ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

U.S. EPA Brownfield
American Recovery and Reinvestment Act of 2009 (ARRA) Assistance
Amendment # 2B-00E96801-1
Indiana Brownfields Program

Former Ellis BP Site
1718 Spring Street
Jeffersonville, Indiana
February 2011

This Analysis of Brownfield Cleanup Alternatives (ABCA) was prepared in cooperation among the Indiana Brownfields Program (Program), the City of Jeffersonville, and Bruce Carter Associates, LLC (BCA) as a requirement for borrowing United States Environmental Protection Agency (U.S. EPA) ARRA Revolving Loan Fund (RLF) monies to remediate a brownfield. The subject brownfield site is the Former Ellis BP Site located at 1718 Spring Street in Jeffersonville, Indiana (Site). The Program and U.S. EPA deemed the Site eligible for the expenditure of ARRA RLF funds by the City of Jeffersonville (City) as the borrower. Phase II Environmental Site Assessments (ESA) activities that were conducted determined soil and ground water contamination at the Site. Environmental remediation activities utilizing this ARRA RLF funding are anticipated to be implemented in 2011.

The ABCA outlines the following four alternative cleanup and environmental management activities that are being considered for the Site:

1. **Alternative 1** – No Action other than institutional controls to restrict future land use to commercial/industrial.
2. **Alternative 2** – Removal of underground storage tanks (USTs), excavation of on-Site contaminated soil, Soil Vapor Extraction (SVE) System for off-Site contaminated soil, application/injection of oxygen releasing compound (ORC^{TM}) for groundwater.
3. **Alternative 3** – Removal of USTs, excavation of on-Site contaminated soil, excavation of off-Site contaminated soil, ORC^{TM} for groundwater.
4. **Alternative 4** – Removal of USTs, excavation of on-Site contaminated soil, excavation of off-Site contaminated soil, monitored natural attenuation (MNA) for groundwater.

Note: demolition of on-Site buildings is assumed for all alternatives.

Site History/Comprehensive Plan

The Site is located at the southwest corner of the intersection of Spring Street and Eastern Boulevard, Clark County, Jeffersonville, Indiana (Figure 1 and Figure 2). The Site operated as a retail gasoline station from approximately 1925 until its closure in

approximately 2001. Five USTs remain in place: two 8,000-gallon gasoline USTs, one 4,000-gallon gasoline UST, one 4,000-gallon diesel UST, and one smaller kerosene UST of unknown size. Registration documents show that the gasoline and diesel USTs are registered, are constructed of steel, and were installed in 1966 and 1971. The smaller kerosene UST is not registered.

The following environmental reports/studies have been conducted at the Site:

X *Phase II Site Investigation, Former Ellis BP, 1718 Spring Street, Jeffersonville, Indiana, Bruce Carter Associates, LLC, October, 2010* .

The following is a summary of the Phase II ESA information:

Soil

Results of the on and off-Site soil samples were compared to the Indiana Department of Environmental Management's (IDEM) Risk Integrated System of Closure (RISC) industrial and residential closure standards. Laboratory results of on-Site soil samples were compared to the appropriate RISC industrial closure levels. Samples from five of the eight borings on-Site were reported to exceed the RISC industrial closure level for one or more petroleum hydrocarbon parameters. Sample depths in these borings ranged from 8 feet to 16 feet.

Results of off-Site soil boring samples were compared to the RISC residential closure levels. Total petroleum hydrocarbons (TPH)-gasoline range organics (GRO), benzene, toluene, ethylbenzene, and total xylenes (BTEX) and naphthalene exceeded their respective RISC residential closure levels in one boring in the 18 to 20-foot interval located in the parking lot of the Alben Motel south of the Site.

