat to human health or the environment at the following Solid Waste Management Units (identified as Areas) and the Riverbank Area of the Facility.

- **Area 7:** EPA will require C&D to establish an enforceable institutional control to periodically inspect and maintain the concrete flooring that is acting as an exposure barrier for Arsenic contamination in soil beneath the building.

- **Areas 9 and 4:** EPA will require C&D to install a Soil Vapor Extraction (SVE) system, and install a cap with an off- gas treatment system. EPA will also require C&D to establish enforceable institutional controls to periodically inspect and maintain any existing or to be installed exposure barrier.

- **Areas 3, 5 and 11 Hot Spots**: EPA will require C&D to cap contaminated "hot spots" at these Areas with concrete pavement consistent with other paved areas at the Facility to prevent exposure to contaminants remaining in place. EPA will also require C&D to establish enforceable institutional control to periodically inspect and maintain any existing or to be installed exposure barrier.

- **Riverbank**: EPA will require C&D to construct an exposure barrier wall to stop erosion in the Riverbank Area. EPA will also require C&D to establish an enforceable institutional control to periodically inspect and maintain the exposure barrier wall.

- **Groundwater Monitoring**: EPA will require C&D to sample monitoring well 4S twice a year and analyze the sample(s) for metals including lead. C&D will continue monitoring until the lead level in groundwater does not exceed the Indiana Department of Environmental Management (IDEM) Residential Default Closure Levels (RDCL) for two consecutive rounds six months apart.

Landuse Institutional Control: To limit exposure to remaining contaminants, EPA will require C&D to establish an enforceable institutional control to restrict the land use of the C&D property to industrial or commercial use now and in the future.

Work Plan for Selected Remedy: EPA will require C&D to submit a corrective measures implementation workplan for EPA approval within 90 days after EPA makes its final remedy selection. The workplan will provide specific details about the establishment of enforceable institutional controls, dust control, confirmation sampling, health and safety of remediation workers, etc., as necessary to implement the EPA selected remedy.

FACILITY BACKGROUND

Location and History

C&D owns and operates a battery manufacturing plant at 200 West Main Street in the City of Attica, Fountain County, Indiana. The Facility is located on approximately 12.5 acres in the north-northwestern portion of the city. The Wabash River borders the Facility on the west and northwest. Residential and commercial properties surround the remaining sides of the Facility (Figure 1). The Facility contains an active battery manufacturing area, a former landfill, and riverbank property along the Wabash River.

The Attica plant manufactures lead acid batteries for commercial, industrial and military applications. Manufacturing processes include casting or curing lead battery parts, pasting battery grids, plate processing, battery assembling, charging and finishing. Supporting operations at the Facility include material receiving, product shipment, quality control laboratory analysis, equipment maintenance, wastewater pretreatment and waste management.

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Hydro-geological Setting

The Facility is located in the Wabash River Valley, which is underlain by approximately 140 feet of unconsolidated deposits containing sand and gravel. The Facility's terrain slopes northwest, toward the river. Groundwater that enters bedrock in the up-gradient areas east and southeast of the C&D facility flows in a northwest direction to its discharge point, the alluvium and ultimately the Wabash River. Groundwater production wells owned by the City of Attica are located approximately 300 to 400 feet to the southwest of the site.

Ecological Setting

The Riverbank area is a narrow riparian area between the Site and the Wabash River that is characterized by large cottonwood, box elder, silver maple, mulberry and sycamore trees with sparse understory of herbaceous vegetation (primarily grasses).

Corrective Action Process

In January 2007, EPA Region 5 and C&D entered into a RCRA Section 3008(h) Corrective Action Order (Corrective Action Order) that required C&D to investigate and address all historic releases of hazardous waste and constituents at or from the site. Figure 2 is a flow chart that illustrates the corrective action process. C&D identified 16 Solid Waste Management Units (SWMU) identified as areas in the Current Conditions Report (CCR) (Clayton, 2006) based on current and historical site uses, documented releases, and material management practices. Figure 3 shows the location of these areas in and around the Facility.

C&D collected and analyzed groundwater, surface water, sediment, soil, sub-slab soil gas and indoor air samples. Table 1 contains a description for all C&D identified Areas of investigation. Contaminants of Concern were identified by screening the analytes from different media against IDEM Default Closure Levels (DCL).

IDEM has calculated Default Closure Levels (DCLs) to protect human health and the environment from contaminants present in industrial and residential settings. The residual contaminant levels below these DCLs do not pose an unacceptable risk to people or the environment if exposure to the contaminated media occurs through the following pathways:

- incidental ingestion;
- incidental dermal contact; and
- inhalation of dust/volatiles

The acceptable target risk level for the IDEM DCLs has been set at $1x10^{-5}$ excess cancer risk (meaning one in one hundred thousand persons may experience an additional lifetime cancer risk) and at a hazard quotient value of 1 for non-cancer health risks. These target levels are derived from a combination of default exposure parameters, chemical/physical properties of contaminants, toxicological data and other relevant criteria to evaluate the impact of chemicals on human health.

C&D investigated the extent of soil and groundwater contamination in and around the Facility (Figure 3) as required under the Corrective Action Order. C&D's RFI report identified chlorinated organic solvents and metals (e.g. lead and cadmium) contamination in the surface soil and subsurface soil based on exceedances of the IDEM Industrial Default Closure Levels (IDCL). The RDCL and IDCL are the relevant cleanup standards or remediation criteria for this Facility.

C&D performed human health and ecological risk evaluations using the RFI data it had collected in 2008 and 2009 from the Areas by:

- Characterizing the potential pathways of contaminant migration
- Identifying any actual or potential receptors (people, plants or animals)
- Gathering all data to support a risk and/or ecological assessment
- Gathering all necessary data to support the Corrective Measures Study

Interim Measures Taken

Pursuant to the Corrective Action Order between EPA and C&D, C&D has investigated the Facility and offsite areas. C&D has not conducted any interim measures at the Facility. As required by the Corrective Action Order, C&D will implement the final corrective measures selected by EPA.

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SUMMARY OF FACILITY RISKS

The following tables and paragraphs describe the waste management areas, areas of concern and contaminants that remain in those areas at the site and the risks posed by those contaminants.

Investigative Results

Table 1: Describes the nature of waste handling areas and the contaminants of concern.

Table 1: Description of Areas of Investigation/Contaminants of concern

Areas SWMUs/ AOCs	Contaminant of Concern *	Description of the Solid Waste Management Unit (SWMU)	Area	Contaminant of Concern *	Description of the Solid Waste Management Unit (SWMU)
Area 1	None	Waste Water Treatment Plant	Area 10	None	South Waste Former Container Storage
Area 2	None	Current and former acid storage lofts	**Area 11**	**Lead**	**Northeastern Former Container Storage Area**
Area 3	**Arsenic, Lead**	**Lead Oxide Storage Silos**	Area 12	None	Central Vacuum System/ Baghouses
Area 4	**Trichloroethylene**	**Storm Water Sewers**	Area 13	None	Former Oxide Mill
Area 5	**Lead**	**Exterior Former Hazardous Waste Materials Storage**	Area 14	None (removed ll USTs. TPH in soil below detection limits)	Former Onsite Filling Station
Area 6	None	Exterior Former Drum Storage and Transfer pad	**Area 15**	**Lead**	**West Container Storage**
Area 7	**Arsenic**	**Poly Mixing Room**	Area 16	None (PCB Aroclorsnot detected)	DC Generator Area
Area 8	**Arsenic, Lead**	**Former Drive up Disposal Area**	**Riverbank Area**	**Arsenic, Lead, Cadmium**	**Wabash River west of the Facility**
Area 9	**Trichloroethylene, Tetrachloroethylene**	**Former Waste and Dust Storage Room**	Off-site Residential	None	Downwind of the Facility

* COC – Contaminants of Concern with maximum concentration known to be above IDEM DCLs.

