REMEDIATION WORK PLAN
REVISION 2

FORMER ELLIS BP
1718 SPRING STREET

JEFFERSONVILLE, INDIANA

UST FACILITY ID: 4898

January 17, 2011
Project No. 7893/10-191

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Prepared For
The City of Jeffersonville, Indiana

January 17, 2011
Project No. 7893/10-191

Prepared For:

City of Jeffersonville
500 Quartermaster Court
Jeffersonville, IN. 47130

Respectfully Submitted by:
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EXECUTIVE SUMMARY

The Former Ellis BP (Subject Site) is located at the southwest corner of the intersection of Spring Street and Eastern Avenue, Clark County, Jeffersonville, Indiana (Figure 1). The Subject Site was developed as gasoline retailer prior to 1925. The station (FID#4898) was closed in approximately 2001, however, the underground storage tanks (USTs) remain in place. The Subject Site has two 8,000 gallon and one 4,000 gallon gasoline tank registered and one 4,000 gallon diesel fuel tank registered. Registration documents show these tanks to be constructed of steel and were installed in 1966 and 1971. A smaller kerosene tank which is not registered is also present at the Subject Site.

In September 2010 a subsurface investigation was performed by Bruce Carter Associates, LLC (BCA) on behalf of the City of Jeffersonville to determine if petroleum hydrocarbons were present in the soil and groundwater at the Subject Site. Results of that investigation reported that total petroleum hydrocarbons (TPH) were present in the gasoline range organics (GRO) fraction in concentrations exceeding the Indiana Department of Environmental Management (IDEM) Risk Integrated System of Closure (RISC) Industrial default closure levels (IDCL) in soil. Benzene, Ethyl benzene, Toluene, and Xylenes (BETX) were detected in soil and while benzene and methyl tertiary butyl ether (MTBE) were detected in the groundwater at concentrations which exceed the IDCL.

The September investigation was limited to the Subject Site. The presence of TPH GRO and benzene in soil and/or groundwater at the southwest property line warranted investigation of adjoining properties. In October 2010 site access was granted to the adjoining properties and a subsurface investigation was conducted. Hydrocarbons were reported in the soil and groundwater in excess of the IDCL in the Alben Motel property adjoining the Subject Site to the southwest. Hydrocarbons were reported in groundwater in excess of the IDCL at the closed restaurant property adjoining the Subject Site to the northwest. No impacted soil or groundwater was found on the property of a Doctor's Office located southwest of the Alben Motel.

This Remediation Work Plan outlines the planned remediation of the Subject Site. The four registered and one unregistered USTs will be removed. Impacted soil adjoining the

UST pit will be excavated. Excavation will continue on-site where they exceed the IDCL. Excavation of soils will continue to the south on the Alben Motel property. Soil excavation on the Alben Motel site will continue until soils exceeding the residential default closure levels (RDCLs) are removed or until further excavation could endanger the buildings on the motel property.

Excavated soil will be loaded and transported to a permitted landfill. Following excavation, oxygen release compound will be added to the groundwater through the open excavation and by injection in the affected area of the plume. If necessary, additional borings will be drilled and an expanded monitoring well network will be installed. It is expected that groundwater monitoring will be initially performed to monitor the decline of hydrocarbons in groundwater for the first year. Demonstration monitoring will then be conducted for two years.

1.0 INTRODUCTION

1.1 Project Background

Site Name: Former Ellis BP FID#4898
1718 Spring Street
Jeffersonville, Clark County, Indiana

Owner: Mr. David Brar

Occupant: Sandwich Vendor (Seasonal)

Consultant: Bruce Carter Associates, LLC
David King, LPG (317-578-4233)

At the request of the City of Jeffersonville, Bruce Carter Associates, LLC (BCA) conducted investigations of the Subject Site in 2010 to evaluate the presence and extent of petroleum hydrocarbons. The City is current seeking financing to remediate and redevelop the Subject Site.

1.2 Site Information

The Former Ellis BP property is located at 1718 Spring Street, Jeffersonville, Clark County, Indiana (Subject Site). The Subject Site consists of one parcel which has the dimensions of 200'X104' as shown on the property tax card. There are three buildings at the Subject Site. These include a cashier's booth, and two concrete block storage buildings. Five underground storage tanks are present at the Subject Site. The Subject Site is currently used only seasonally by a sandwich vendor who sells sandwiches from stationary trailers.

1.3 Current Owner Information

At the time of this writing the Subject Site is owned by Mr. David Brar of Prospect Kentucky. The property tax card shows the name of the owner as Brar Devinder who is the same person.

1.4 Historical Summary

The earliest known use of the Subject Site is shown on a Sanborn Map in 1904 when the Subject Site was used as a grocery store and saloon. Prior to 1925 the Subject Site was a gasoline retailer. This land use continued until 2001. The Subject Site is currently used only seasonally by a sandwich vendor who sells sandwiches from stationary trailers.

1.5 Past and Current Operations

Most of the Subject Site's history has been as a gasoline retailer from before 1925 until 2001. The Subject Site is currently used only seasonally by a sandwich vendor who sells sandwiches from stationary trailers.

1.6 Report Contact Information

This Remediation Work Plan is prepared by Bruce Carter Associates, LLC (BCA). Contact information for BCA personnel preparing this report:

Bruce Carter Associates, LLC
6330 East 75th Street
Indianapolis, Indiana 46250
(317-578-4233)

Contact persons, David King, LPG or John Kilmer

1.7 Contamination and Spill History

This RWP has been prepared in response to evidence of petroleum hydrocarbon contamination of soil and groundwater that was discovered during a site investigation performed by BCA in September and October 2010. Evidence indicates that gasoline and (minor) diesel fuel is the contaminant of concern for the Subject Site and adjoining properties. The presence of relatively high levels of benzene in the groundwater is presented on the tables of laboratory groundwater results in Appendix A. There is no history of spills or hazardous materials incidents at the Subject Site.

1.8 Supporting Documentation

The supporting document is:

- *Phase II Site Investigation, Former Ellis BP, 1718 Spring Street, Jeffersonville, Indiana* (BCA, 2010).

Summary Lab data tables and figures from the Phase II report are included in the Figures section and Appendix A of this RWP. No prior investigations are known to have been performed at the Subject Site.

1.9 Discussion of Relevant Reports

The following environmental report has been prepared for the Subject Site:

- *Phase II Site Investigation, Former Ellis BP, 1718 Spring Street, Jeffersonville, Indiana* (BCA, 2010).

Identification of areas of concern and the scope of work for this remediation work plan are based entirely on investigation results of the above referenced report. The results of the Phase II investigation are discussed in further detail in subsequent sections of this RWP.

1.10 Description of Other Available Data and Documents for the Site

A UST registration for the Subject Site is available on the IDEM Virtual File Cabinet. The registration shows three steel USTs for gasoline (two 8,000-gallon and one 4,000-gallon) and one steel UST for diesel (4,000-gallon) installed in 1966 and 1971. No other data were available for the preparation of this workplan.

1.11 Remedial Action Objectives

The City of Jeffersonville, Indiana is acquiring the Subject Site for redevelopment as recreational/green space or commercial land use, therefore, the on-site closure objective is the industrial or recreation closure levels (Rec-DCL or IDCL). For adjoining sites which have been impacted by the release of petroleum from the Subject Site to the objective will be Residential Default Closure levels (RDCLs).

Following completion of the remediation an Environmental Restrictive Covenant (ERC) will be required for the Subject Site to limit land use to non-residential and prevent installation and use of potable water wells.

1.12 Remedial Objectives

The goal of the remediation is to do the following:

1. Close (by removal) the existing tanks in accordance with American Petroleum Institute (API) 1604 and IDEM UST guidance.
2. Remove impacted soil from the tank pit excavation down to the water table and outward where it is economical to excavate.
3. Perform confirmatory sampling at the bottom and sidewall limits of the excavation.
4. Remove petroleum hydrocarbons from the groundwater on-site and on adjoining sites by oxygen releasing compound (ORC^{TM}) injections.
5. Monitor groundwater and document decline of concentrations and completion of remediation.

1.13 Remedial Work Items

The first phase of remediation will be removal of the leaking UST system in compliance with API 1604 and IDEM UST quidance. Impacted soil located on-site exceeding the IDCL will also be removed. This will be done by removing clean overburden soil to an expected depth of eight feet. Clean soil will be staged on-site. Most on-site soils impacted above the IDCL will be exhumed and hauled for disposal.

Impacted soil located off-site at the Alben Motel which exceeds the RDCL will also be removed. This will be done by removing clean overburden soil to an expected depth of 12-feet. Clean soil will be staged on-site. Most on-site soils impacted above the RDCL will be exhumed and hauled for disposal.

Groundwater is contained in a stratum of silty sand below 20-feet in depth. The impacted area is estimated at 27,360 ft^2 (Figure 6). Treatment of impacted groundwater will be done by bio-stimulation. This will be done by admixing ORC™ into the bottom of the excavation. Where impacted groundwater is present outside the excavation, ORC™ will be injected through direct push probes rode into the 21 to 30 foot depths

Additional borings may need to be drilled to finalize delineation of the impacted area. The existing network of monitoring wells will be expanded to facilitate monitoring of groundwater which will continue until completion.

2.0 INVESTIGATION ACTIVITIES

2.1 Summary Information to Select Remedy

Laboratory results for on-site soil samples were compared to the IDCL. Samples from B-1, B-2, B-5, B-7, and B-8 were reported to have hydrocarbon parameters exceeding the IDCL for one or more parameters. Sample depths in these borings ranged from 8 feet to 16 feet.

Soil samples from off-site borings were screened for headspace gasses and only one boring (P-19) located in the parking lot of the Alben Motel south of the Subject Site had elevated readings. Laboratory analysis from this boring was compared to RDCLs. The soil sample from the 18-20 foot interval in P-19 exceeded the RDCL for TPH GRO, Naphthalene and Benzene. Locations of soil samples and laboratory results of parameters exceeding the appropriate closure level are illustrated on Figure 3.

Groundwater was collected from a silty sand unit which was encountered below the 20 foot depth in all borings. Four permanent monitoring wells and three temporary monitoring wells were sampled on-site. Eight off-site soil probes were finished as temporary monitoring wells and one off-site soil probe was finished as a permanent monitoring well and sampled. A map of groundwater flow was prepared by measuring the elevation of the wellheads of each of the permanent monitoring wells relative to an arbitrary site datum. Depth to water was measured and subtracted from the wellhead elevation resulting in a calculated elevation of groundwater. A map of groundwater elevations was prepared. A groundwater flow direction nearly due west was mapped (Figure 4). The gradient is shallow only measuring one half foot drop over 222 horizontal feet.

For the follow up investigation (October 12 and 13, 2010) borings were placed off-site on the property of a closed restaurant, (northwest), and a Doctor's office and motel both located southwest of the Subject Site. Groundwater was found to be impacted in all borings except those on the Doctors office property and in the east most sample from the motel property. A permanent monitoring well was placed on the west most side of the closed restaurant property in the most down gradient direction from the source. Analytical results show a benzene plume exceeding 1.0 mg/l on the motel property and on the closed restaurant property. The limits of the plume are defined to the south by groundwater samples from the Doctors office property (P-13, P-14, and P-20), defined to the north by on-

site monitoring well MW-4, to the west by MW-5 and to the east by boring P-18 and MW-2. Locations of monitoring wells, sampling results and groundwater flow directions are illustrated on the attached Figure 4.

2.2 Baseline Assessment and Literature Search

An Environmental Baseline Survey (EBS) has not been conducted for the Subject Site.

2.3 Potential Chemicals of Concern

Chemicals of concern (CoCs) detected in groundwater are tabulated in the tables attached in Appendix A. In groundwater all of the BETX, MTBE, n-hexane, naphthalene and poly nuclear aromatic hydrocarbons (PAH) components are potential CoCs. In soil TPH GRO/DRO, BTEX/MTBE, n-hexane, naphthalene and PAHs are potential chemicals of concern. Based on the investigation results, only BTEX, TPH-GRO and naphthalene were detected in the soil above the closure level. The various closure levels for project 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

Only Benzene, naphthalene and MTBE were detected in the groundwater above the 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

2.4 Extent of Subsurface Investigations

In September 2010 a subsurface investigation was conducted that included 11 boring locations with soil samples. Most of the borings extended to the groundwater at 20 feet. Groundwater samples were obtained from temporary wells in three of the locations and permanent wells in four of the locations. TPH GRO and BTEX concentrations exceeding the IDCL were found in the soil. Benzene was also detected in groundwater at concentrations which exceed the IDCL.

The September investigation was limited to the Subject Site. The presence of TPH GRO at the southwest property line warranted investigation of adjoining properties. In October 2010 site access was granted to the adjoining properties and a subsurface investigation was conducted. The investigation included nine probes. Soil samples from two probes and groundwater from all nine locations were sampled, included one completed as a monitoring well. The four existing monitoring wells were sampled a second time.