The various closure levels (IDCL = Industrial Default Closure Level; RDCL = Residential Default Closure Level) for project Contaminants of Concern (CoCs) for soil are presented below:

RISC Closure levels Soil mg/kg

Parameter	IDCL	RDCL	Recreational
Benzene	0.35	0.035	24.0
Toluene	96.0	12.0	25,000
Ethylbenzene	160	13.0	12,000
Xylene (Total)	170	170	1,800
MTBE	3.2	0.18	1,100
n-Hexane	100	100	440
Naphthalene	170	0.7	9,800

TPH-GRO	4,300	3,100	none
TPH-DRO	5,800	3,100	none

An estimated 3200 to 3800 tons of contaminated soil are on-Site. On-Site soils will be remediated to recreational levels where direct exposure is a concern, and to industrial levels for migration to groundwater where migration is a concern. An estimated 1900 to 2300 tons of contaminated soil are on the adjoining sites. Off-Site soils will be remediated to residential levels.

Groundwater

Groundwater was collected and sampled from four permanent monitoring wells and three temporary monitoring wells on-Site, as well as from eight off-Site temporary monitoring wells and one off-Site permanent monitoring well. One groundwater sample from each location was analyzed for BTEX and poly aromatic hydrocarbons (PAHs). Off-Site groundwater analytical results indicated benzene in the groundwater on the closed restaurant and motel properties approximately 120 feet from the Site UST pit at levels which exceeded the RISC industrial closure level. The various closure levels for project CoCs in groundwater are presented below:

RISC Closure levels Groundwater mg/l

Parameter	IDCL	RDCL
Benzene	0.052	0.005
Toluene	8.2	1.0
Ethylbenzene	10	0.7
Xylene (Total)	20	10
MTBE	0.72	0.04
Naphthalene	2.0	0.0083

The planned uses of the Site include commercial/industrial and recreational/green space. Closure of the adjoining sites will be for residential.

Alternative 1 – No Action

No action; the City does not directly address the health and environmental impacts on the Site, other than building demolition and complying with Environmental Restrictive Covenants (ERCs) to limit land use to commercial/industrial and prevent excavation and groundwater usage.

1. **Effectiveness** – This alternative would not comply with UST regulations requiring tank removal. Off-Site groundwater and soil would remain contaminated. This alternative is not as effective as remediation.

2. **Implementability** – Easy to implement in terms of technical feasibility and availability of equipment and materials. However, it is not administratively feasible. No Action does not comply with Office of the State Fire Marshall regulations and does not achieve any project goals. No permits or approvals would be available as this option is not consistent with IDEM policy and rule. Although feasible in using No Action, the hazard mitigation would take decades to complete, and contaminated groundwater could potentially impact residences and wildlife.
3. **Cost** – None.

Alternative 2 – UST Removal/excavate on-site/SVE off-site/ ORC™ groundwater

Demolish the buildings. Remove the USTs. Excavate clean overburden and remove on-Site contaminated soil. This alternative assumes that off-Site access is limited to non-excavation alternatives. Install and operate SVE for off-Site soil contamination. Add ORC™ to excavation and inject for groundwater remediation on-Site and off-Site. Limiting land use to non-residential and restricting groundwater usage is likely.

1. **Effectiveness** – This alternative is more effective than Alternative 1 No Action or implementing institutional controls alone, but less so than removing all contaminated soil off-Site. This option is effective and will prevent exposure in excess of appropriate RISC limits on-Site and off-Site. Soil contamination reduction using SVE will depend on system design and duration of operation. Properly designed and allowed to run as long as needed, SVE will achieve project cleanup goals. The application of ORC™ should be effective at treating groundwater contamination simply through admixing to the bottom of the excavation. The Remediation Work Plan calls for quarterly evaluation of the effectiveness of ORC™ and plans for additional injection if needed.
2. **Implementability** – The removal actions are relatively easy, however the SVE requires a pilot study, and subsurface conditions are not ideal for SVE. The institutional controls, which are included in the Terms of any Deed Restriction, are relatively simple to implement.
3. **Cost** – This is the most costly option. Projected cost for this option: $1,127,000.

Alternative 3 – UST Removal/excavate on-site & off-site/ ORC™ groundwater

Demolish the buildings. Remove the USTs. Excavate clean overburden and remove on-Site and (almost all) off-Site contaminated soil. Add ORC™ to excavation and inject for groundwater remediation on-Site and off-Site. Limiting land-use to non-residential and restricting groundwater usage is likely.