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Table 2: Describes surface soil and subsurface soil contaminant concentrations with the relevant screening criteria. Based on the contaminant concentrations found and the corresponding screening criteria, C&D has determined that Areas of concern are 3, 4, 5, 7, 8, 9, 11, 15 and the Riverbank area. The table presents the maximum concentration in the surface soil (0-1 ft) and in the subsurface soil (4-5 ft below ground and deeper). With the exception of Areas 4 and 15, all sampling locations within the site were under concrete flooring. These hotspots are the areas of the site where remediation is required.

Table 2: Surface soil and subsurface soil Contamination in comparison with Major Screening Criteria

Contaminant	Area	Location**	Maximum Concentration (mg/Kg)†	GW Protection Criteria (mg/Kg)	IDEM DCL (mg/Kg)
Arsenic	Area 3	SB-14 (0-1 ft)	31.7	5.9	16
Lead	Area 3	SB-13 (4-5 ft)	2040	270	970
TCE	Area 4	SB-21	31	0.036	20
Lead	Area 5	SB- 22 (0-1 ft)	7840	270	1300
Arsenic	Area 7	SB- 26 (4-5 ft)	25.7	5.9	430
Arsenic	Area 8	SB-31 (19-20 ft)	29.6	5.9	430
Lead	Area 8	SB-32 (19-20 ft)	1460	270	970
TCE	Area 9	Multiple surface/ subsurface soil locations	31	0.036	20-3
PCE	Area 9	Multiple surface/ subsurface soil locations	23	0.045	26-170
Lead	Area 11	SB-36 (0-1 ft)	2930	270	1300
Arsenic	Area 15	SB-52 (0-1 ft)	24.4	5.9	16
Lead	Area 15	SB-50 (4-5 ft)	1140	270	970
Lead	Riverbank Area	SB-59	5356	270	1940§
Zinc	Riverbank Area	SB-59	2190	N/A	1059§
Lead	Residential Yard	CD 403	350	270	400

* Area – SWMU/Area of Concern ** SB-14 denotes soil boring number † mg/Kg – milligram per kilogram §- Ecological Toxicity Reference Value N/A – Not Available

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Human Health Risk

Onsite Industrial Worker Exposure

The following paragraphs examine the contaminated areas or "hotspots" at the Facility where industrial workers might be exposed to contaminants.

Area 3: C&D identified Area 3 as the Lead Oxide Storage Silos and Tanker Truck Loading Operations Area which contain contaminated soil. The Arsenic concentration is elevated in the surface soil at location SB-14, and the Lead concentration is elevated at location SB-13. Therefore, Area 3 is a C&D identified hotspot.

Area 4: This area refers to storm water sewers located along Area 9. C&D combined one selected location (CD-SB-21) of Area 4 storm water sewers with Area 9 to investigate vapor intrusion and evaluate the potential for preferential pathways. Please refer to the Area 9 discussion for additional information.

Area 5: C&D identified Area 5 as a former hazardous waste materials storage Area. C&D identified the surface soil at location SB-22 in Area 5 as a hotspot due to a high Lead level.

Area 7: Due to the historical use and storage of solvents in the poly mixing room, C&D analyzed this area for metals, VOCs and SVOCs. The existing concrete flooring in Area 7 is acting as an exposure barrier for the Arsenic contamination found at SB-26.

Area 8: C&D identified Area 8 as the former Drive up and Disposal Area. The average concentration of Arsenic and Lead in Area 8 is below the IDEM screening criteria for industrial and construction workers. However, due to the presence of these contaminants above the ground water protection criteria, EPA requires C&D to continually monitor MW-4S twice a year for inorganic compounds.

Area 9: C&D identified Area 9 using a 1948 fire insurance map. Area 9 was a former waste and dust storage room. Area 9 is now an interior room centered over an abandoned rail spur between two manufacturing Areas. C&D combined Area 9 and a selected location (CD-SB-21) of Area 4 storm water sewers for a vapor intrusion investigation to evaluate the potential for preferential pathways. Volatile Organic Chemicals (VOCs) such as Trichloroethylene (TCE) and Tetrachloroethylene (also known as Perchloroethylene or PCE) were found in shallow (top 5 feet) soils in Area 9 and 4; both are Areas of concern and pose a potential risk for migration of PCE and TCE to groundwater and indoor vapor intrusion.

- Table 2 compares the maximum soil and subsurface soil contamination in this Area against the protective risk based screening criteria.

- Table 3 provides as estimate of risk associated with potential indoor vapor intrusion.

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Area 11: Area 11 is a historical former container storage area C&D identified as a SWMU since the historical material storage practices in this area are unknown. C&D identified Lead contamination at location SB-36 in area 11 as a hotspot.

- Table 2 compares the maximum soil and subsurface soil contamination in this area against the protective risk based screening criteria.

Area 15: Area 15 is the West Container Storage Area located at the western and northwestern perimeter of the Facility. The average concentration of Arsenic and Lead in Area 15 is below the IDEM screening criteria for industrial and construction workers. However, due to the presence of these contaminants in soil above the ground water protection criteria, EPA requires C&D to monitor monitoring well4S (MW-4S) semi annually for inorganic compounds.

Onsite Construction Worker Exposure to Subsurface Soil

The average lead concentrations at Areas 7 and 11 and Arsenic concentrations at Area 3, 7 and 15 were below the IDEM construction worker IDCL. The maximum concentration of TCE and PCE in the subsurface soil risk exceeded the acceptable IDEM IDCL.

Onsite Industrial Worker Exposure to Vapors in Indoor Air

C&D evaluated **t**he potential for industrial worker exposure to vapors arising from the contaminated soil in Area 9 and Area 4. The risk screening analysis showed that there are potential health risks due to an indoor air inhalation pathway from soil and sub slab soil gas contaminated with TCE and PCE. These chemicals were not detected in the indoor air. This indicates that the concrete slab currently in place across Area 9 and Area 4 (SB-21) provides an adequate barrier to prevent vapor intrusion. However, under current or future conditions if the integrity of the concrete becomes compromised, the risks due to cancer and non-cancer health endpoints may become unacceptable due to PCE and TCE inhalation exposure. See Table 3 below for the estimated cancer and non-cancer hazard quotient.

Table 3: Subsurface soil contamination at Area 9 and Area 4 evaluated for Indoor Air Inhalation Pathway

Medium	**Unit**	**TCE level**	**Potential Excess Cancer Risk*** **	**HQ**	**IDEM IDCL***	**PCE level**	**Potential Excess Cancer Risk*** **	**HQ**	**IDEM IDCL***
Soil	mg/Kg	31	$2.2x10^{-5}$	1.55	0.036	23	$0.2x\ 10^{-6}$	0.05	0.045
Sub slab Soil Gas	$\mu g/m^3$ **	89,000	2.9x10-4	101	N/A	10,000	$0.2x\ 10^{-5}$	0.57	N/A
Indoor air	$\mu g/m^3$	ND †	N/A ††	N/A	N/A	ND	N/A	N/A	N/A

. * IDEM IDCL for ground water Protection through migration from soil ** µg/m3 - micrograms per cubic meter *** Based on IDEM 2012 Remediation Closure Guide. Default exposure parameters based on 25 year exposure to industrial land use , HQ – Non cancer hazard quotient † ND - Not Detected †† N/A - Not Applicable

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Offsite Residential Exposure to Surface Soil

C&D collected soil samples (from 0 to 1 ft below ground surface or bgs) at twenty locations within commercial/industrial and residential areas north and east of the Facility to evaluate the airborne migration of lead dust downwind from the site. Figure 3 shows the off-site sample location areas. The maximum lead concentration of 770 mg/Kg in the industrial area did not exceed the IDEM IDCLof 970 mg/Kg. A maximum concentration of lead at 280 mg/Kg in the right-of-way at the residential area did not exceed the IDEM RDCL of 400 mg/Kg. Since the preliminary RFI investigation focused on right-of-way samples and not the actual residential lots, C&D conducted an additional offsite investigation for lead contamination in December 2011 at eleven residential properties adjoining the Facility.