Hydrocarbons were reported in the soil and groundwater in excess of the IDCL in the Alben Motel property adjoining the Subject Site to the south. Hydrocarbons were reported in groundwater in excess of the IDCL at the closed restaurant property adjoining the Subject Site to the west. No impacted soil or groundwater was found on the property of a Doctor's Office located south of the Alben Motel, impacted groundwater was detected close to the property line and corrective action activities may have to be conducted on the Doctors Office property.

2.5 Summary of Site Investigations

No documentation is available regarding the date of contaminant releases at the Subject Site. Petroleum Retailing activities at the Subject Site date back to before 1925, so it is possible that undocumented releases of contaminants have occurred at the Subject Site. The only known investigation to be conducted at the Subject Site is the *Phase II Site Investigation, Former Ellis BP, 1718 Spring Street, Jeffersonville, Indiana* (BCA, 2010). The impacted area is defined. Well locations and the defined impacted area are illustrated on the attached Figures 3, 4, and 5.

2.6 Baseline Assessment

An Environmental Baseline Survey (EBS) has not been conducted for this site.

2.7 Summary of Site Specific Geology and Hydrogeology

The site specific geology of the Subject Site was investigated in the Phase II ESA (BCA, 2010). A summary follows:

Soils

According to the Clark County Soil Survey the soils under the Subject Site are mapped as belonging to the Wheeling Fine Sandy Loam (WhB2) series (Nickel, 1974). The Wheeling is described as a gently sloping soil occupying dunes on terraces. The texture is a fine sandy loam with a color range from dark yellowish-brown to yellowish-brown. This soil is moderately well drained and has a fragipan in areas.

Regional Geology

The Subject Site is located in Southern Indiana approximately 1.5 miles north of the Ohio River within the Scottsburg Lowland physiographic province. Surficial deposits are mapped (Gray, 1989) as undifferentiated Pleistocene age outwash. Conditions observed at the Subject Site are overbank fluvial deposits (Sand and Silt) overlain by a yellowish silt.

Bedrock underlying the Subject Site is Devonian age limestone of the Muscatatuck group. The Muscatatuck is describes as predominantly fine-

grained to granular dolomite and limestone. The carbonate rocks range from pure to sandy or shaley. The lower part the Muscatatuck group contains some anhydrite and gypsum (Fenelon, and others. 1994).

2.8 Discussion of Identified Sources of Contamination

At the time of the investigation four underground storage tanks (USTs) were registered at the Subject Site. It is believed that five tanks are actually present. The pattern of contamination at the Subject Site generally showed the highest impact in the vicinity of the tanks with lower concentrations away from the tanks. Both Gasoline and Diesel range hydrocarbons were reported in the soil samples from this investigation, however, only TPH-GRO exceeds the IDEM limit. For the former Ellis BP site the closure objective is industrial default closure levels. There is a potential for recreational post closure land use, therefore, recreational limits should not be exceeded. For the adjoining Alben Motel site land use is residential and the RDCL is the target closure level. There are no registered USTs on adjoining sites or near enough to suspect the potential for an off-site source.

2.9 Summary of Extent of Contamination

Soil

The results of laboratory analyses of soil samples are summarized in Tables 1 and 2 (Appendix A). Locations of soil samples and laboratory results of parameters exceeding the appropriate closure level are illustrated on Figure 3.

Soil samples from on-site borings were collected at depths where elevated headspace gasses were recorded. Laboratory results for on-site soil samples were compared to the IDCL. Samples B-1,B-2, and B-7 exceeded the IDCL for TPH GRO, Benzene and Xylene. Soil from boring B-8 exceeded for TPH GRO, Benzene, Toluene and Ethylbenzene. Soil in borings B-5 and B-9 exceeded for TPH GRO only. Sample depths in these borings ranged from 8 feet to 16 feet.

Soil samples from off-site borings were screened by testing headspace gasses with a PID and only one boring (P-19) located in the parking lot of the Alben Motel south of the Subject Site had elevated readings. Laboratory analysis from this boring was compared to RDCLs. The soil sample from the 18-20 foot interval in P-19 exceeded the RDCL for TPH

GRO, Benzene, Xylene and Naphthalene. No analytes were detected in the soil sample from P-18 (18-20 feet).

Groundwater

Groundwater was collected from a silty sand unit which was encountered below the 20 foot depth in all borings. Four permanent monitoring wells and three temporary monitoring wells were sampled on-site. Eight off-site soil probes were finished as temporary monitoring wells and one off-site soil probe was finished as a permanent monitoring well and sampled.

Groundwater flow direction was inferred from the gradient which was mapped from water level data from permanent monitoring wells. A nearly due west gradient was mapped from these data. The gradient is shallow with only one-half foot drop across 222 feet.

Groundwater sample results are summarized in Tables 3 and 4 (Appendix A). Locations of monitoring wells, sampling results and groundwater flow directions are illustrated on the attached Figure 4.

For the follow up investigation (October 12 and 13, 2010) borings were placed off-site on the property of a closed restaurant (northwest) and a Doctor's office and a motel both located southwest of the site. Groundwater was sampled in each well. Because groundwater on-site did not have poly nuclear aromatic hydrocarbons (PAH) concentrations exceeding the RDCL, most groundwater samples from off-site sampling locations were analyzed for BTEX and MTBE only. Two of the off-site wells, P-18 and P-19, were sampled for BTEX/MTBE and PAHs because headspace readings indicated the presence of high concentrations of gasoline. Groundwater was found to be impacted in four borings on the closed restaurant and motel properties, but not in five other locations on the adjoining properties. A permanent monitoring well was placed on the western side of the closed restaurant property in the most down gradient direction from the source. Analytical results show a benzene plume exceeding 1.0 mg/l extending from the Subject Site onto the motel property and the closed restaurant property. The limits of the plume are defined to the south by groundwater samples from the Doctors office property (P-13, P-14, and P-20), defined to the north by on-site monitoring well MW-4, to the west by MW-5 and to the east by boring P-18 and MW-2.

2.10 Summary of Risk Associated with Site

The primary potential affect of residual groundwater contamination under the Subject Site is continued migration. Groundwater in the water bearing unit under and near the Subject Site is not a drinking water source, however, may be the source of vapor intrusion in buildings both at the Subject Site and off-site properties. Residual contamination has the potential to affect human health at the Subject Site or at surrounding sites.

2.11 Human, Ecological, and Environmental Risks

Groundwater in the water bearing unit under and near the Subject Site is not a drinking water source, however, may be the source of vapor intrusion in buildings both at the Subject Site and off-site properties.

Inhalation Exposure Pathway
There is a potential for inhalation exposure to migrating vapor for building occupants over the impacted soil and groundwater plume on the subject and adjoining motel property.

Ingestion Exposure Pathway
It is unlikely that ingestion is a risk to humans for the Subject Site because the aquifer is not a groundwater source. However, if it were used on the subject or adjoining sites exposure could potentially result.

Direct Exposure Pathway
There is no impacted soil at the surface and no potential for direct exposure. There is a potential for dermal exposure for construction workers at the Subject Site and the adjoining motel site from subsurface soils. Dermal exposure prevention will be addressed in the health and safety plan for the site.

The ecological and environmental risks are remote, however, the following exposures could occur:

Potential Impacts to Aquatic Life
There are no known potential impacts to aquatic life associated with documented contamination at the Property.

Potential Impacts to Wildlife and Vegetation

Burrowing animals over the plume may be exposed to an accumulation of vapors. Plants rooted deep in the soil may accumulate hydrocarbons which can bio accumulate in herbivores.

2.12 Future Land Use Impacts

Existing contamination at the Subject Site constitutes a legal liability for prospective buyers of the property. Human health impacts to site occupants and construction workers are also possible from current site conditions. Impact to wildlife and ecology are also possible from current site conditions.

2.13 Summary of Background Concentration

No investigation of background concentrations was done as part of this investigation. Contaminants present at the Subject Site are not believed to be from naturally occurring or background influences.

2.14 Additional Field Investigation Requirements

The impacted area has been identified. No additional field investigations are required prior to remediation. However, additional borings may be added to refine the extent of impact and the monitoring well network will be expanded to support monitoring.

3.0 REMEDIATION PLAN

3.1 Evaluation of Remedial Alternatives Soil

A remedial strategy for the Subject Site must address petroleum hydrocarbons in a silt unit below the 8 foot depth at the Subject Site and on the adjoining property to the south at the Alben Motel (Figure 2). The USTs on the Subject Site must be removed for compliance with Indiana State Fire Marshall regulations. The impacted soils are nearly all silts with only moderate permeability and relatively high impacts. Therefore, the most practical option for remediation of soil is removal. Once the soil is removed from the ground, it can be disposed of as special waste. Because the Subject Site is small, and located in an urban setting on-site ex-situ treatment is not practical, therefore off-site landfill disposal is selected

Removal of impacted soils is limited by the presence of buildings on the Alben Motel site (Figure 6). It is expected that impacted soils below the building, if even present, are near the closure levels and at a depth where they will not impact motel occupants. Regulatory compliance will most likely be achieved by statistically comparing hydrocarbon concentrations below the building to concentrations within the excavated area. The impacted zone thins (away from the tank field, to just the smear zone (16-20 feet) and a large amount of clean overburden must be removed to reach it. It is likely that some impacted soil will be left above the water table.

Other options for remediation of off-site soils that were considered include:

(1) Soil Vapor Extraction
Soil Vapor Extraction (SVE) is a very effective means of mass removal of VOCs from the vadose zone. Although ideal conditions are permeable coarse-grained soils, it is also reasonable effective in finer grained soils such as the silt and sandy silt found in the vadose zone at the Subject Site. The lower permeability means that higher vacuums must be used to achieve acceptable radii of influence. Higher vacuums result in groundwater elevation cones which reduce the effectiveness of the SVE system. This tendency can be countered by a higher density of SVE wells and the use of air recharge wells. These allow the use of a lower vacuum and lower radii of influence.

(2) SVE with water level suppression
By installing a groundwater extraction pump in the SVE well the

groundwater level can be suppressed and the effectiveness of the SVE system maximized. This allows higher vacuums, air flow rates and radii of influence and would remediate the soil more rapidly than SVE alone. This system would pump a larger volume of water needing to be treated, would be more complex to install and operate and more costly.

(3) Multi Phase Extraction. Multi Phase Extraction (MPE), also called dual-phase extraction (DPE), is a remedial technique in which all subsurface media (water, air, free product) are drawn from the ground via a vacuum pump and treated at the surface. This technique has the advantage of SVE in that any residual material in the unsaturated zone can be addressed. It has the advantage of pump-and-treat in that contaminated water is removed from the ground. It creates a groundwater gradient towards the Subject Site, preventing any further off-site migration, and the affects of draw-down, which exposes the saturated zone to air flow, thus promoting volatilization and biodegradation. Since the depth to groundwater at the Subject Site is below 20 feet, the conditions for DPE are non-ideal. However, if feasible, the system is simpler to install and operate than SVE with groundwater suppression.

Groundwater

Following removal of soil by excavation impacted groundwater must be remediated. Thus, the selected remedial technologies must remediate residual contamination in the groundwater. Several options were considered for this project:

(1) Bioaugmentation Bioaugmentation is the addition of native or non-native microbial cultures or “inocula” to the matrix to enhance or replace the native microbial population. Indigenous or native microbes are those that occur naturally at a site. They are usually present in very small quantities and they may not be able to prevent the spread of the contaminant. In some cases, native microbes do not have the ability to degrade a particular contaminant. Bioaugmentation offers a way to provide specific microbes in sufficient numbers to complete the biodegradation. Microbial inocula are prepared in the laboratory from soil or groundwater either from the site where they are to be used or from another site where the biodegradation of the chemicals of interest is known to be occurring. Microbes from the soil or groundwater are isolated and are added to media containing the chemicals to be degraded. Only microbes capable of metabolizing the chemicals will grow on the media. This process isolates the microbial population of interest, which may

contain several different strains of microbes. Experience with Bioaugmentation indicates that it usually requires several injections and supplemental nutrient injections. This technology is most frequently applied to chlorinated hydrocarbons.

(2) In-Situ Chemical Oxidation. In-Situ Chemical Oxidation (ISCO) process involves injecting oxidants (substances readily reduced) and, in some instances, other reaction generating substances (catalysts) into contaminated areas of the subsurface. The oxidant reacts with the contaminant causing decomposition of the contaminant and the production of innocuous substances such as carbon dioxide and water. This reaction, called oxidation, is a chemical reaction characterized by the loss of one or more electrons from an atom or molecule. When an atom or molecule combines with oxygen, it tends to give up electrons to the oxygen in forming a chemical bond. Carbon in the form of organic carbon and manufactured hydrocarbons are common substances readily oxidized (reductants). For ISCO to effectively reduce contaminant concentrations there must be direct contact between the oxidant and the contaminant. Soil exploration and groundwater sampling observations indicate that the geometry and texture of the water bearing unit is very homogeneous across the Subject Site. The high Benzene and TPH levels would require large amounts of oxidant to be injected. This could result in chemically unstable conditions in the subsurface. In addition, ISCO vendors report only limited success with oxidation of benzene.