1. **Effectiveness** – This alternative is more effective than Alternative 1 No Action and likely more effective than using SVE for off-Site soil, as this option will remove contaminated soils rather than seek to remediate via SVE. Soil contamination reduction by excavation and disposal will permanently eliminate the contaminated soil and therefore the source of groundwater contamination. The application of ORC™ should be effective at treating groundwater contamination simply through

admixing to the bottom of the excavation. The Remediation Work Plan calls for quarterly evaluation of the effectiveness of ORC™ and plans for additional injection if needed.

2. **Implementability** – The removal actions are technically and administratively feasible, and required material, equipment and services are readily available. Excavation/trucking and ORC™ injection uses equipment and skilled personnel that are readily available. Licenses and permits for excavation and ORC™ are readily available, and permit assistance is available through the City. Contaminated sites are all developed parcels, so no wildlife habitat will be impacted. Exhumed soil may be used as alternative daily cover, thereby no net landfill space will be used for disposal, and over time, attenuation of petroleum hydrocarbons will occur.
3. **Cost** – This alternative would cost more than Alternative 1 No Action but less than using SVE for off-Site soil. Projected cost for this option: $867,600.

Alternative 4 – UST Removal/excavate on-site & off-site/monitor groundwater

Demolish the buildings. Remove the USTs. Excavate clean overburden and remove on-Site and (almost all) off-Site contaminated soil. Monitor groundwater for natural attenuation (MNA). Limit land use to non-residential and restrict groundwater usage.

1. **Effectiveness** – This alternative is more effective than Alterative 1 No Action and more effective than using SVE for off-Site soil contamination. However, it is not as effective as using ORC™ for groundwater remediation and may result in further migration of contaminated groundwater. This option is effective in the long term and will prevent exposure in excess of appropriate RISC limits on-Site and off-Site.
2. **Implementability** – The option is technically feasible, and the equipment and services are readily available. Excavating/hauling uses equipment, and personnel skills are readily available. Monitoring groundwater is easy to implement with equipment and personnel already dedicated to the project. Exhumed soil may be used as alternative daily cover, thereby no net landfill space will be used for disposal, and over time, attenuation of petroleum hydrocarbons will occur. Implementation would only require tasks currently planned extended beyond the current project schedule. Permitting and approval may not be administratively feasible because the IDEM guidance for MNA does not recommend it for benzene concentrations in groundwater exceeding 300 ppb on-Site and 15 ppb off-Site.
3. **Cost** – This alternative would cost more than Alternative 1 No Action, but less than using SVE for off-Site soil and ORC™ for groundwater. Project cost for Alternative 4 will be at least $780,000 to complete the three-year duration of the project. However, the ongoing monitoring would extend beyond the expected project duration at an ongoing cost of approximately $26,000 per year. After four years of quarterly monitoring, the cost of monitoring would exceed Alternative 3.

Recommendation

Alternative 3 is the least costly option which prevents exposure under the planned commercial/industrial end-uses of the property. Alternative 4 would have similar costs but would extend the time period and be more difficult to sustain. Alternative 2 is the highest cost and is only considered if off-Site access is limited. Thus, Alternative 3 is

the recommended option. However, before conducting ORC™ injection, the status of groundwater should be re-evaluated and the need for the injection confirmed.

Decision document

A decision document will be issued at the close of the 30-day public comment period with additional details on the selected alternative.