Data from lead emissions collected from the stack, identified areas of potential lead impact in the neighborhood through air dispersion model analysis. Fugitive sources were not identified in the Facility. C&D selected eleven homes from the high concentration zone of the dispersion model and soil samples were collected from 0-2 inches and 2-6 inches below ground surface in different areas of the lawn. Of the eleven properties, two areas were identified as play areas for children. The levels in the play area were below the IDEM RDCL of 400 mg/kg. The average lead concentration found at depth 0-2 inches at the properties tested ranged from 114 mg/kg to 350 mg/kg. Similarly, the average lead concentration found at depth 2-6 inches ranged from 109mg/kg to 340 mg/kg.

C&D did not detect TCE and PCE vapors during testing of the indoor air in the on-site buildings. Since sampling indicated that the VOC contamination from C&D does not extend off-site, there is no reason for EPA to suspect that the indoor air of any residences might be contaminated with vapors.

Offsite Recreational Receptor Exposure

The level of lead in the riverbank soil exceeded IDEM RDCL of 400 mg/kg. C&D used a tiered risk-based approach to evaluate potential human health risks associated with recreational use. Using the Adult Lead Model (ALM) and Integrated Exposure Uptake BioKinetic (IEUBK) Model, C&D calculated that the average concentration of lead in the riverbank soil at 558 mg/kg did not pose an adverse impact to the health of children based on the limited exposure frequency assumptions associated with recreation. However, the risk to ecological receptors exceeded the acceptable ecological target limit.

Potential for soil contamination migration to groundwater
The approximate depth to groundwater ranges between 30 and 40 ft bgs at the Facility. The low concentrations of TCE in soil at the 9-10 ft depth in Area 9, combined with water quality data from down gradient wells MW-1S, MW-2S, MW-4S, MW-6S and MW-7S, indicates that TCE has not migrated vertically beyond approximately the 5ft depth in Area 9. However, under current or future conditions, if the integrity of the concrete was compromised, potential

migration of chlorinated solvents from soil to groundwater might occur. See table 3 for the potential for contaminants migration from soil to ground water.

Resident and Water Department Worker Exposure to Groundwater

Following the detection of trichloroethylene (TCE) in the City of Attica drinking water supply wells, C&D conducted ground water profiling at the Facility and up gradient of the Facility. Monitoring well data are presented in the Volatile Organic Chemical (VOC) Investigation Report (Clayton, 2006). Analytical results for groundwater samples collected from shallow wells MW-1S through MW-8S representing groundwater in December 2007, January 2008, and June 2008 at and downgradient of the Facility indicate that TCE is not present at concentrations greater than the maximum contaminant limit (MCL) (USEPA, 2003) and the IDEM Groundwater RDCL. As shown in Table 4, TCE was found in excess of the IDEM RDCL in MW-2 which is located upgradient of the Facility. The groundwater flow direction data and the VOC concentration data indicate that the Facility is not a source of the VOCs detected in the municipal wells. A Facility up gradient of site is responsible for the contamination of the municipal wells. The drinking water for the city is currently treated before distribution to the residents.

Monitoring Well 4S exceeded the IDEM RDCL for lead in one of the two rounds of sampling for inorganics that have occurred to date. The lead concentration in MW-4S showed a highest level of 22 µg/l exceeding the IDEM RDCL of 15 µg/l. About 20 samples were collected during the monitoring period of 2008 to 2010. The average concentration of lead during the monitoring period was reported to be 6 µg/l.

Table 4: Ground Water Contamination in comparison with Major Screening Criteria

Contaminant	Location	Maximum Concentration (µg/l)*	IDEM RDCL (µg/l)
TCE	MW -2	20	5
Lead	MW-4S	22	15

* µg/l - micrograms per liter

Recreational Receptor Exposure to Sediment

Arsenic at a maximum concentration of 5.2 mg/kg did not exceed the IDEM residential direct contact screening concentration of 5.5 mg/kg in the sediment.

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Ecological Risk

Baseline Ecological Risk Assessment (BERA)

The BERA conducted at the Facility identified two areas of interest relevant to the ecological risk evaluation: (1) the Wabash River, and (2) the Riverbank Area adjacent to the Wabash River. Based on the analytical results, Arsenic, Cadmium, Copper, Thallium, Tin and Zinc were identified as constituents of ecological interest (COEIs) in surface soils of the Riverbank Area. Through the BERA process, EPA did not identify any site-related COEIs in surface water or sediment in the Wabash River or in groundwater with the potential to discharge to the Wabash River. EPA summarized the risk for ecological receptors in Table 5.

Table 5: Risk for Ecological Receptors in the Riverbank soil at Wabash River

COEI	EPC 0-1 ft mg/kg*	Short tailed Shrew		American Robin	
		EEQ**$_{NOAEL}$†	EEQ$_{LOAEL}$††	EEQ$_{NOAEL}$	EEQ$_{LOAEL}$
Cadmium	11.5	7.7	5	4.4	2.8
Lead	5356	2.2	1.7	15	14
Tin	108	0.16	0.2	3.3	1.3
Zinc	2190	1.5	1.5	2.6	2.6
Thallium	1.55	2.8	0.3	0.5	0.5

* EPC - Exposure Point Concentration ** EEQ - Environmental Effects Quotient
† NOAEL - No Observable Adverse Effect Level †† LOAEL - Lowest Observed Adverse Effect Level

Risk to mammals and terrestrial birds

EPA determined from the BERA that there are potential adverse ecological effects at the Riverbank soil due to the soil erosion or surface water run-off from the C&D facility. The following table provides the ecological effects quotients for mammals and terrestrial birds exposed to contaminant hot spots in Riverbank soil.

Table 6: Estimated Risk for Ecological Receptors in the Riverbank soil at Wabash River after installation of barrier.

COEI	EPC 0-1 ft mg/kg*	Short tailed Shrew		American Robin	
		EEQ**$_{NOAEL}$†	EEQ$_{LOAEL}$††	EEQ$_{NOAEL}$	EEQ$_{LOAEL}$
Cadmium	1.09	1.2	0.8	0.7	0.4
Lead	965	0.5	0.4	3.3	3.0
Tin	12.8	0	0	0.4	0.2
Zinc	144	0.6	0.6	0.8	0.8
Thallium	1.08	1.9	0.2	0.4	0.4

* EPC - Exposure Point Concentration ** EEQ - Environmental Effects Quotient
† NOAEL - No Observable Adverse Effect Level †† LOAEL - Lowest Observed Adverse Effect Level

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SCOPE OF CORRECTIVE ACTION

The Corrective Action Order required C&D to meet the short-term goals listed below by August 2008:

a. Control all current human exposures to contamination at or from the Facility. That is, C&D must establish controls so that significant or unacceptable exposures do not exist for all media known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above risk-based levels for which there are complete pathways between contamination and human receptors.

b. Stabilize migration of contaminated groundwater at or from the Facility. That is, C&D must stabilize the migration of all groundwater known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above acceptable levels so that the groundwater remains within any existing areas of contamination as defined by monitoring locations designated at the time of the demonstration. In addition, any discharge of groundwater to surface water is either insignificant or currently acceptable according to an appropriate interim assessment. C&D must collect monitoring and measurement data in the future as necessary to verify thamigration of any contaminated groundwater is stabilized.

In accordance with the Corrective Action Order, C&D submitted a RCRA Facility Investigation to demonstrate that the short-term goals (current conditions under control for human health and groundwater migration) had been achieved. In June 2009, EPA determined that these short term goals have been achieved. See Administrative Record, Item 7, URS 2009 RCRA Facility Investigation Part 2A Report: Additional Sampling and Analysis, C&D Technologies, Attica, IN. EPA's long-term goals for the remedy being proposed for final remedy selection are:

- Protecting human health and the environment;
- Attaining the applicable media (soil, water or air) cleanup standards;
- Controlling the sources of the releases to the extent practicable; and
- Managing all remediation waste in compliance with the applicable standards.