(3) Bio-stimulation Bio-stimulation is the addition of limiting nutrients to stimulate the growth of naturally occurring micro flora. Usually, magnesium or calcium peroxide that releases oxygen slowly is introduced to facilitate the aerobic degradation of a range of environmental contaminants including petroleum hydrocarbons. This technology can be characterized as a time release electron acceptor, for engineering accelerated bio-attenuation. Bio-stimulation can be configured as a permeable reactive barrier, or applied as a broader plume treatment. Bio-stimulation is generally effective only for dissolved phase hydrocarbons once the free product is removed by more intensive means. Hydrocarbon concentrations at the Subject Site are too high for effective use of bio-stimulation by itself. However, bio-stimulation would be effective in association with source and vadose zone removal. This is the selected option.

(4) Monitored Natural Attenuation (MNA). MNA was considered because the primary sources, USTs and highly impacted soil will be removed along with the tank backfill. The remaining contaminants will eventually degrade. However, MNA will not prevent further off-site migration; long

time frames would be required due to the high concentrations of BTEX; and the concentrations of BTEX exceed levels IDEM considers acceptable for application of MNA. However, this option can be reconsidered in the future if a primary remediation system is implemented which reduces the peak concentrations.

(5) Groundwater sparge/soil vapor extraction. Groundwater sparging combined with soil vapor extraction (SVE) has been used at many sites in which both soil and groundwater contamination are present. Because the impacted soil is a silt and the groundwater is in sandy silt the vapor extraction in the silt would not be likely to capture the sparge gasses in the groundwater. This could have the undesired effect of spreading the hydrocarbons in the groundwater.

(7) Groundwater pump-and-treat Pumping and treatment of groundwater can have limited affect for the removal of high BTEX concentrations (though generally not for removal of low BTEX levels). The remediation method does establish hydraulic control and can prevent further off-site migration of affected groundwater. Air stripping is the most accepted technology for treating BTEX in groundwater for all but short-term projects. The air stripper would remove all but a trace of the BTEX constituents, and the groundwater would be discharged to a storm sewer under a NPDES Permit or the sanitary sewer. Groundwater would be extracted from wells in the impacted area . This option is most effective for removing free product, and, by itself, is unlikely to complete remediation to closure levels.

3.2 Selected Remediation Option

Most of the above options were discounted because they are unlikely to be effective or cost prohibitive. Source removal and soil excavation combined with bio-stimulation in groundwater appears to be the best technology combination.

3.3 Risk Assessment

No site specific Risk assessment is anticipated.

3.4 Description of Remediation Technology

Remedial Design (Soil)

The first phase of remediation will be removal of the leaking UST system in compliance with API 1604. Impacted soil exceeding the IDCL will also be removed. This will be done by removing clean soil to an expected depth of eight-feet on the Former Ellis BP site and to an average depth of 12 feet off-site. Clean soil will be staged on-site. Most soils impacted above the IDCL will be exhumed and hauled for disposal. In the event that groundwater is encountered during the soil excavation project, it may be pumped from the excavation and disposed of as special waste.

Implementation (Soil)

Impacted soil will be exhumed during tank removal activities. Removing the tanks and impacted soil will be done by the following steps:

- removing the pavement over the tanks and razing Subject Site structures that interfere with the excavation: the canopy, the cashier booth/shed and the northern storage shed;
- excavating non-impacted soil above 8 feet (average on-site) and above 12 feet (average off-site) and segregating non-impacted soil. It is estimated that 4,208 to 6,377 tons of clean overburden will be removed.
- Tank closure of all tanks and associated piping and equipment on-site including removal/disposal of any tank liquids; according to API 1604 and UST guidance
- Exhuming impacted soil below 8 feet on-site and 12 feet off-site to the limits of the impacted area as demonstrated by closure sampling results. It is estimated that at least 4,018 and up to 6,088 tons of impacted soil will be removed for disposal.
- Disposal of exhumed soil at an approved landfill.
- Oxygen Releasing Compound will be placed at the bottom of the excavation (top of the water table) prior to backfilling. ORC^{TM} will be added at a rate of 1.4 lbs per square yard and mixed with about 1.0 foot of soil/groundwater.
- Backfill and compact clean overburden soil into the excavation.
- Backfill with granular off-site fill and clean soils from on-site that have been tested.

Remedial Design (Groundwater)

During the soil excavation process, minor groundwater removal may be conducted below the former tank pit. The application of ORC™ at the bottom of the excavation is intended primarily to remediate hydrocarbons remaining in the groundwater below the excavation.

Groundwater is contained in a stratum of silty sand below 20-feet in depth. The impacted area is estimated at 27,360 ft^2. For estimating purposes, the following average BETX concentrations were calculated for the plume

Benzene	0.92 mg/l
Ethylbenzene	0.06 mg/l
Toluene	0.10 mg/l
Xylenes	0.20 mg/l
MTBE	0.07 mg/l

ORC™ will be injected at a rate of 4 lbs per vertical foot from approximately 22 to 30 feet. Injections will be made on a 10 foot by 10 foot grid for a total of approximately 115 injection points. Locations of injection points are illustrated on the attached Figure 6.

Implementation (Groundwater)

Admixing ORC™ in the bottom of the excavation will commence after the tanks have been closed and the most highly impacted soil has been removed. Injections of ORC™ outside the limits of the excavation will be performed at a later date following excavation backfilling and closure. The process of injecting ORC™ in areas adjacent to the excavation will only be done after a period of monitoring. The duration of the monitoring period is not defined at this time. Injection of ORC™ will only proceed with the concurrence of Indiana Brownfields Program (IBP) staff. During the monitoring period additional data may be generated which may result in modifications to the injection density, formulation of the injected bio-stimulant, or data may even obviate the need for bio-stimulation.

3.4.1 Permit Requirements/Disposal Approval

A contaminated water and soil disposal approval will required from the treatment facility and landfill. The receiving facilities will be contacted to determine their data needs for waste characterization. Under most circumstances the required test is for the known contaminant to be analyzed following extraction using the toxicity

characteristic leaching procedure (TCLP). Additional testing for corrosivity, flammability, reactivity and paint filter may be required. A representative soil sample will be collected from the area to be excavated/ disposed and will be tested by means of the TCLP to confirm whether the soil is non-hazardous. The results will be provided to the landfill, as required. This work plan assumes that the soil will be confirmed to be non-hazardous.

3.4.2 Soil exhumation and Hauling

The vertical and horizontal extent of contamination the area will be marked in the field. After utility clearance excavation equipment will be mobilized and the five underground storage tanks will be removed and closed. Exhumed soil will be sampled and headspace gasses will be screened in the field using the PID. Soils expected to be below the IDCL will be segregated and Soils expected to be above the IDCL will be loaded onto trucks for Disposal at a permitted landfill.

Removal of the soil will be visually observed by the owner's representative. Monitoring will be done by observing contractor work, confirmatory soil sampling, and photographing conditions prior to backfilling the excavations. Upon completion excavations will be backfilled to grade with clean off-site granular backfill and clean overburden staged on-site. Granular backfill will be obtained from a commercial source such as a gravel pit and the source will be documented and clean overburden will be confirmed at a rate of at least one sample per 100 cubic yards.

Excavation work will comply with state and federal health and safety requirements.

3.5 Monitoring and Sampling Plan

Soil Excavation closure

Soil samples will be collected from the walls and floor of the excavation at 20-foot intervals. The soil samples will be analyzed for BTEX and TPH-GRO, only, since these are the only analytes that exceeded the closure criteria on-site. Off-site closure samples will be analyzed for BTEX, TPH-GRO and Naphthalene. Stockpiled clean overburden will also be analyzed BTEX, Naphthalene and TPH-GRO to confirm that it is below closure levels for return to the

excavation. Closure sampling and data package will meet Level IV QA/QC requirements. Soil will compared to Recreational or IDCL-construction levels within the limits of the Subject Site and will meet the RDCLs on adjoining property. Compliance with closure levels may be determined statistically.

Further Delineation

Prior to initiating the UST and Soil removal activities, further delineation of the impacted area will be conducted on the adjoining properties. The delineation will focus on the area along the motel building. A minimum of six (6) probes are anticipated which will be driven to the water table. Soil will be screened and analyzed for BTEX, TPH-GRO and Naphthalene. Groundwater samples will be collected from each location and analyzed for BTEX/MTBE. At least three and as many as six of the boring locations will be converted to monitoring wells following remediation and included in the groundwater monitoring network (see below).

Groundwater
Quarterly groundwater monitoring will be performed for BTEX/MTBE and Naphthalene. Wells being sampled for quarterly monitoring include MW-1, MW-2, MW-3, MW-4, MW-5 and at least three additional monitoring wells to be installed within the identified plume Samples will be collected using low flow sampling protocol to the extent possible. Final samples will meet Level IV QA/QC requirements.

3.6 PROJECT WORK SCHEDULE

An approximate schedule for implementation of the remediation work plan is presented below:

1. November 16, 2010:
   Submit RWP
2. December 23, 2010:
   Submit RWP Addendum.
3. January 10, 2011:
   Submit RWP Revision 1.
4. February 2, 2011
   Bid documents released.
5. March 9, 2011:
   Bid Opening.

6. March 16, 2011:
   Contractor Selection.
7. March 31, 2011
   SRF Loan Closing and Contract.
8. 2nd Quarter, 2011:
   Mobilization, Complete Tank Closure. Soil excavation.
9. 3rd Quarter, 2011:
   Install monitoring wells.
10. 2nd Quarter, 2011 to 4th Quarter, 2013
    Monitor groundwater. ORC™ injection with IBP concurrance
11. 1st Quarter, 2014:
    Final sampling and Closure.

3.7 DATA MANAGEMENT

Data from the confirmation sampling at the Subject Site will be submitted as tables, figures and lab report for approval. For the final excavation closures the laboratory reports, chain-of-custody, data summary tables, and sample location map will be submitted with the Closure Report.

3.8 OPERATION AND MAINTENANCE PLAN

Not Applicable

3.9 Community Relations

The primary purpose of a community relations plan is to provide a means of informing the public regarding the project. The main components include a public meetings associated with the release and approval of bids for the remediation of the Subject Site. These will be held prior to approval of the public works contract for the UST removal and Subject Site remediation by the Department of Redevelopment of the City of Jeffersonville. All Board meetings are open to the public. City officials and public bodies (Department of Redevelopment and City Council) will be kept apprised of the status of the project by means of internal progress reports. All Quarterly Reports are public documents and will be provided as requested.

3.10 Quality Assurance Project Plan

The project will comply with the protocol of the IDEM Leaking Underground Storage Tank (LUST) Section. The IDEM/LUST QAPP has been approved by US EPA for use on UST removal and remediation projects.

3.11 Site HASP

A site-specific Health and Safety Plan (HASP) is attached as Appendix B. In addition, the project will comply with IDEM UST removal safety guidance where applicable.

3.12 Closure Report

A Closure Report detailing the remediation system and confirmation sampling will be submitted upon achievement of cleanup goals. The report will include a summary of all remedial activity performed and will present the confirmation sampling in tabular form, with the full analytical laboratory reports attached.

3.14 Future Property Use

The City intends to convert the Subject Site, and possibly neighboring sites, to public green space in order to provide a more welcoming entrance to the City, promote better stormwater management and improve water quality, and establish a venue for public welcome and way-finding signage.