Figure 1

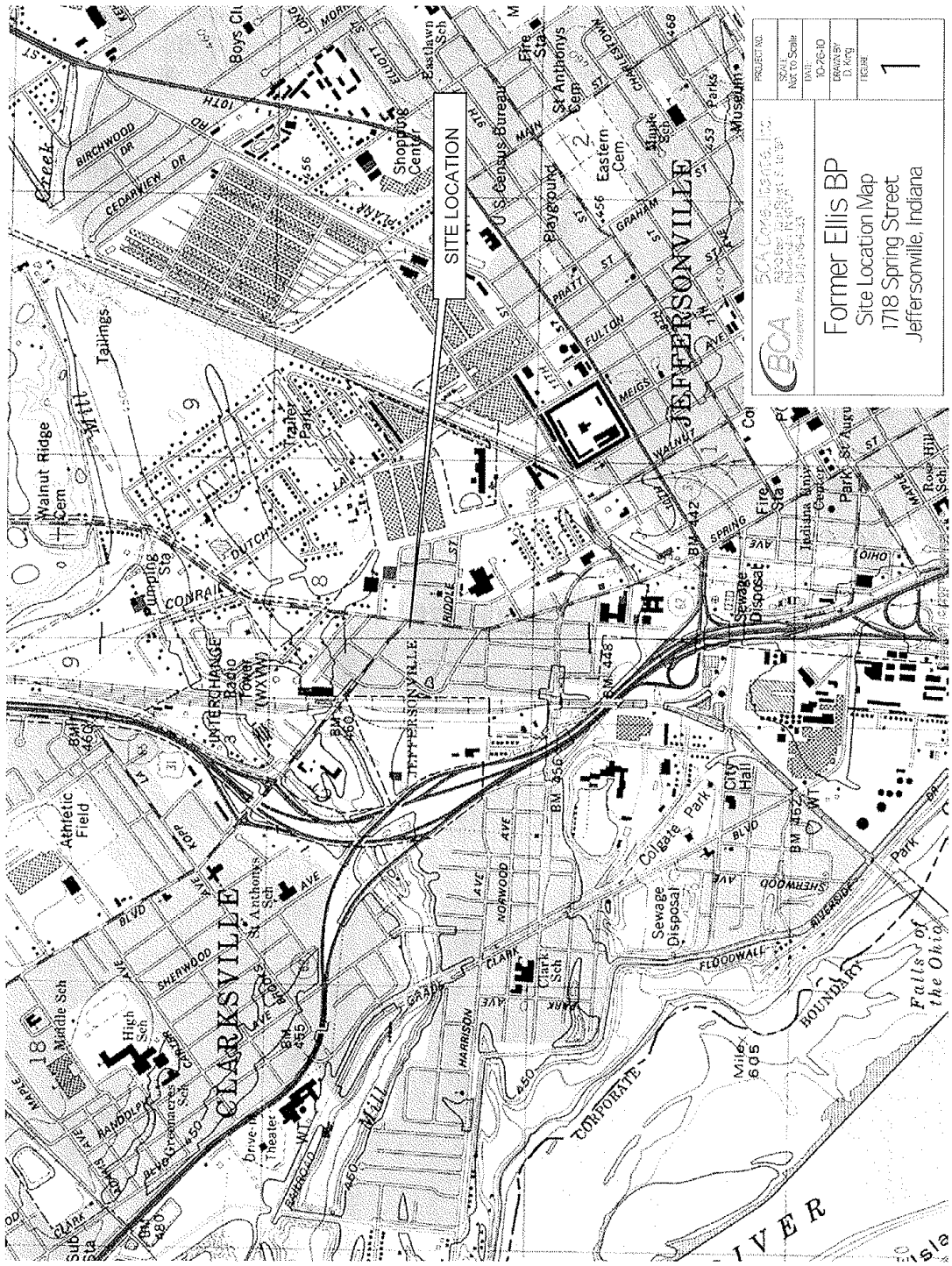
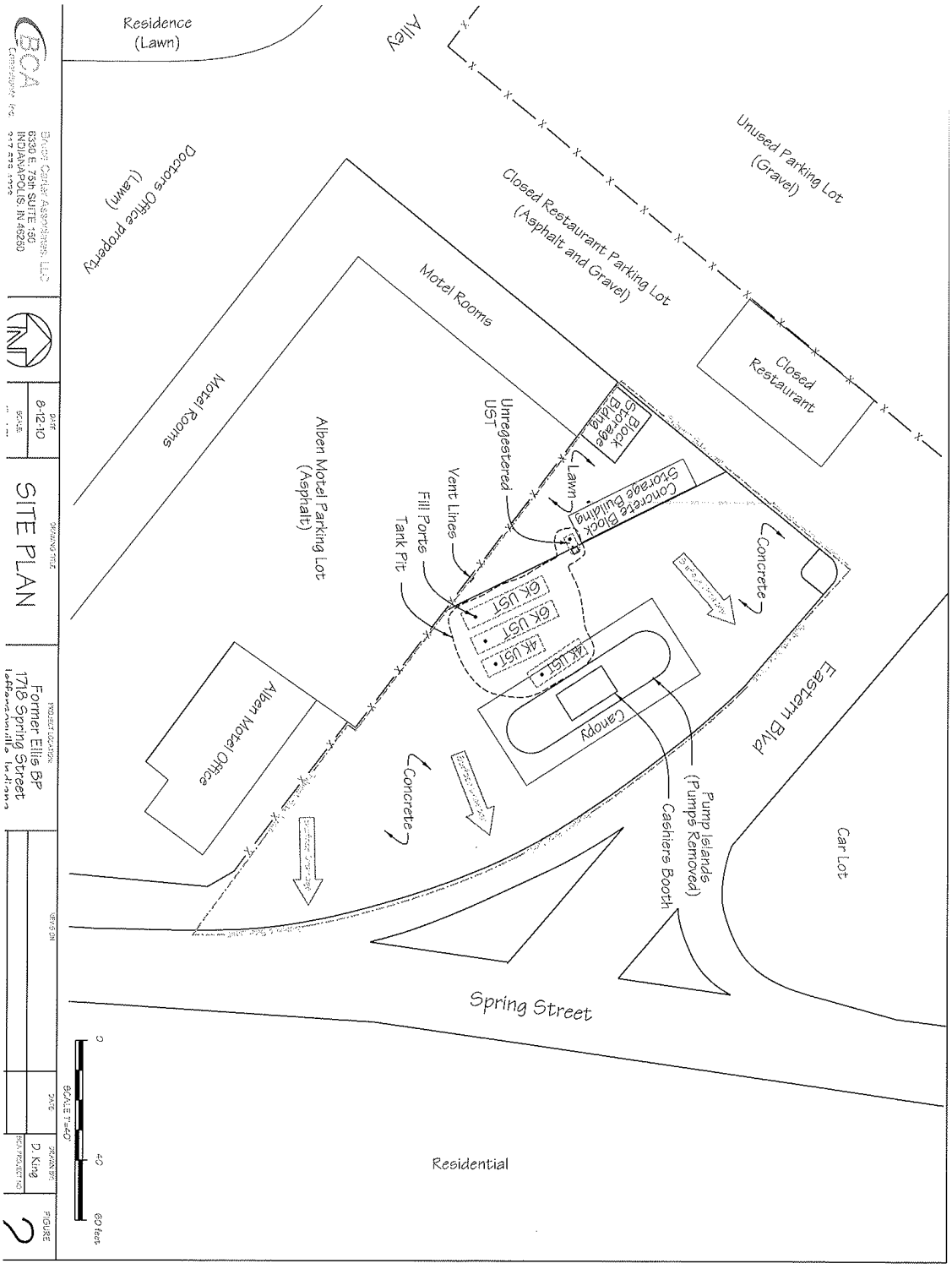

SITE LOCATION
JEFFERSONVILLE
CLARKSVILLE
Former Ellis BP
Site Location Map
1718 Spring Street
Jeffersonville, Indiana
SCALE
Not to Scale
DATE
10-26-10
DRAWN BY
D. King
FIGURE
1

Figure 2


Residence
(Lawn)
Alley
Doctors Office property
(Lawn)
Unused Parking Lot
(Gravel)
Closed Restaurant Parking Lot
(Asphalt and Gravel)
Motel Rooms
Closed
Restaurant
Motel Rooms
Alben Motel Parking Lot
(Asphalt)
Unregistered
UST
Block
Storage
Building
Lawn
Concrete Block
Storage Building
Vent Lines
Fill Ports
Tank Pit
6K UST
6K UST
4K UST
4K UST
Concrete
Canopy
Alben Motel Office
Concrete
Eastern Blvd
Pump Islands
(Pumps Removed)
Cashiers Booth
Car Lot
Spring Street
Residential
SITE PLAN
Former Ellis BP
1718 Spring Street
Jeffersonville, Indiana
8-12-10
D. King
2
0
40
80 feet