Returning usable groundwater to its maximum beneficial use wherever practical is a factor leading to the goal of protecting human health and the environment. At this Facility, C&D must monitor the groundwater contamination at MW-4S to make sure that the contaminant levels do not increase, or cause any harm to surface waters. C&D may request EPA approval to discontinue the groundwater monitoring if/when the IDEM DCLs have been met.

C&D has informed EPA, that in order to limit exposure to remaining contaminants at the facility, it will establish enforceable restrictions to limit the use of the property to industrial use only. As a result, EPA's cleanup standards are based upon restricting the C&D property to industrial or commercial land use. The site cannot be converted to residential land use unless further cleanup is conducted. The standards are also based upon C&D establishing enforceable institutional controls to periodically inspect and maintain exposure barriers,

complying with its *Health and Safety Plan* for protecting on-site industrial workers and construction workers from unacceptable exposures unless they are using the appropriate personal protective equipment.

SUMMARY OF POTENTIAL REMEDY ALTERNATIVES

EPA uses four threshold criteria and five balancing criteria to evaluate alternative remedies. Any alternative that fails to meet the four threshold criteria are screened out from further consideration. The five balancing criteria are used to identify the remedy that provides the best relative combination of attributes.

The four threshold criteria are:

1. Protection of Human Health and the Environment
2. Attain Media Cleanup Standards
3. Controlling the Sources of Releases
4. Compliance with Waste Management Standards

The five balancing criteria are:

1. Long-term Reliability and Effectiveness
2. Reduction of Toxicity, Mobility or Volume of Wastes
3. Short-term Effectiveness
4. Implementability
5. Cost

EPA's proposed remedy will include several of the alternative components being considered below. For example, EPA's proposed remedy for a certain area might include excavation to a certain action level or covering contaminated soil with clean soil to block exposure pathways for routine industrial workers, but deeper contaminated soils might be left in place. So, another component of the remedy would involve implementing a health and safety plan to assure that construction workers would use the appropriate personal protective equipment when digging down into the deeper soils that remain contaminated. Some alternatives are best implemented for the entire site rather than for specific units or Areas, while other alternatives are best implemented for a specific unit or area only.

Site-wide Actions

EPA's long term goal is to remediate the contamination found at the facility and to manage any unacceptable risk human health and the environment at or near the C&D facility. In order to manage the risk at the facility, the EPA has reviewed a number of actions that would reduce the current risk at the facility. For each Area, a number of alternative approaches were assessed and those alternatives and their assessments are documented below. For all areas EPA considered for remedy alternatives excluding the No Further Action (Alternative 1), C&D must take the following actions at the Facility:

Action 1: Implement and Maintain Institutional Controls

US EPA ARCHIVE DOCUMENT

C&D must implement enforceable institutional controls to conduct periodic monitoring and maintenance of exposure barriers, to restrict the current and future use of the property to industrial or commercial land use and to restrict the use of on-site groundwater to make sure that human exposure pathways in the future will not be substantially different from the exposure pathways that were described in the studies and reports, which serve as the basis for EPA's proposed remedies. In addition, C&D must comply with its *Health and Safety Plan* to assure that industrial workers and construction workers are protected from unacceptable exposures unless they are using the appropriate personal protective equipment. Further removal of contaminants would be needed if C&D does not wish to implement the enforceable institutional controls. C&D must submit its *Health and Safety Plan* to EPA for approval within 90 days after EPA issues the *Final Decision and Response to Comments,* and C&D must negotiate an agreement with EPA to restrict the land use and the use of groundwater within 180 days after the issuance of the *Final Decision and Response to Comments*.

Action 2: Financial Assurance

C&D will need adequate funds to cover the costs of the construction, as well as the operation, maintenance, and monitoring of the proposed remedy. C&D must provide EPA-approved financial assurance in an amount sufficient to cover the cost of the cleanup within 90 days after EPA selects the remedy and issues its *Final Decision and Response to Comments.* C&D may demonstrate the adequacy of its financial assurance by using mechanisms that comply with EPA regulations at 40 Code of Federal Regulation 265 or 264 Subpart F. Those financial assurance mechanisms include financial trusts, surety bonds, letters of credit, insurance, or self-insurance as demonstrated by a financial test. C&D may request that the amount of the financial assurance be reduced after successfully completing the construction, and annually during the operation and maintenance phase of the remedy.

In the bullet point paragraphs below, EPA summarizes the potential remedy alternatives evaluated by C&D to address the onsite soil and the offsite Riverbank Area. A more detailed discussion of the alternatives is in C&D's revised CMS Report dated February 22, 2010. See Administrative Record, Item 14, URS 2010. Corrective Measures Proposal. C&D Technologies, Attica, IN. February 22, 2010.

Specific Area Actions

Area 7 Remedial Alternatives (PolyMixing Room Storage)

- **Alternative 1 - No Further Action:** EPA would not require C&D to conduct any remedial action at this area.

- **Alternative 2 – Exposure barrier:** C&D will leave the concrete slab covering Area 7 in place. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the concrete slab.

US EPA ARCHIVE DOCUMENT

Area 9 and Area 4 Remedial Alternatives (Former Waste and Dust Storage and Storm Sewer SB-21)

- **Alternative 1 - No Further Action**: EPA would not require C&D to conduct any remedial action; C&D will leave the concrete slab covering Area 9 in place. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the concrete slab.

- **Alternative 2 - Excavation and Offsite Disposal of Contaminated Soil**: C&D will leave soils contaminated with PCE and TCE beneath active manufacturing areas in place. C&D will excavate accessible soil to a depth of five feet below ground surface (bgs). C&D estimated the volume of soil removed to be approximately 231 cubic yards. C&D will dispose of the excavated soil off site at an EPA approved landfill.

- **Alternative 3 - Soil Vapor Extraction (SVE)**: C&D will use this *in-situ* remedial technology to reduce concentrations of VOCs adsorbed to soils in the unsaturated (vadose) zone. The SVE system will utilize three extraction wells screened across the shallow contaminated zone to maximize soil vapor collection. C&D estimated that a 20ft effective radius of influence will be around each SVE well. The extracted vapors from each SVE well would be released in to the atmosphere without treatment. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the concrete foundation slab.

- **Alternative 4 - Soil Vapor Extraction (SVE) with off-gas treatment**: C&D will use this *in-situ* remedial technology to reduce concentrations of VOCs adsorbed to soils in the unsaturated (vadose) zone. The SVE system will utilize three extraction wells screened across the shallow contaminated zone to maximize soil vapor collection. A 20 ft effective radius of influence is estimated around each SVE well. C&D will treat the extracted vapors discharged over time with an appropriate vapor treatment system (activated carbon) before discharging to the atmosphere. With the exception of well installation, C&D will not modify the existing concrete foundation slab in Area 9 since the slab will continue to serve as the cap. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the concrete foundation slab.

- **Alternative 5 - Excavation and Off- site Disposal and SVE:** With this alternative, C&D will excavate contaminated soil from the outdoor alleyway and dispose of the soil off-site at an EPA approved landfill. C&D will backfill the excavated area with clean fill and restore the area to the pre-excavation condition. C&D will use a modified a SVE system to treat PCE and TCE contaminated soils that are not excavated from beneath the active manufacturing areas. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the concrete foundation slab.

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C&D estimated the capital cost for each potential remedy alternative design and implementation and operation and maintenance costs for Area 9 and Area 4 (SB-21) as:

Area 9 and Area 4 Onsite soil VOC removal - Potential Remedy Alternative	**Estimated Implementation Cost**	**Estimated Operation and Maintenance Cost**	**Total**
1 -No Action	$0	$0	$0
2- Excavation and off-site disposal	$91,500	$0	$91,500
3- SVE and Capping (No off-gas treatment)	$52,000	$43,500	$95,000
4 - SVE and Capping (with off-gas treatment)	$59,500	$45,500	$105,000
5 – Excavation and off-site disposal and SVE	$119,000	$45,599	$165,000

Areas 3, 4, 5 and 11 Remedial Alternative (Lead Oxide Storage Areas, Exterior Former Hazardous Waste Storage Area and Northeastern Former Container Storage Area)

Alternative 1 - No Further Action: EPA would not require C&D to conduct any remedial action to mitigate potential lead and Arsenic exposure from the surface soil to Facility workers.