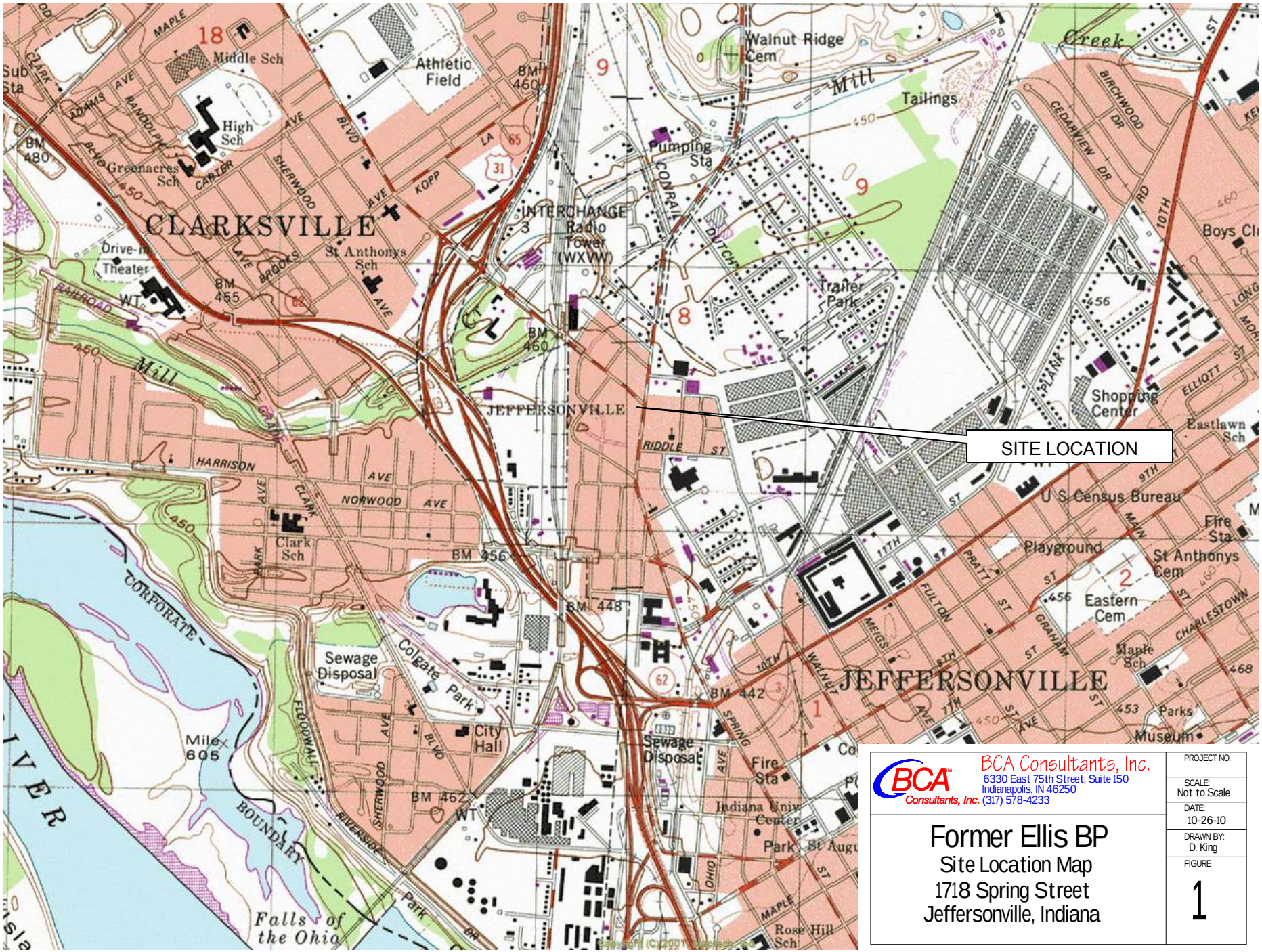
4.0 REFERENCES

1. BCA, 2010 Phase II Site Investigation, Former Ellis BP, 1718 Spring Street, Jeffersonville, Indiana. October 2010.

2. Fenelon, J. M., K. E. Bobay, T. K. Greeman, M. E. Hoover, D. A. Cohen, K. K. Fowler, M. C. Woodsfield, P. K. Doss, and J. M. Durbin, 1994. Hydrogeologic Atlas of Aquifers in Indiana. Water-Resources Investigations Report 92-4142. United States Geological Survey, Indianapolis, Indiana. 197 pp.

3. Nickell, Allen K., 1974. Soil Survey of Clark and Floyd Counties, Indiana, U. S. Soil Conservation Service.

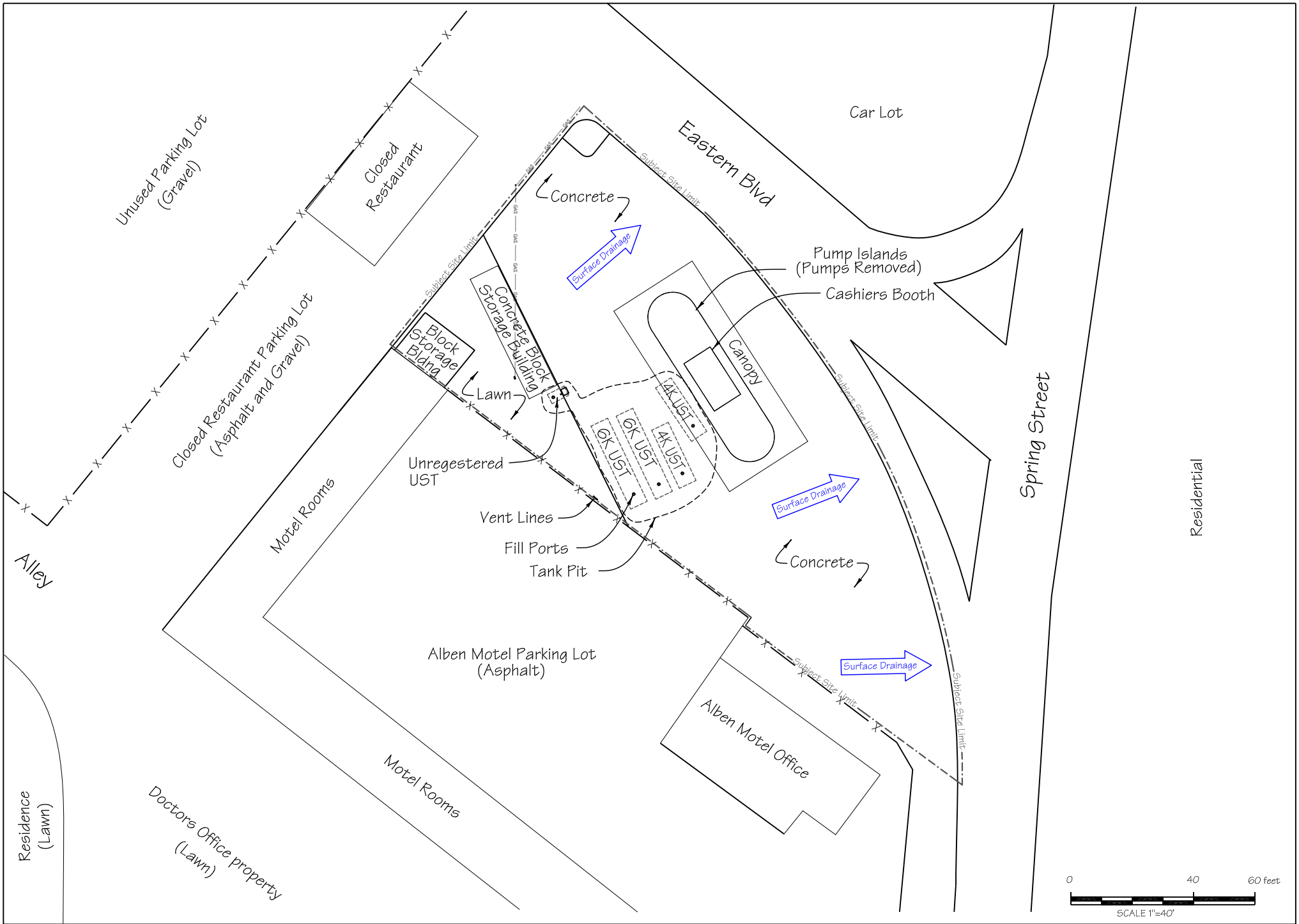
FIGURES



BCA Consultants, Inc.
6330 East 75th Street, Suite 150
Indianapolis, IN 46250
(317) 578-4233

Former Ellis BP
Site Location Map
1718 Spring Street
Jeffersonville, Indiana

PROJECT NO.	
SCALE:	Not to Scale
DATE:	10-26-10
DRAWN BY:	D. King
FIGURE	1



BCA Consultants, Inc.
Bruce Carter Associates, LLC
6330 E. 75th SUITE 150
INDIANAPOLIS, IN 46250
317-578-4233

DATE: 8-12-10

SCALE: 1"=40'

DRAWING TITLE: SITE PLAN

PROJECT LOCATION:
Former Ellis BP
1718 Spring Street
Jeffersonville, Indiana

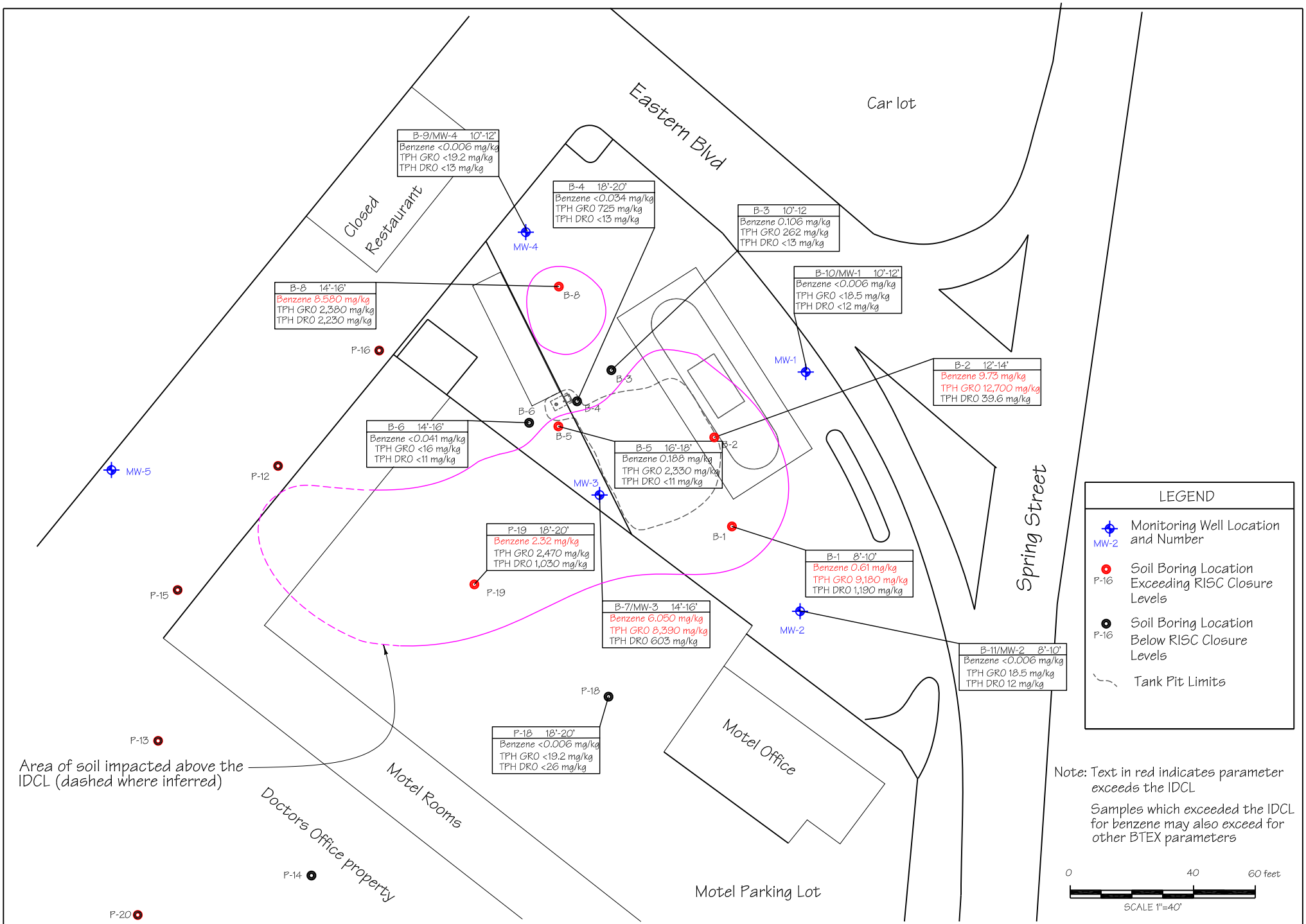
REVISION:

DATE:

DRAWN BY: D. King

BCA PROJECT NO.

