
WEAVER

BOOS

CONSULTANTS

December 19, 2011
Project No. 2379352-03

Ms. Aunna Huber, Project Manager
IDEM OLQ State Cleanup Section
MC66-30 (1370)
100 N. Senate Ave, IGCN 1101
Indianapolis, IN 46204-2251

Re: **Response to Request for Further Site Investigation
Former Brick Yard Property
Sexton Avenue & Lincoln Street
Porter, Indiana**

Dear Ms. Huber:

Weaver Boos Consultants, LLC (Weaver Boos) has completed several environmental site assessments (ESAs) at above-referenced property (the Property) as you are aware. The results of the ESAs completed thus far were most recently integrated and evaluated in our Phase II ESA report dated September 12, 2011. No indication of imminent risk to human health was found, even though elevated concentrations of several polycyclic aromatic hydrocarbons (PAHs), lead, or arsenic were detected in surface soil on the southern portion of the Property. We therefore recommended that activities involving intensive or long-term human exposure to the affected surface soil be actively discouraged. Furthermore, no indications of adverse affects to groundwater were found.

The Indiana Department of Environmental Management (IDEM) reviewed our Phase II ESA report and requested that a Further Site Investigation (FSI) be completed in written correspondence dated November 28, 2011. This letter evaluates the technical aspects of IDEM's FSI request and responds to the comments. Excerpts from the FSI request correspondence are provided in *italic* text for completeness and ease of review and followed immediately by our technical responses.

IDEM Comment:

Site Review

The Site is currently an unimproved, forested 24-acre parcel located northwest of Sexton Avenue and Lincoln Street in Porter, Indiana. Chicago Hydraulic Press Brick Company developed and operated a brickyard on the Site from the late 1880's until 1925, when on-site and nearby clay sources were exhausted. During its operation, the plant used steam powered hydraulics to press the clay into bricks for baking in one of several on-site kilns. Historical maps show structures located across the central and southern portions of the Site. The earliest Sanborn Maps available for the property (1893) show a New York Central railroad line bordering to the south. A series of railroad spur lines are shown from the tracks at the southeast corner of the property leading from the main line to the manufacturing area north of the kilns in 1893; these spurs are not on the property in the 1991 aerial photograph.

Weaver Boos identified historical oil tanks on the property in two previous environmental assessments. Previous investigations found surface soil contamination of total petroleum hydrocarbons extended range organics (TPH-ERO), carcinogenic polyaromatic hydrocarbons (PAHs) and metals (lead and arsenic) located along the south side of the property. The surface contamination found at soil boring WB-2 (0 to 1 feet) appears to be associated with a layer of fill (reportedly comprised of combustion products such as cinders/ash/soot) located along a historic railroad embankment. Weaver Boos noted that soil arsenic levels in northwest Indiana are reported to range from 1 to 13 milligrams per kilogram (mg/kg); therefore, elevated arsenic levels may be linked to the geology of the area, cinder fill, or possibly from lead-arsenic containing pesticides/herbicides that were historically used along the railroad right of way.

During the 2009 and July 7 and 8, 2011 investigations, subsurface (12 to 28 feet) soil and ground water (temporary wells based on reported regional ground water direction flow) were evaluated with a total of 26 soil borings at various locations. Weaver Boos states that soil up to a depth of five feet may be excavated during proposed construction of recreational facilities. Ground water was reportedly encountered at approximately 20 feet below the surface. With the exception of total lead from one boring located in the northwest corner of the property, the 2011 ground water samples did not contain significant levels of metals (total and dissolved arsenic and lead) and PAHs that were reported to be found in soil. Significant levels of dissolved lead and arsenic were not found in ground water. In addition, the ground water samples obtained in 2009 did not contain significant levels of volatile organic compounds (VOCs). Municipal water

is supplied to the majority of the Town of Porter residents. Some areas are still served by private wells.

Based on a minimum number of soil samples containing indicator compounds [benzo(a) pyrene, total arsenic and total lead] and computer modeling contour intervals, contamination exceeding the RISC residential default closure levels (RDCLs) and RISC industrial default closure levels (IDCLs) appears to be confined mainly to the southern portion of the Site where historic transportation and industrial activities were reported to have occurred. The evaluation of several potential remedial alternatives indicates that the implementation of any remedial actions will depend on the future use(s) of the property; namely recreational, industrial/commercial and/or residential usage. Weaver Boos has recommended additional sampling, specifically along the boundaries separating impacted and apparent non-impacted areas, in an effort to more accurately delineate the contamination present at the Site.