Alternative 2: Pave the currently unpaved surface areas at the Facility (most of the Facility's grounds are already paved with concrete).

Therefore, EPA requires C&D to pave the locations labeled SB -14, SB -21, SB -22 and SB-36, located in areas 3, 5 and 11, with concrete consistent with other paved areas at the Facility. The contaminants are of concern at the surface due to direct contact with Facility workers and migration potential to groundwater. Paving the surface would provide an exposure barrier for workers as well as prevent migration of soil contaminants to groundwater. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the concrete exposure barrier. The implementation and maintenance cost is estimated to be $10,000.

River Bank Area Remedial Alternatives

Alternative 1 - No Further Action: EPA would not require C&D to conduct anremedial action to mitigate potential Lead exposure ecological receptors.

Alternative 2 - Immobilization and Exposure Barrier: This alternative involves excavation of lead contaminated soil and on-site treatment (immobilization) with Triple Super Phosphate (TSP). C&D will place treated soil back in the excavation

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footprint and cover the soil with an exposure barrier. C&D will construct the exposure barrier with a permeable geo-textile fabric covered with appropriately sized riprap. Such a measure will aid in bank stabilization and erosion control. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the geo-textile exposure barrier.

Alternative 3 - On-Site Treatment and Off-Site Disposal with Exposure Barriers: This alternative involves excavation of lead contaminated soil, on-site treatment (immobilization), and off-site disposal at an EPA approved landfill. The C&D proposed excavation Area covers 800 square feet. Approximately 30 cubic yards of contaminated soil will be removed for off-site disposal.

Alternative 4 - Exposure Barrier: This alternative involves construction of an exposure barrier to contain and isolate lead-contaminated soils associated with CD-SB-59. C&D will construct the exposure barrier to cover approximately 800 square feet of the Riverbank Area. C&D will construct the cap using a permeable geo-textile fabric overlain with riprap. As established by an enforceable institutional control, C&D will conduct routine monitoring and will maintain the integrity of the geo-textile exposure barrier.

C&D estimated the capital cost for each potential remedy alternative design and implementation and operation and maintenance costs for Riverbank Area to be:

Riverbank Area Metal Potential Remedy Alternative	Estimated Implementation Cost	Estimated Operation and Maintenance Cost	Total
1 - No Action	$0	$0	$0
2 - Immobilization and Capping	$71,500	$5,000	$76,500
3 – On-Site Treatment and Off-Site Disposal with Capping	$83,000	$5,000	$88,000
4 - Exposure Barrier	$56,000	$5,000	$61,000

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DESCRIPTION OF PROPOSED REMEDIES FOR THE FACILITY

Based upon the evaluation of the alternative remedies and the threshold and balancing criteria, EPA proposes the following remedies for the Facility:

Area 7: EPA's proposed remedy for Area 7 is C&D to conduct routine inspection and maintenance in accordance with an enforceable institutional control to ensure the integrity of the existing concrete flooring in Area 7 that is acting as an exposure barrier for Arsenic contamination. No alternative was evaluated.

Area 9 and 4: EPA's proposed remedy for Area 9 and 4 is SVE and capping with off- gas Treatment (Alternative 4). C&D will use *in-situ* remediation technology to reduce PCE and TCE concentration in the soil underneath the manufacturing building. Approximately 2.4 to 5 pounds of PCE and 8 to 16 pounds of TCE are present in the subsurface soil in Area 9 and 4. The SVE system will utilize three extraction wells screened across the shallow contaminated zone to maximize soil vapor collection (Figure 4). Treatment will continue until the soil vapor levels do not exceed the IDEM IDCL of 880 µg/m3 of TCE. The PCE level in the soil gas is already below the IDEM IDCL of 17,500 ug/m3. C&D will treat the extracted vapor if necessary (based on the nature, concentration, and total mass discharged over time) with an appropriate vapor treatment system (activated carbon) before discharging to the atmosphere. With the exception of well installation, C&D will not modify the existing concrete foundation slab in Area 9 so that the existing slab will continue to serve as the cap. During system operation, C&D will monitor influent soil gas vapor concentrations on a routine basis. C&D will pave areas where surface soil contamination exceeds the IDEM groundwater protection criteria. The paved area would act as an exposure barrier to workers and limit infiltration of precipitation into the subsurface. The proposed remedy also includes an enforceable institutional control requiring routine inspection and maintenance to ensure the integrity of the concrete slab foundation and pavement in Area 9 that is acting as an exposure barrier for remaining contamination.

Area 3, 5 and 11: EPA's proposed remedy for the hotspots in Area 3, 5 and 11 is capping with concrete (Alternative 2). The contaminants of concern are at the surface posing a direct contact threat to Facility workers and potential for migration to groundwater. Paving the surface will provide an exposure barrier for workers, as well as prevent migration of soil contaminants to groundwater. EPA's proposed remedy also includes an enforceable institutional control requiring C&D to conduct routine inspection and maintenance. The institutional control will ensure the integrity of the concrete and pavement in Areas 3, 5, and 11 that is acting as an exposure barrier for remaining contamination.

Riverbank: EPA's proposed remedy for the Riverbank Area is construction of an exposure barrier (Alternative 4). This barrier will have minimal impact to the native soils and will help stabilize the stream bank and prevent erosion. Prior to construction, C&D will remove the understory vegetation and visible surface debris from the work area. Since mature trees are present with in the footprint of the exposure barrier, C&D will cut and fit the geo-textile around the base of each tree. Riprap will be placed over the geo-textile fabric. Riprap will be sized based on the velocity of the Wabash River during flood stage. During installation, soil

will be trenched along the hillside at the base of the work area to provide a base and reduce the potential for erosion during the flood events. In addition, riprap on the upstream and downstream sides of the exposure barrier will also be keyed in to prevent dislodging. C&D will conduct routine inspections of the exposure barrier after heavy rain or flood events. EPA's proposed remedy also includes an enforceable institutional control requiring routine inspection and maintenance to ensure the integrity of the geotextile and riprap exposure barrier.

Groundwater Monitoring: C&D will sample and analyze monitoring well 4S twice a year for metals. Monitoring will continue until the lead level in groundwater does not exceed the IDEM RDCL for two consecutive rounds six months apart.

Corrective Measures Implementation Workplan: Within 90 days after EPA makes its final remedy selection, C&D must submit its corrective measures implementation workplan for EPA approval. This document will provide specific details about institutional controls, dust control, confirmation sampling, health and safety of remediation workers, etc., as necessary to implement the selected remedy. Within one year after selection of the final remedy, C&D must submit its operation and maintenance plan for EPA approval. C&D must periodically, but no less than annually, monitor and maintain as necessary to ensure the integrity of the any exposure barrier,

EVALUATION OF THE PROPOSED REMEDIES AND ALTERNATIVES

As described above, at Areas 4 and 9, EPA's proposed remedy for cleaning the soil is SVE and capping (Alternative 4). At Areas 3, 5, and 11 the proposed remedy for the contaminated soil is capping (Alternative 2). At the Riverbank Area the proposed remedy is constructing exposure barrier (Alternative 4). This section profiles the performance of these proposed remedies against the four general standards and the five remedy decision factors, noting how the proposed remedies compare to the other alternatives under consideration.

1. *Overall Protection:* All of the alternatives, with the exception of the "no action" alternative, would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls. The proposed remedies would reduce the risk through direct contact to VOCs in the soil through SVE and to metals in the Riverbank area and hot spots through construction of exposure barrier or capping. Enforceable institutional controls that require routine inspection and maintenance will ensure the integrity of the various exposure barriers. Because the "no action" alternative is not protective of human health and the environment, it is not considered further in this analysis as an option for the C&D facility.