FIGURE 2



BCA Consultants, Inc.
Bruce Carter Associates, LLC
6330 E. 75th SUITE 150
INDIANAPOLIS, IN 46250
317-578-4233

DATE: 1-10-11

SCALE: 1"=40'

DRAWING TITLE: Soil Results

PROJECT LOCATION: Former Ellis BP, 1718 Spring Street, Jeffersonville, Indiana

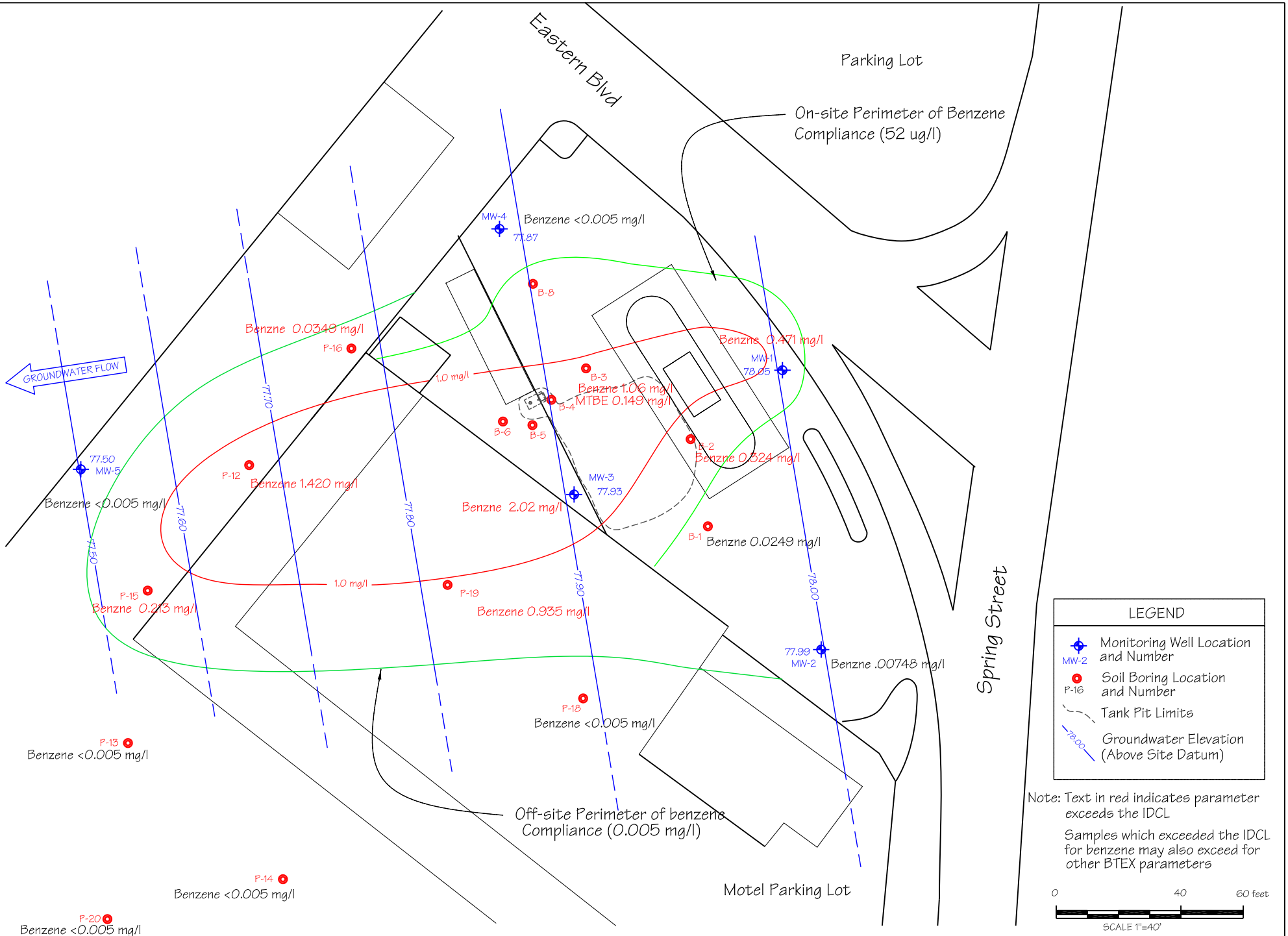
REVISION:

DATE:

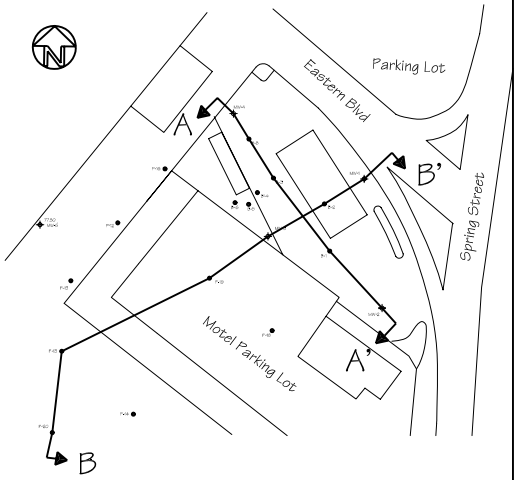
DRAWN BY: D. King

BCA PROJECT NO. 10-191

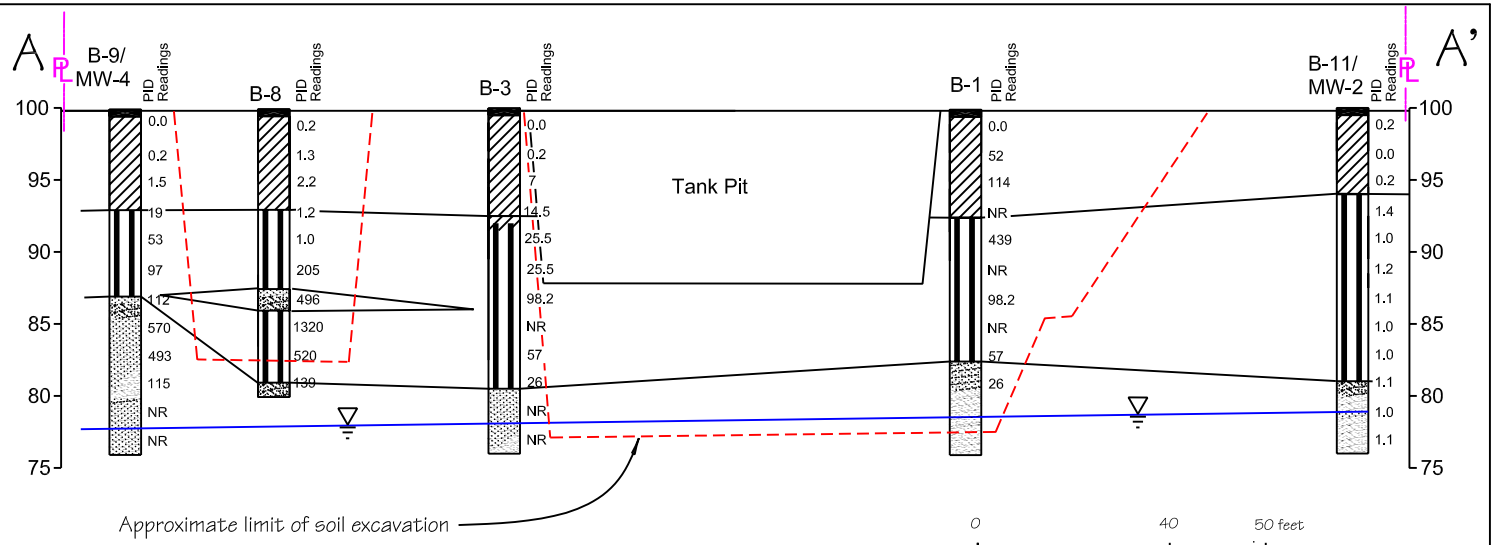
FIGURE 3



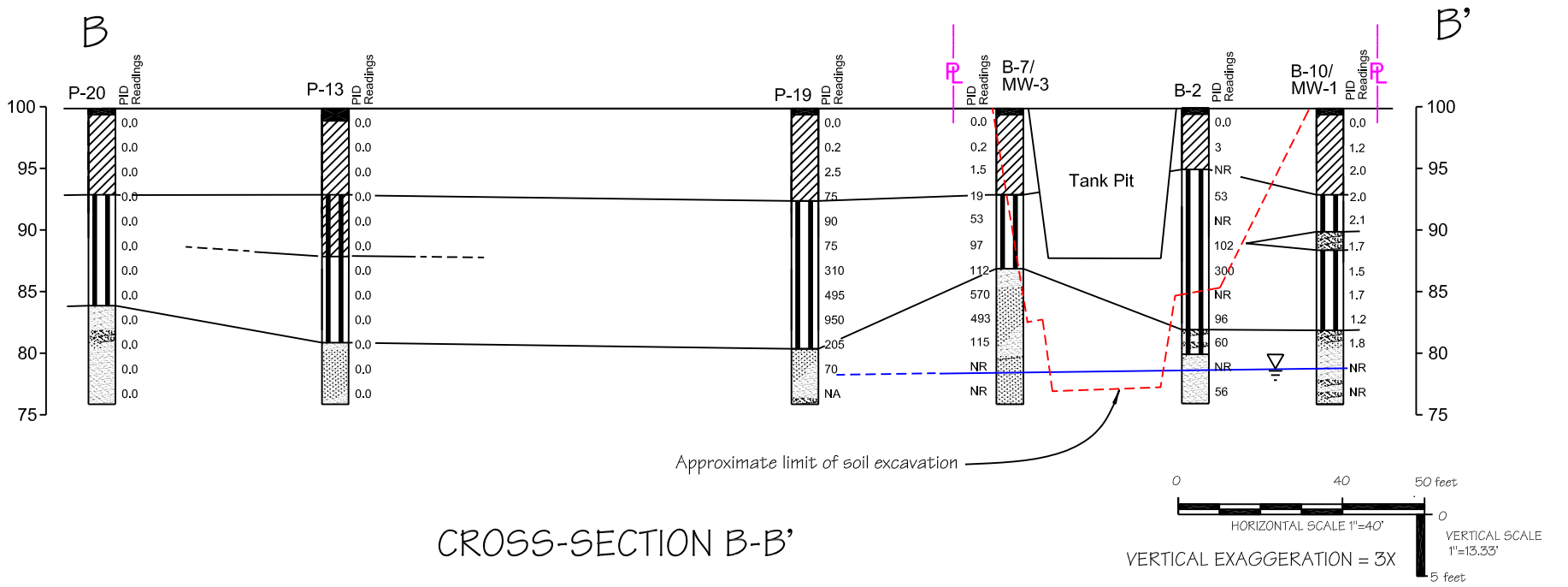
BCA Consultants, Inc.	N	DATE: 8-12-10	DRAWING TITLE: Groundwater Results	PROJECT LOCATION: Former Ellis BP 1718 Spring Street Jeffersonville, Indiana	REVISION:	DATE:	DRAWN BY: D. King	FIGURE 4
Bruce Carter Associates, LLC 6330 E. 75th SUITE 150 INDIANAPOLIS, IN 46250 317-578-4233		SCALE: 1"=40'					BCA PROJECT NO. 10-191	



CROSS-SECTION LOCATIONS



CROSS-SECTION A-A'



CROSS-SECTION B-B'

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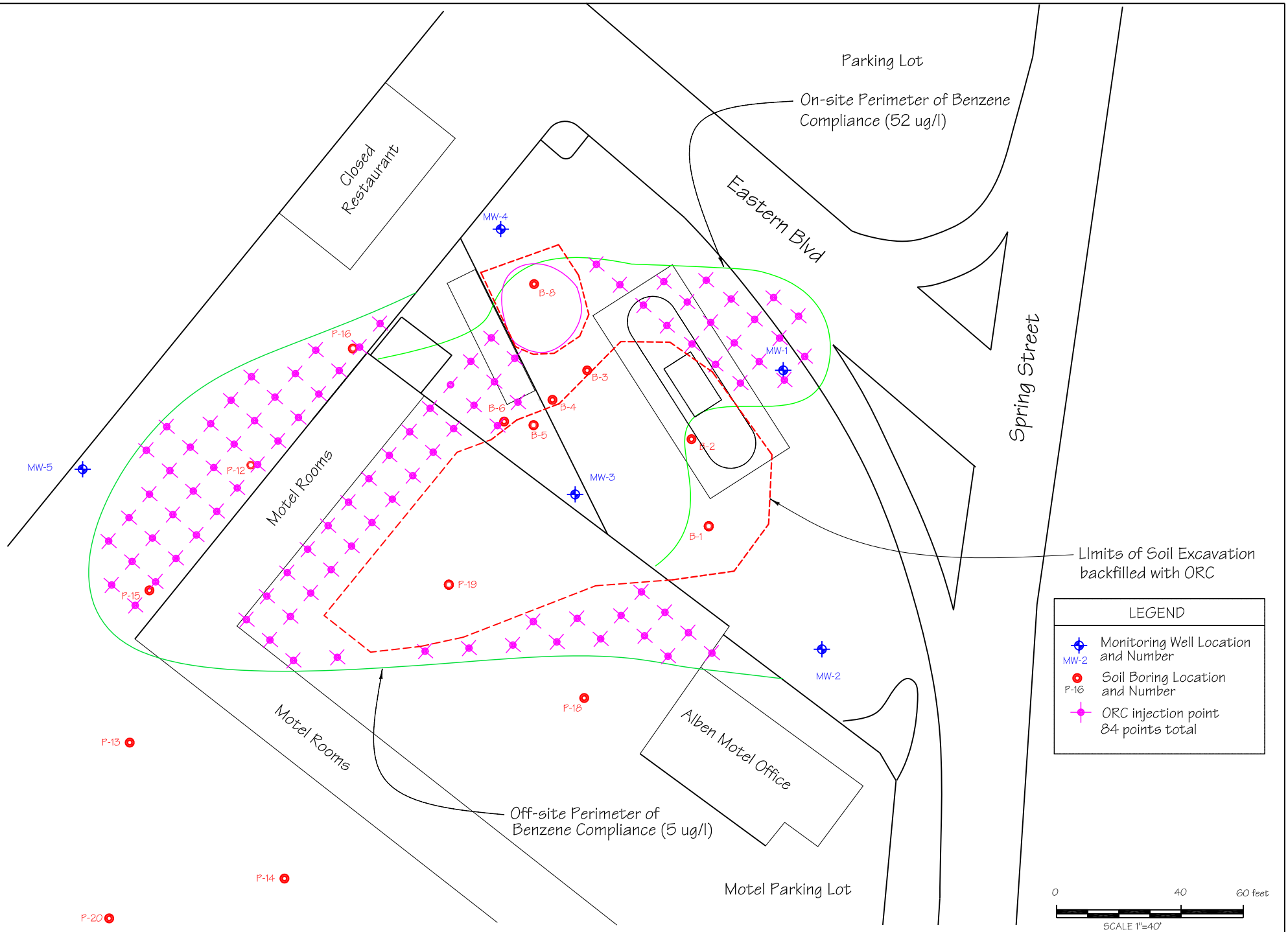
317-578-4233