2. *Attainment of Media Cleanup Standards.* The facility is zoned for industrial use and will remain as such per C&D corrective measures workplan. All alternatives, with the exception of the "no action" alternative, would meet their IDEM IDCLs. At the Riverbank area, the exposure barrier will meet the ecological protective criteria.

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3. *Controlling the Sources of Releases.* All of the alternatives, with the exception of the "no action" alternative, would be effective in reducing, to the maximum extent practicable, releases of contaminants to the groundwater, surface water, air and other soils. The proposed SVE and capping with off-gas treatment remedy would reduce the release of VOCs in the soil to groundwater, indoor air and outdoor air. Containment of the contaminated soil in the Riverbank area will eliminate the uncontrolled release that currently poses a potential risk to ecological receptors. Paving the hot spots at Areas 3, 5 and 11 will stop leaching of contaminants through less-contaminated soils and to the groundwater. Enforceable institutional controls that require routine inspection and maintenance will ensure the integrity of the various exposure barriers.

4. *Compliance with Waste Management Standards* C&D will properly characterize, treat and/or dispose offsite at a regulated facility any waste generated during implementation of the remedy in accordance with all applicable regulations and permits. Because the proposed remedy for Areas 4 and 9 involves SVE and capping with off-gas treatment, it is ensured that the VOCs released in the atmosphere do not exceed ambient air standards.

5. *Long-term Reliability and Effectiveness.* All the alternatives would be effective in providing long term reliability. EPA considers the proposed remedies to address VOCs at Area 9 and 4 and metals at the Riverbank area as presumptive remedies due to the demonstrated efficiency of the technology at other sites. The long-term risks of the exposure to residual contaminants in the soil would be reduced by sealing the soils in the capped area onsite. Dense vegetative cover in the Riverbank Area would eliminate erosion. EPA requires periodic inspections and repair of the fabric (exposure barrier) under the riprap in the Riverbank area and the paved surface cover over the hotspot areas according to an O&M plan. Enforceable institutional controls that require routine inspection and maintenance will ensure the integrity of the exposure barriers.

6. *Reduction in the Toxicity, Mobility, or Volume of Wastes.* All the alternatives would be effective in reducing the toxicity and mobility of the contaminants on site and in the Riverbank Area. Use of SVE at areas 9 and 4 will reduce the volume and toxicity of VOCs at the C&D facility. Monitoring of soil gas source reduction and sealing the contaminant mass at Riverbank area and the hotspots at Areas 3, 5 and 11 will prevent further uncontrolled migration of metals and VOCs to surface water and sediment or groundwater.

7. *Short-term Effectiveness.* The proposed remedy at Areas 9 and 4 would considerably reduce the potential for indoor vapor intrusion more quickly than other alternatives. The SVE system will immediately draw the soil gas away from the potential migration route. For Riverbank Area, the proposed remedy implementation will be faster than other alternatives thus not disturbing the ecosystem longer than necessary.

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8. *Implement*ability. Implementation of SVE (alternative 4) in (alternative 4) Areas 9 and 4 is technically feasible. This area is accessible and located in an area of low traffic and VOC contamination in the soil is isolated to shallow and unsaturated soil. Containment of soil in the Riverbank area is technically feasible with traditional excavation equipment and manual labor. Because the proposed work area for the Riverbank is located adjacent to the Wabash River, C&D may be required to obtain State and Federal permits.

9. *Cost.* The total estimated cost of the potential remedial alternatives considered by C&D to address site contamination ranged from $0 for institutional controls to $226,000 for reducing VOC and metal contamination. The remedy alternative recommended by C&D in its CMS Report would cost $166,000. The cost covers SVE with off-gas treatment with capping for Area 9 and containment for the Riverbank area, O&M as necessary, as well as design costs and other implementation expenses.

The EPA-proposed remedy cost as shown in the table below is estimated to be $179,000.Apart from the C&D selected remedy cost of 166,000 for the River bank Area and Area 4 and 9, the additional cost includes capping hotspot locations at areas 3,5, 11 and monitoring groundwater for metals at MW-4S.

Remedy Implementation Areas	Remedy Type	Estimated Implementation Cost	Estimated Operation and Maintenance Cost	Total
Areas 9 and 4	SVE and Off-gas Treatment	$59,500	$45,500	$105,000
Areas 3,5 and 11	Capping	$7,000	$3,000	$10,000
Reiverbank Area	Exposure Barrier	$56,000	$5,000	$61,000
MW-4S			$3,000	$3,000
				$179,000

Based on information currently available, the proposed remedy provides the best balance with respect to the criteria described above. EPA believes that the proposed remedy is protective of human health and the environment, and will effectively control human and environmental exposure to contaminants in soil, surface water, sediment and groundwater. C&D will address and comply with all applicable standards regarding surface water protection, worker protection, and on-site/off-site waste management during implementation of the remedy.

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PUBLIC PARTICIPATION

EPA seeks input from the local community on the cleanup methods and the proposed remedy to address contaminated soil with in the Facility boundaries and at the Riverbank Area. The public is invited to provide comment on alternatives not addressed in this *Statement of Basis*. There will be a 30-day public comment period for the local community to participate in the final remedy selection. During this period, EPA will accept written comments on the proposed action. Members of the public can request that the Agency hold a public meeting during this 30 day period. The public may submit written comments, questions and requests for a public meeting to the following address:

Rafael Gonzalez
Community Involvement Coordinator
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
(312) 886-4188
E-mail: gonzalez. rafaelp@epa.gov

After consideration of public comments on the proposed remedy, EPA will select a final remedy and document its selection in the Final Decision and Response to Comments. In addition, EPA will summarize and provide responses to public comments. EPA will draft the Final Decision and Response to Comments at the conclusion of the public comment period and will send copies to everyone who submitted comments during the public comment period.

To send written comments or request technical information on the C&D facility, please contact:

Ms. Bhooma Sundar
EPA Project Manager
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Corrective Action Section, LU-9J
Chicago, Illinois 60604-3590
(312) 886-1660
E-mail: sundar.bhooma@epa.gov

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Index to the Administrative Record

1. PA/VSI Screening Site Inspection Report for Eltra Corporation C&D Batteries Division, Attica, IN. October, 1990
2. Clayton Group Services, Inc. Current Conditions Report, C&D Technologies, Inc, Attica, IN. March 1, 2007
3. RCRA Section 3008(h) Corrective Action Order to C&D Technologies under RCRA, Section 3008(h). January 2007
4. URS Corporation (URS) 2007 a. RCRA Facility Investigation Work Plan, C&D Technologies, Attica, IN. September 2007
5. URS 2007b. RCRA Facility Investigation Work Plan Addendum, C&D Technologies, Attica, IN. December 2007
6. URS 2008. RCRA Facility Investigation, Part 1 Report, C&D Technologies, Attica, IN. October 30, 2008
7. URS 2009 a. RCRA Facility Investigation Part 2A Report: Additional Sampling and Analysis, C&D Technologies, Attica, IN. June 5, 2009
8. URS 2009 b. RCRA Facility Investigation, Baseline Ecological Assessment C&D Technologies, Attica, IN. June 8, 2009
9. URS 2009c. RCRA Facility Investigation Vapor Intrusion Evaluation Work Plan, C&D Technologies, Attica, IN. August 31, 2009. C&D Technologies, Attica, IN. July 28, 2009
10. URS 2009 d. RCRA Facility Investigation, Baseline Ecological Risk Assessment, Addendum. C&D Technologies, Attica, IN. October 26, 2009
11. URS 2009e. RCRA Facility Investigation Vapor Intrusion Evaluation Report. C&D Technologies, Attica, IN. November 2, 2009
12. EPA 2009, Current Human Exposures Under Control. June 2009
13. EPA 2009, Migration of Contaminated Groundwater Under Control. June 2009
14. URS 2010. Corrective Measures Proposal. C&D Technologies, Attica, IN. February 22, 2010
15. URS 2012. RFI Results of Off-site supplemental lead investigation. C&D Technologies, Attica, IN. February 10, 2012.
16. Quarterly Progress Reports.

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Figure 1: C& D Facility Location Map

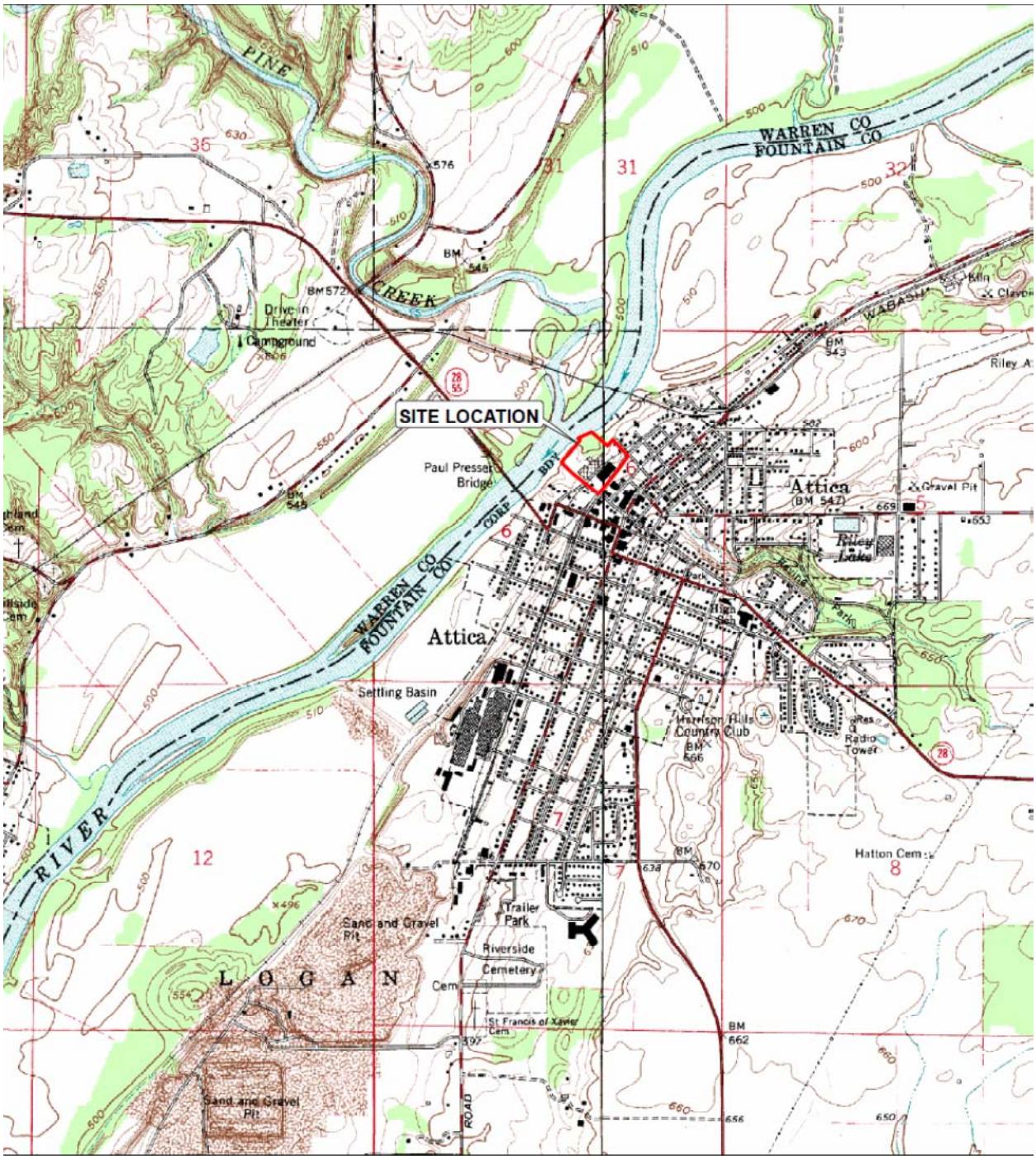

Figure 2: C&D RCRA Corrective Action Flow Chart

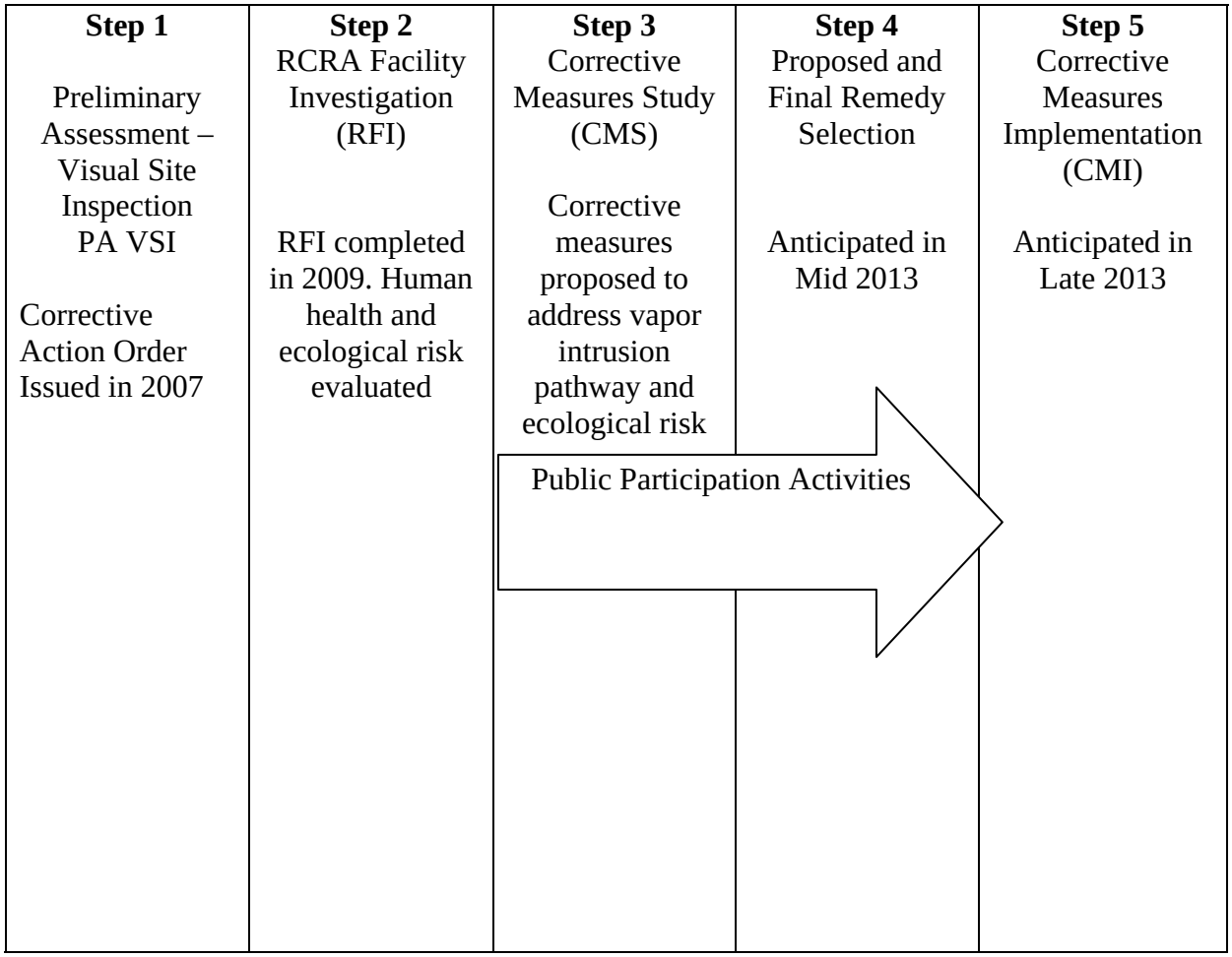

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Figure 3: SWMUs/Areas, Monitoring Wells and Soil Sampling Locations