DRAWN BY:	Date:	TITLE:	PROJECT:	REVISION:	DATE:	REVISION:	DATE:	FIGURE
D. King	8-12-10	CROSS-SECTIONS A-A' AND B-B'	1718 SPRING STREET Jeffersonville, Indiana					5
BCA PROJECT NO. 10-191	SCALE: AS SHOWN							



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317-578-4233

DATE: 8-12-10

SCALE: 1"=40'

DRAWING TITLE

ORC ADMIXED TO EXCAVATION BOTTOM AND ORC INJECTION POINTS

PROJECT LOCATION:
Former Ellis BP
1718 Spring Street
Jeffersonville, Indiana

DRAWN BY: D. King

BCA PROJECT NO. 10-191

FIGURE 6

APPENDIX A
SUMMARY DATA TABLES

TABLE 1-BTEX/MTBE SOIL RESULTS (mg/kg)

1718 Spring Street, Jeffersonville, Indiana

Bruce Carter Associates, LLC., September, October 2010

Sample No.	Benzene	Toluene	Ethylbenzene	Xylene (Total)	Methyl-tert-butyl-ether	n-Hexane
On-Site Soil Samples						
B-1 8-10	1.16	33.30	86.10	465.00	< 0.180	< 1.22
B-2 12-14	9.73	28.30	119.00	555.00	< 0.180	<0.633
B3 10-12	0.11	< 0.316	1.62	6.28	< 0.180	<0.632
B4 18-20	< 0.034	0.24	1.92	12.50	< 0.180	<0.633
B5 16-18	0.19	2.74	12.80	72.00	< 0.180	< 1.30
B6 14-16	<0.041	0.18	0.43	1.77	< 0.180	< 1.08
B7 14-16	6.05	35.50	32.90	177.50	< 0.180	< 0.633
B8 14-16	8.58	155.00	171.00	677.00	0.302	< 0.633
B7 14-16 DUP	3.76	18.90	25.10	109.70	< 0.180	< 6.17
B9 10-12	< 0.006	< 0.006	< 0.006	< 0.013	< 0.006	< 0.013
B10 10-12	< 0.006	< 0.006	< 0.006	< 0.012	< 0.006	< 0.012
B-11 8-10	< 0.006	< 0.006	< 0.006	< 0.012	< 0.006	< 0.012
Off-Site Soil Samples						
P-18 18-20	< 0.006	< 0.006	< 0.006	< 0.013	< 0.006	< 0.013
P-19 18-20	2.32	32.00	51.70	229.60	< 0.180	<0.633
Closure Levels						
IDEM Recreational Limits	24.00	25,000.00	12,000.00	1,800.00	1,100.00	440.00
IDEM Default Residential Limits	0.034	12.00	13.00	170.00	0.18	100.00
IDEM Default Industrial Limits	0.350	96.00	160.00	170.00	3.20	100.00

Notes:

Method 8260

mg/kg = milligrams per kilogram

VOCs = Volatile Organic Compounds

TABLE 2-SOIL RESULTS (mg/kg)

1718 Spring Street, Jeffersonville, Indiana

Bruce Carter Associates, LLC., September, October 2010

Sample No.	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Naphthalene	TPH-GRO	TPH-DRO
On-Site Soil Samples										
B-1 8-10	0.40	0.40	0.40	0.40	0.40	0.40	0.40	< 0.44	**9180**	1190
B-2 12-14	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	**12700**	**39.6**
B3 10-12	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	**262**	< 13
B4 18-20	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	**725**	< 13
B5 16-18	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	< 0.43	**2330**	< 13
B6 14-16	< 0.35	< 0.35	< 0.35	< 0.35	< 0.35	< 0.35	< 0.35	< 0.35	< 16.1	< 11
B7 14-16	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	**7.97**	**8390**	**603**
B8 14-16	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	**16.1**	**23800**	**2230.0**
B7 14-16 DUP	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	**8.35**	**8740**	**627**
B9 10-12	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 19.2	< 13
B10 10-12	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 18.5	< 12
B-11 8-10	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 0.41	< 18.5	< 12
Off-Site Soil Samples										
P-18 18-20	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 19.2	< 26
P-19 18-20	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	< 0.42	**7.64**	**2470.0**	**1030.0**
Closure Levels										
IDEM Recreational Limits	**5.1**	**0.51**	**0.51**	**51**	**510**	**5.1**	**5.1**	**9800**		
IDEM RISC Residential Limits	**5**	**0.5**	**5**	**50**	**500**	**0.5**	**5**	**0.7**	**3100**	**3100**
IDEM RISC Industrial Limits	**15**	**1.5**	**15**	**150**	**1500**	**1.5**	**15**	**170**	**4300**	**5800**

Notes:
Samples analyzed using EPA SW-846 Method 8270
mg/kg = milligrams per kilogram

TABLE 3-GROUNDWATER RESULTS (mg/l)

1718 Spring Street, Jeffersonville, Indiana

Bruce Carter Associates, LLC., September 2010

Sample No.	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Naphthalene	Benzene	Toluene	Ethylbenzene	Xylene, M&P	Xylene, 0rtho	Xylene (Total)	Methyl-tert-butyl-ether	n-Hexane
B-1	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	**0.01621**	**0.0249**	**0.048**	**0.0147**	**0.0718**	**0.0325**	**0.1043**	**0.0243**	< 0.010
B-2	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	**0.00211**	**0.0324**	< 0.005	**0.00611**	**0.0199**	< 0.005	**0.0199**	**0.035**	< 0.010
B-3	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	**0.0115**	**1.06**	< 0.050	< 0.050	< 0.050	< 0.050	< 100	**0.149**	< 0.100
MW-1	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	**0.0144**	**0.335**	**0.0978**	**0.163**	**0.3**	**0.168**	**0.468**	**0.102**	< 0.100
MW-2	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	< 0.0001	**0.245**	**0.29**	**0.0907**	**0.319**	**0.128**	**0.447**	**0.0247**	< 0.100
MW-3	**0.00026**	**0.00042**	**0.00032**	**0.00054**	**0.00059**	< 0.0001	< 0.000022	**0.0126**	**1.14**	**0.492**	**0.107**	**0.346**	**0.135**	**0.481**	**0.331**	< 0.100
MW-3D	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	**0.00785**	**0.678**	**0.29**	**0.0783**	**0.208**	**0.11**	**0.318**	**0.305**	< 0.010
MW4	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.000022	< 0.0001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.010	< 0.0005	< 0.010
Closure Levels																
IDEM RISC Residential	**0.0012**	**0.0002**	**0.0012**	**0.012**	**0.12**	**0.00012**	**0.001**	**0.0083**	**0.005**	**1**	**0.7**	**NA**	**NA**	**10**	**0.04**	**0.54**
IDEM RISC Industrial	**0.0039**	**0.04**	**0.0039**	**0.039**	**0.39**	**0.00039**	**0.004**	**2**	**0.052**	**8.2**	**10.0**	**NA**	**NA**	**20**	**0.72**	**9.5**

Notes:

Samples analyzed using EPA SW-846 Method 8270

mg/L = milligrams per liter

TABLE 4-GROUNDWATER RESULTS (mg/l)

1718 Spring Street, Jeffersonville, Indiana

Bruce Carter Associates, LLC., October 2010

Sample No.	Benzene	Toluene	Ethylbenzene	Xylene (Total)	Methyl-tert-butyl-ether	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Naphthalene
On-site groundwater samples compared to RISC Industrial Limits													
MW-1	**0.471**	< 0.005	**0.0717**	**0.0855**	**0.0658**	-	-	-	-	-	-	-	-
MW-2	**0.00748**	< 0.005	< 0.005	<0.010	**0.0069**	-	-	-	-	-	-	-	-
MW-2 FD	**0.0108**	< 0.005	< 0.005	<0.010	**0.0093**	-	-	-	-	-	-	-	-
MW-3	**2.02**	**0.462**	**0.249**	**1.006**	**0.207**	-	-	-	-	-	-	-	-
MW-4	< 0.005	< 0.005	< 0.005	<0.010	< 0.005	-	-	-	-	-	-	-	-
Off-site groundwater samples compared to RISC Residential Limits													
P-12	**1.42**	**0.0212**	**0.0297**	**0.0397**	**0.05**	-	-	-	-	-	-	-	-
P-13	<0.00 5	<0.00 5	<0.00 5	<0.010	<0.00 5	-	-	-	-	-	-	-	-
P-14	<0.00 5	<0.00 5	<0.00 5	<0.010	<0.00 5	-	-	-	-	-	-	-	-
P-15	**0.213**	**0.00534**	<0.00 5	**0.0068**	**0.0131**	-	-	-	-	-	-	-	-
P-16	**0.0349**	<0.00 5	<0.00 5	<0.010	<0.00 5	-	-	-	-	-	-	-	-
P-17/MW-5	<0.00 5	<0.00 5	<0.00 5	<0.010	<0.00 5	-	-	-	-	-	-	-	-
P-18	<0.00 5	<0.00 5	<0.00 5	<0.010	<0.00 5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	< 0.000022	< 0.10
P-19	**0.935**	<0.250	< 0.250	**0.354**	**0.0625**	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.000022	**0.144**
P-20	<0.00 5	<0.00 5	<0.00 5	<0.010	<0.00 5	-	-	-	-	-	-	-	-
TRIP BLANK	<0.00 5	<0.00 5	<0.00 5	<0.010	<0.00 5	-	-	-	-	-	-	-	-
Closure Levels													
IDEM RISC Residential Limits	**0.005**	**1**	**0.7**	**10**	**0.04**	**0.0012**	**0.0002**	**0.0012**	**0.012**	**0.12**	**0.00012**	**0.001**	**0.0083**
IDEM RISC Industrial Limits	**0.052**	**8.2**	**10.0**	**20**	**0.72**	**0.0039**	**0.0039**	**0.0039**	**0.0039**	**0.39**	**0.0039**	**0.004**	**2**

Notes:

Samples analyzed using EPA SW-846 Method 8260

mg/L = milligrams per liter

VOCs = Volatile Organic Compounds

Table 5 Groundwater Elevations Measured 10-13-10 BCA Consultants			
Well	**Elev (Site Datum)**	**DTW**	**GW ELE**
MW-1	98.93	20.88	78.05
MW-2	98.91	20.92	77.99
MW-3	100.6	22.67	77.93
MW-4	99.95	22.08	77.87
MW-5	97.96	20.46	77.5

APPENDIX B
HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN

Former Ellis BP Property
1718 Spring Street
Jeffersonville, Indiana

October 4, 2010
Project No. 7893/10-191

Respectfully Submitted by:
Bruce Carter Associates, Inc.

Prepared by
David King, LPG

6330 East 75th Street, Suite 150
Indianapolis, Indiana 46250

Telephone (317) 578-4233 Fax (317) 578-4250

SITE HEALTH AND SAFETY PLAN

1718 Spring Street, Jeffersonville, Indiana

1.0 GENERAL PROJECT INFORMATION

Prime Contractor:	Bruce Carter Associates, LLC
Client:	City of Jeffersonvile/Indiana Brownfields Program
Site Name:	Former Ellis BP
Site Address:	1718 Spring St., Jeffersonville, IN
Principal: Project Manager:	John Kilmer David King, LPG
Date of Plan:	10/5/2010

SITE DESCRIPTION

Type of Facility (describe):	Abandoned/seasonal gas station
Active or Closed/Abandoned:	Site is seasonally occupied
Describe surface features (buildings, paved or unpaved, overhead/underground utilities):	Combination concrete and commercial buildings
List any site access restrictions:	None
Surrounding neighborhood description:	Residential, Commercial and Industrial

SITE ACTIVITIES

The site activities covered by this HASP include those checked in the box below:

Site Activity	Soil Borings	Monitoring Well Install	Soil Cutting/Purge water Removal	Soil Excavation	Soil sampling
Assessment					
Investigation	X		X		X
Remediation		X		X	

EMERGENCY PHONE NUMBERS

POSITION	NAME	CONTACT
Safety Officer	**David King, LPG**	**(317) 414-2991**
Field technician	**David King, LPG,**	**(317) 414-2991**
Industrial Services	**To be determined**	**To be determined**
Subcontractors: List all names of subcontractors to be used for site activities	**To be determined**	**To be determined**
Hospital Name	Clark Memorial	
Hospital Address	1220 Missouri Ave Jeffersonville, IN 47130	
Hospital Phone Number	812-282-6631	
Directions to nearest Hospital	See attached map	
Fire and Emergency	Call 911	
EPA Hotline:	1-800- 621-3191	

2.0. INTRODUCTION/SCOPE OF WORK

This plan provides health and safety guidelines for site investigation and remediation activities conducted by Bruce Carter Associates, LLC. (BCA) to protect on-site personnel, visitors and the public from physical harm and exposure to hazardous materials and/or wastes. The procedures and guidelines contained herein are based on the best available information at the time of the plan's preparation. Specific requirements may be revised if new information is received, or site conditions change. It is the responsibility of the field personnel to evaluate the site work conditions and if in doubt about safety or an operation, request assistance from the Site Safety Officer. Compliance with this plan is mandatory for all on-site BCA personnel and subcontractors.

Operations at the site may require additional tasks not identified in the preparation of this safety plan. Before performing any task not covered in this HASP a revision must be prepared, and approved by the Site Safety Officer (SSO).

2.1 Scope of Work

Scope of work for the investigation at the site includes:

- Tasks include soil and groundwater sampling
- Waste water and soil excavation and disposal.
- ORC injection

3.0 PERSONNEL CONTACT INFORMATION AND PHONE NUMBERS

The BCA SSO will have the authority to alter work practices, stop work, and/or allocate resources to mitigate unsafe work practices. All personnel have the authority to stop any work practice that may endanger site personnel or the general public. Restrting work will be done in consultation with the site Safety officer. The following personnel and subcontractor resources will be used on this site:

POSITION	NAME	CONTACT
Safety Officer	**David King, LPG**	**(317) 414-2991**
Field technician	**David King, LPG, David Scovel, LPG**	**(317) 414-2991 (317) 475-0309**
Excavation Services	**To be determined**	**To be determined**
Industrial Services	**To be determined**	**To be determined**
Subcontractors: List all names of subcontractors to be used for site activities	**NA**	**NA**

TABLE OF AUTHORTIY

Project Manager
John Kilmer
Responsibilities
Accident Reporting
Restart work following work stoppage
OSHA and USEPA point of contact

Site Safety Officer
David King, LPG
Responsibilities
Air Monitoring/PPE upgrade determination
Incident Investigation Documentation
Tool Box HASP Meetings
Decision to involve Police, Fire and Ambulance
Enforcing PPE use, observing compliance with HASP Provisions

Subcontractor Supervisors
TBD
Responsibilities
Assure personnel compliance with HASP
Observe/Report unanticipated conditions

BCA field Personnel

Responsibilities
Assure compliance with HASP
Observe/Report unanticipated conditions
Stop Work/Report to supervisors if unanticipated conditions exist

Subcontractor Personnel
TBD
Responsibilities
Assure personnel compliance with HASP
Observe/Report unanticipated conditions
Stop Work/Report to supervisors if unanticipated conditions exist

4.0 EMERGENCY INFORMATION/RESPONSE

The purpose of this section is to provide the on-site user with contact and location information to be used in case of an emergency response situation. In case of an emergency on-site, **CALL 911** first and **NOTIFY** the site operator (if available). Then contact the BCA project manager and safety officer for this site.

EMERGENCY PHONE NUMBERS

Hospital Name	Clark Memorial
Hospital Address	1220 Missouri Ave, Jeffersonville, IN 47130
Hospital Phone Number	812-282-6631
Directions to nearest Hospital	See attached map
Fire and Emergency	Call 911
EPA Hotline:	1-800- 621-3191
National Response Center	1-800-424-8802
TSCA HOTLINE	1-800-424-9065
Poison Control Center	1-800-382-9097
CHEMTREC	1-800-424-9300
National Pesticide Center	1-800-858-7378

5.0 STANDARD EMERGENCY PROCEDURES

5.1 Hazard Communication

Any organization wishing to bring any hazardous material onto any BCA-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the Safety Officer for approval and filing (the Safety Officer will maintain copies of all MSDSs on site). MSDSs may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable. All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDSs. All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

The Hazard Communication standard (29 CFR 1910.1200) has been provided to employees, and a written copy is on file at BCA's office.

5.2 Confined Space Entry

During the UST removal the USTs may be entered and cleaned. Entry will only be conducted by qualified personnel in accordance with IDEM UST and IOSHA guidance. There is no other expectation that confined space will be entered during this project.

6.0. PERSONNEL TRAINING RECORDS

All personnel working within the exclusion zone are required to have 40 hour HAZWOPPER training and be current with refresher training in accordance with 29CFR 1910.120.

7.0 KNOWN OR ANTICIPATED HAZARDS

7.1 General Safety Rules

Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any BCA-controlled site.

Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

- An adequate supply of potable water will be available for field personnel consumption.
- Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
- Non-potable water may be used for hand washing and cleaning activities. Nonpotable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

Non-Potable Water
Not Intended for Drinking Water Consumption

- Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required. Washing Facilities: Employees will be provided washing facilities (e.g., buckets with water and Alconox) at each work location. The use of water and hand soap (or similar substance) will required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for BCA personnel. Under no circumstances will any employee be present alone in a controlled work area.

7.2 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing

heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress.

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel operating in a hot, humid environment. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress.

7.3 Responding to Heat-Related Illness

The guidance below will be used in identifying and treating heat-related illness.

Type of Heat-Related Illness	Description	First Aid
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	• Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • If an air-conditioned spot is available, this is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move Involuntarily.	• Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (Make the victim lie down, raise his or her feet 6–12 inches, and keep him or her cool by loosening all clothing).
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly	• Immediately evacuate the victim to a cool and shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his or her back with the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water or rubbing alcohol, if available. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

8.0 PHYSICAL HAZARDS AND MITIGATION PROCEDURES

Safe work practices in compliance with OSHA standards and this document will be used at all times. The first aid kit and fire extinguisher are to be on site at all times. The following table lists the anticipated hazards and the associated safety rules for proper control.

Hazard Description	Potential Result	Control Measure
tool handling	cuts, contusions, bruises	Wear gloves, steel-toed boots and safety glasses
vehicle traffic	Impact, getting struck by vehicle	Set up safety cones around well being sampled. Communicate activities with any onsite personnel. Wear reflective vest. Use truck or van as a shield if possible. Set up snow fence for each location where pedestrian walkways are affected and cover all openings or secure with snow fence during all breaks or overnight.
heat/cold	heat stress/frostbite	Heat: Take frequent breaks and drink plenty of fluids. Watch for signs/symptoms of heat stress (fainting, dizziness, excessive sweating) Cold: Wear several layers of clothing, do not work in excessive cold, take frequent breaks.
Slip, trip and fall	Bruising, sprained ankle/foot/knee	Be aware of surroundings and practice good housekeeping measures around the site area to minimize items that pose a trip hazard.
Splash	Exposure to contaminants in the groundwater – dermal and/or eye	Wear gloves and safety glasses during purging of well and sample collection.
Hazardous Energy Control	Personal injury, electrocution	Use lockout/tagout controls to ensure that hazardous energy sources (electrical) are controlled prior to valve removal activities, including electrical and water pressure. All underground utilities should be marked prior to intrusive activities. A site walk-through should identify all overhead power lines.
Heavy Equipment	Struck by	Keep aware of the location of heavy equipment at all times. If overhead activities are taking place (drilling, digging) hard hats will be used.
Fire and Explosion	Flammable vapors from petroleum may ignite	Monitor for the presence of flammable vapors with an explosimeter. Fire extinguishers should be available. Evacuate the area immediately, call 911 and evaluate the situation.
Noise/Hearing Protection	Active drilling and other processes may exceed noise exposure standard of 85 decibels	Wear appropriate hearing protection.
Biological Hazards	Poisonous vegetation and/or stinging/biting insects or animals	Keep aware of surroundings and if bite or sting takes place seek first aid and/or medical attention

9.0. CHEMICAL HAZARDS POTENTIALLY ON SITE

9.1 Waste Characterization

Potential hazards for each of the tasks presented below are assessed. As work items are being performed, continued monitoring and observation will be used to determine if conditions change. Site Safety officer will be responsible for continued assessment, and work practice modification in the event that unsafe work practices are observed. The following site activities are anticipated:

- Waste Media Excavation and Disposal

9.2 Hazard Evaluation

Chemicals of Concern: Identify all chemicals that are present or suspected to be present on site and the maximum concentrations detected in soil or water.

Chemical Name	**TLV/PEL (8 hour TWA exposure limit for inhalation exposure in breathing zone)**	**Maximum concentration in Soil (mg/kg)**	**Maximum concentration in Water (mg/l or ppm)**	**Health Hazard/Comments (CNS: central nervous system)**
TPH	None established	3500ppm	Not analyzed	Irritant (eye, skin, mucous membranes) Liver Damage Carcinogen
Benzene (IDLH) 500ppm	1 ppm 5 ppm	9.73 ppm	1.42	Reproductive, Liver Damage Carcinogen

Is free product onsite? ___ Yes _X_ No

Will work tasks be performed inside buildings/enclosures? ___ Yes _X_ No

Is there evidence that contaminants present could cause vapor problems in structures on-site? _X_ Yes __ No

If Yes, is building mechanically ventilated? ___Yes _X__No

10.0 BIOLOGICAL HAZARDS AND MITIGATION PROCEDURES

Contact with animals, insects, and plants can cause injury and illness to personnel. Care must be taken to ensure that these types of injuries are avoided. Some examples of biological hazards include:

- Wild animals, such as snakes, raccoons, squirrels, and rats. These animals not only can bite and scratch, but can carry transmittable diseases (e.g., rabies). Avoid the animals whenever possible. If bitten, go to the nearest medical facility.

- Insects such as mosquitoes, ticks, bees, and wasps. Mosquitoes can potentially carry and transmit the West Nile Virus or Eastern Equine Encephalitis (EEE). Ticks can transmit Lyme disease or Rocky Mountain Spotted Fever. Bees and wasps can sting by injecting venom, which causes some individuals to experience anaphylactic shock (an extreme allergic reaction). Whenever you will enter areas that provide a habitat for insects (e.g., grass areas, woods), wear light-colored clothing, long pants and shirt, and spray exposed skin areas with a DEET-containing repellent. Keep away from high grass wherever possible. Keep your eyes and ears open for bee and wasp nests. If bitten by insects, see a doctor if there is any question of an allergic reaction.

- Plants such as poison ivy and poison oak can cause severe rashes on exposed skin. Be careful where you walk, wear long pants, and minimize touching exposed skin with your hands after walking through thickly vegetated areas until after you have thoroughly washed your hands with soap and water.

11.0 ADDITIONAL HAZARDS

The following Daily log should be filled out whenever an unexpected hazard is encountered. Include injuries, PPE used, or work stoppages caused by unsafe conditions.

Hazard Observed	Date	Observed by (Print Name)	Mitigation taken/PPE used

12.0 LIST OF FIELD ACTIVITIES

The following is a list of filed activities anticipated for this project:

- The first field activity in this investigation will be utility location. Because this is not an invasive activity, this Health and Safety Plan will not be applied to the utility locating contractor.

- Pre-marking excavation locations will be performed by BCA. This is also not an invasive activity and no hazards are anticipated.

- Loading/hauling excavated waste soil and water. This activity will be performed by a subcontractor who will excavate soil. These personnel will be subject to the provisions of this health and safety plan.

- All contractors will prepare and submit a Health and Safety Plan (HASP) to the project manager before mobilizing to the site. The HASP will be reviewed by the project manager and accepted or rejected. The Project Manager will not approve the contractors HASP and will only review it to assure that it is at least as stringent as the HASP used by the project manager.

13.0 SITE DESCRIPTION

Type of Facility (describe):	**Warehouse**
Active or Closed/Abandoned:	Site is Abandoned
Describe surface features (buildings, paved or unpaved, overhead/underground utilities):	Combination of concrete paving, and vacant commercial buildings
List any site access restrictions:	None
Surrounding neighborhood description:	Commercial, Industrial, and Residential

14.0 PERSONNEL PROTECTIVE GEAR/ENGINEERING CONTROLS

14.1 Personnel Protective Gear

Level D: Soil concentrations in previous investigations are not expected to cause health risks if handled carefully. Sampling can be performed using modified Level D protection. The following items are needed for modified Level D.