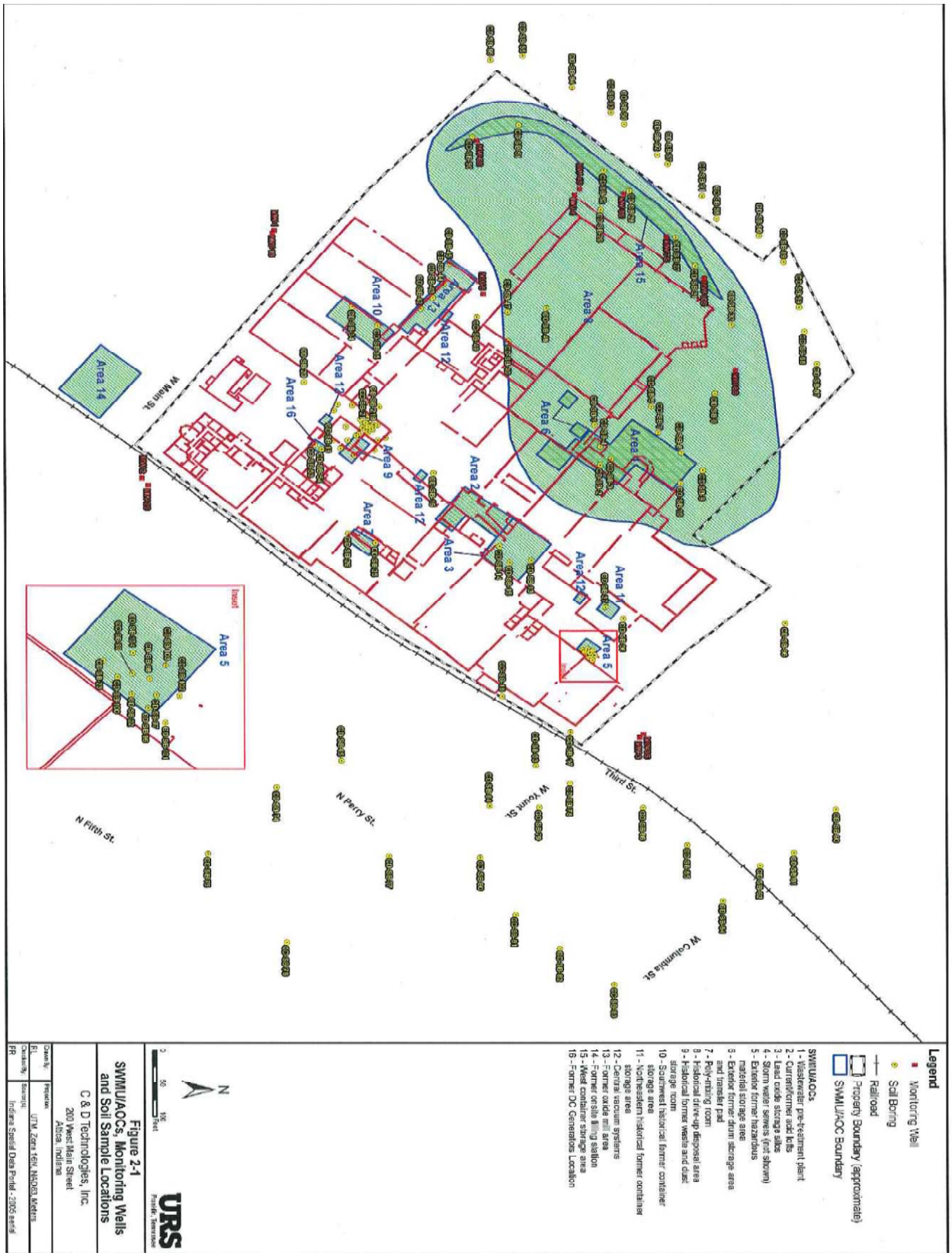
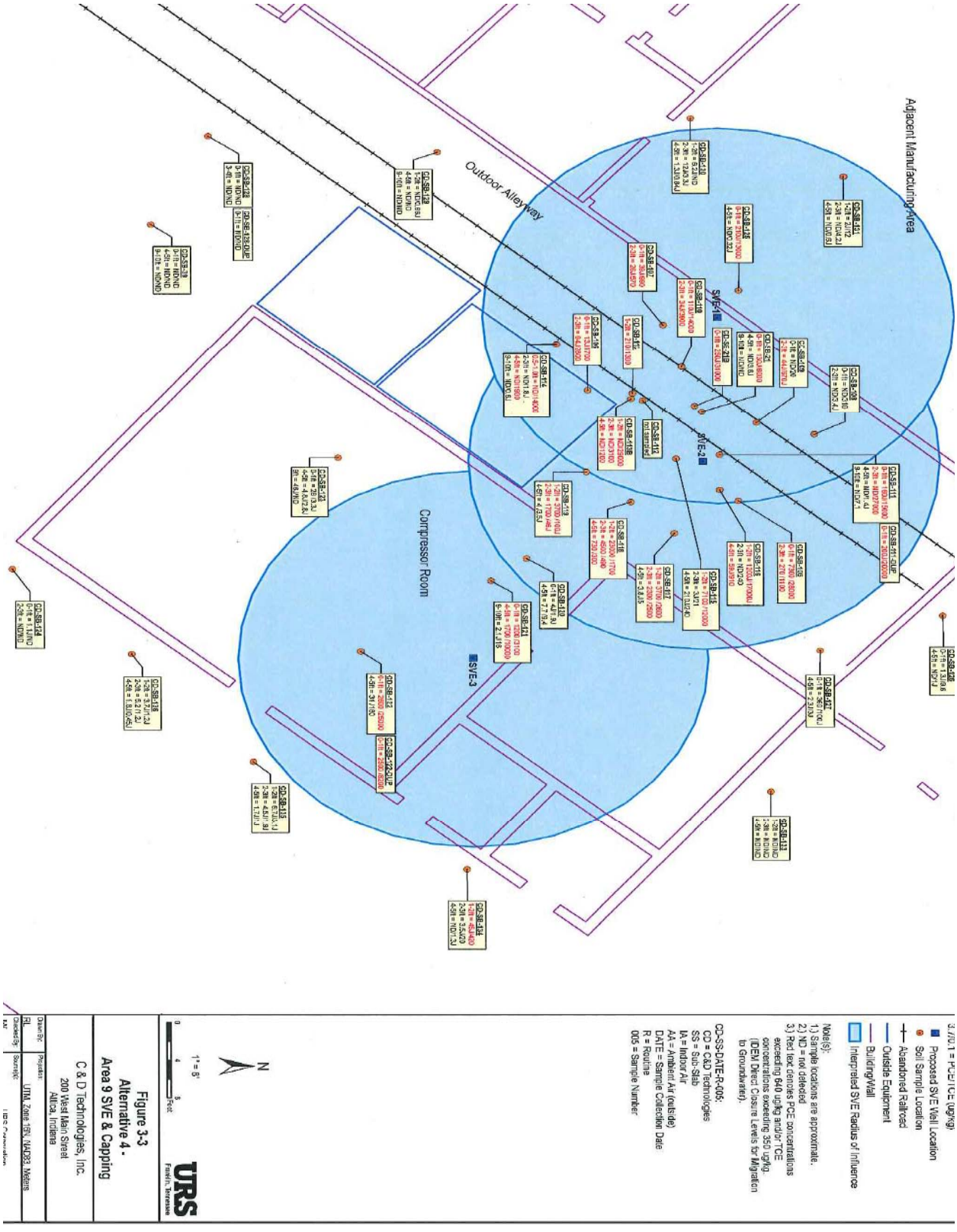


Figure 4: Proposed Soil Vapor Extraction Area of influence in Area 9



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