- hard hat (for overhead hazard activities)
- Steel-toe work boots
- Coveralls and/or long pants with short sleeved shirts (at a minimum)
- Eye protection when a splash hazard exists
- Hearing protection during active drilling or other loud operations
- Nitrile gloves for sampling and/or contact with soil and groundwater.

Tank Liquids

- hard hat (for overhead hazard activities)
- Steel-toe work boots
- long pants with short sleeved shirts (at a minimum)
- Eye protection when a splash hazard exists
- Hearing protection during excavation or other loud operations
- Nitrile gloves for sampling and/or contact with soil and groundwater.
- Tyvek Suits over cloth work apparel (Mandatory)

Modifications: Modifications to this level of protection will be made if site conditions and/or contamination levels warrant an upgrade in protection level.

Level C: If site conditions warrant, an upgrade to level C will be made if air monitoring equipment indicates respiratory protection is required. Air-purifying respirators with organic vapor cartridges will be used in this situation. Also, if a reagent is used on-site for in-situ treatment the MSDS for that substance shall be consulted to determine the appropriate personal protective equipment (i.e. chemical resistant coveralls/gloves, chemical goggles, respiratory protection).

Surveillance Equipment and Materials: Photoionization Detector

Work Limitations: (Time of day, etc.): All sampling operations will be conducted during daylight hours. No smoking or eating during soil handling procedures.

14.1.1 PPE Doffing and Donning Information

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Never cut disposable booties from your feet with basic utility knives. This has resulted in workers cutting through the booty and the underlying sturdy leather work boot, resulting in significant cuts to the legs/ankles. Recommend using a pair of scissors or a package/letter opener (cut above and parallel with the work boot) to start a cut in the edge of the booty, then proceed by manually tearing the material down to the sole of the booty for easy removal.

- When applying duct tape to PPE interfaces (wrist, lower leg, around respirator, etc.) and zippers, leave approximately one inch at the end of the tape to fold over onto itself. This will make it much easier to remove the tape by providing a small handle to grab while still wearing gloves. Without this fold, trying to pull up the tape end with multiple gloves on may be difficult and result in premature tearing of the PPE.

- Have a "buddy" check your ensemble to ensure proper donning before entering controlled work areas. Without mirrors, the most obvious discrepancies can go unnoticed and may result in a potential exposure situation.

- Never perform personal decontamination with a pressure washer.

14.2 Medical Surveillance Requirements

All personnel must have completed the appropriate medical monitoring requirements as specified in 29 CFR 1910.120. Documentation of medical monitoring is the responsibility of each employer.

14.3 Engineering Control

The engineering control to prevent pedestrian/general population from exposure to hazards at the work site is Site Control.

14.3.1 Site Control Measures

Site controls establish the hazardous area perimeter and prevent access or exposure by unauthorized personnel or the public. The site map is attached to the Field Instructions and is incorporated as part of the HASP. The "buddy system" is to be used throughout those site operations that require it.

Site Entry Procedures: Notify property owner before mobilizing to the site.

Perimeter establishment/identification: Area of site east of the building will be work zone perimeter. See site map and field instructions attached.

An exclusion zone, contamination reduction zone and support zone will be identified for each site activity. The exclusion zone and contamination reduction zone are shown on the attached site map.

14.4 Emergency First Aid Procedures

If eye irritation, nausea, vomiting, dizziness, unusual odors or any other unusual mental or physical sensations are noticed, seek medical assistance.

Inhalation: Move person to fresh air, seek medical assistance.
Ingestion: Do not induce vomiting, seek medical attention.
Eyes: Flush with copious amounts of water.
Skin: Wash with soap and water.

15.0 AIR MONITORING REQUIREMENTS

Where the presence of VOC are present, all soil samples will be field screened for volatile organics using a Photoionizing detector. It is expected that headspace gasses will be well below the action level. However, if heaspace gasses exceed 100 ppm, breathing zone monitoring will be conducted. If volatile gasses are detected in the breathing zone, the work activities work will stop and breathing zone gasses will be monitored using the FID or one of the other detectors below. Further work may be conducted after elimination of all ignition sources, increasing the monitoring frequency, or elevate the level of PPE.

Instrumentation Available for Higher Level Air Monitoring

INSTRUMENT	MANUFACTURER/MODEL*	SUBSTANCES DETECTED
Photo Ionization Detector (PID)	RAE Systems mini-RAE Photovac Microtip HNu Model Hnu (min. 10.2 eV bulb)	Petroleum hydrocarbons Organic Solvents
Flame Ionization Detector (FID)	Foxboro	Petroleum hydrocarbons Organic Solvents
Combustible Gas Indicator (CGI) May be combined with individual or multi-gas detectors.	TBD	Explosivity
Individual Gas Detectors	TBD	Oxygen (O_2) Carbon Monoxide (CO) Hydrogen Sulfide (H_2S) Cyanide Gases (CN^-)
Particulate Monitor	MIE Model PDM-3 mini-RAM	Aerosols, mist, dust, and fumes
Colorimetric Detector Tubes	Sensidyne Draeger	Benzene 0.5–10 ppm

16.0 DECONTAMINATION PROCEDURES

Decontamination Procedures: Contamination may result from walking through contaminated soils or liquids, splashing liquids during sampling, or use of or contact with contaminated equipment. Decontamination procedures for the following tasks will be observed onsite.

- Sampling: The bailer/pump is to be scrubbed with an Alconox wash and rinsed with water prior to sampling, and between each well.

- PPE: All contaminated, disposable clothing will be properly bagged for disposal and left onsite for proper disposal. The PPE may be added to the soil drums for disposal.

- Excavation:
  1. The excavator will not track through contaminated soil.
  2. The Excavator bucket, and any other part of the excavation equipment exposed to contaminated soil will be washed and rinsed prior to leaving the site.
  3. Wash and Rinse water shall be collected in a decon pad, pumped to DOT Approved drums and held for testing and hazardous waste disposal if required.

17.0 WASTE STORAGE/DISPOSAL

Investigation-derived Material Disposal: The purge and decontamination water, and disposable protective gear are to be placed in 55 -gallon drums, labeled and stored on site pending the receipt of the laboratory analysis. Free product and contaminated water must remain on-site until the proper disposal method is determined.

The drums of investigative waste will be hauled by a contractor who will be subject to the provisions of this health and safety plan. Waste disposal will be performed in a manor appropriate to the waste characteristic identified by waste profiling.

17.1 Spill Containment Program

No anticipated spills or releases of hazardous chemicals are associated with this project. Any spills will be contained and drummed for proper disposal.

17.2 Soil Groundwater excavation

Soil will be excavated using heavy machinery. In the event that dry soils are encountered or visiable dust is generated. The soils will be wetted prior to further soil exumation. Personnel (supervisory and machine operators) will be advised to stay upwind during all excavation activities. If exhumed soil is staged on site, it will be placed in a roll off bin and covered with visqueen or piled on visqueen and covered with visqueen. Soils being transported will be covered.

18.0 DOCUMENTS EXPECTED TO BE COMPLETED

The Safety Officer will maintain a master Health and Safety Plan which will be updated with the Daily Log (Section 11.0) and daily sign in sheets. In the event that site conditions warrant updating this Health and Safety Plan, updated sections will be appended to this plan. The master Health and Safety Plan will be archived in the project file at the offices of BCA for ten years following the end of the project.

Other documents which will be maintained include field books, boring logs, groundwater sampling sheets, contractor provided MSDSs, and correspondence.

19.0 APPROVALS

I, the undersigned attest that I am familiar with the contents of this Health and Safety Plan and do agree to administrate the procedures described herein.

Plan Prepared by:_____ Date:_____

Plan Approved by:_____ Date:_____

Health and Safety Officer:_____ Date:_____

20.0 EMPLOYEE ACKNOWLEDGMENT

The designated BCA employee shall be responsible for informing all individuals entering the exclusion zone of the contents of this plan, and ensuring each person signs the employee acknowledgment form. By signing this form, individuals are recognizing the hazards present on site and the policies and procedures required to minimize exposure or adverse affects of these hazards.

I have read the site safety plan, have been briefed and fully understand all of the following aspects of the project:

Hazards associated with the project.
Personal protective equipment.
Emergency procedures/contacts.
Project team-member responsibilities.
Work zones and decontamination procedures.

I have undergone medical monitoring and have been respirator fit-tested in the last year.

Form must be signed each day on site.

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

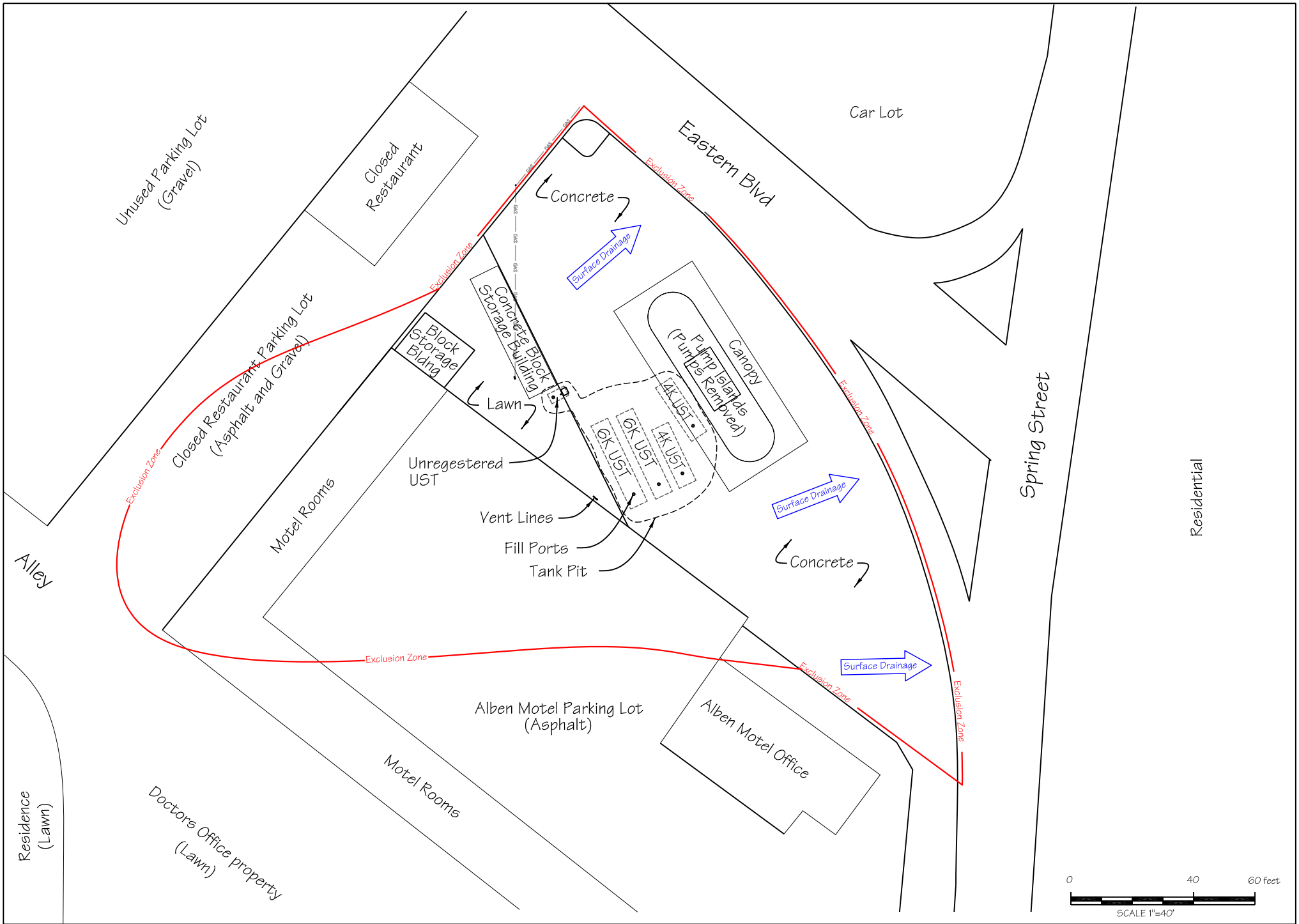
Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____

Signature:_____ Date:_____



BCA Consultants, Inc.		DATE: 8-12-10	DRAWING TITLE: HASP EXCLUSION ZONE	PROJECT LOCATION: Former Ellis BP 1718 Spring Street Jeffersonville, Indiana	REVISION:	DATE:	DRAWN BY: D. King
Bruce Carter Associates, LLC 6330 E. 75th SUITE 150 INDIANAPOLIS, IN 46250 317-578-4233		SCALE: 1"=40'					BCA PROJECT NO.
							FIGURE 1

mapquest

Notes

Trip to:
1220 Missouri Ave
Jeffersonville, IN 47130-3725
0.61 miles
2 minutes