Response:

The foregoing comments appear to recapitulate information presented in the Phase II ESA report and are therefore generally acknowledged.

IDEM Comments:

General Comments

- 1. Arsenic exceeds the RISC RDCL of 3.9 mg/kg at 44 of 47 sample locations (4.5 mg/kg to 77.6 mg/kg). Lead exceeds the RISC RDCL (81 mg/kg) at four locations (495 mg/kg to 1,580 mg/kg). Several PAHs exceed RISC RDCLs: benzo(a)pyrene (0.5 mg/kg) at 10 locations (0.618 mg/kg to 3.34 mg/kg); dibenzo(a,h)anthracene (0.5 mg/kg) at four locations (0.530 mg/kg to 1.02 mg/kg); and naphthalene (0.7 mg/kg) at six locations (0.73 to 1.7 mg/kg).*

Response: This statement is generally acknowledged, although it appears that the IDEM reviewer counts results for duplicate samples as separate sample locations. Weaver Boos also notes that our Phase II ESA report separately evaluates surface soil and subsurface soil, so both the total counts and the frequency of samples indicating concentrations above RDCLs differ from those listed the IDEM's General Comment #1.

- 2. The presence of arsenic, lead and PAH compounds at elevated concentrations, particularly in the southern portion of the property, is not unexpected given the historic land use. Ash and residue from kilns may have been used as fill material. The most*

commonly reported contaminants along rail lines include metals, pesticides (such as lead arsenate) and constituents of oil or fuel (petroleum products), which were part of normal railway operations. Arsenic has been reported in concentrations up to ten times natural background levels in the soil along railroad right of ways from old railroad ties dipped in an arsenic solution, arsenic weed-control sprays and arsenic-laced slag used as railroad bed fill (MA DEP, 2004). Arsenic exceeds the RISC RDCL (3.9 mg/kg) at almost every surface sample location. Arsenic, lead and PAHs exceed RISC screening levels for all uses in the southern portion of the property. Weaver Boos suggests that background concentrations for arsenic may be 13 mg/kg based on professional experience and site-specific references. Elevated concentrations (above background) of arsenic and elevated concentrations of PAHs (over RISC screening levels) roughly coincide with the brick manufacturing areas, rail lines and rail spurs that serviced the historic brickyard, and where near surface soil boring profiles reportedly contain cinders. Elevated concentrations of arsenic, lead and PAHs reported from the southern portion of the Site likely reflect historic uses and may not represent "background" conditions.

Response: The above statement appears to paraphrase the data, information, and evaluation included in the Phase II ESA report and so is generally acknowledged.

- 3. The sampling protocol by Weaver Boos used grid spacing with a bias towards the southern portion of the property. Twenty-six borings were advanced on the parcel with eight, three and 14 locations located in the northern, central and southern portions of the property, respectively. The Report defines surface soil as ground surface to five feet below grade, and averages concentrations over this interval. Typically, surface soil is defined as the top six inches of soil and subsurface soils as the interval extending from six inches below the ground surface to the water table. Averaging the analytical results for the top five feet of soil then using that value to represent surface soil misrepresents actual surface soil conditions. This may impact land use decisions, risk estimates and remedial measures since residential exposure and risk estimates are based in part on contaminants in surface soils. IDEM suggests a better approach for site characterization is to analyze the contaminant profile of surface soils separately from subsurface soils. Additional soil delineation will also provide information that may assist [sic] with redevelopment potential.*

Response: It is technically very reasonable to define surface soil as “the top six inches” in a land use setting such as a fully landscaped residential area, public park, golf course,

or sports facility field where surface grades have been established and fixed for use. Vegetable or flower gardening in such settings only rarely requires digging or tilling to depths greater than 6 inches in personal experience. However, the former Brick Yard is not presently configured or used for any of these purposes. Its topographic surface undulates steeply over several feet of vertical elevation as illustrated on Figure 4 of the Phase II ESA report. The Property will require considerable grade modification (likely including the placement of clean fill) before it can be developed or constructively reused. Given that subsurface conditions indicate the historical overturning of the soil profile as a result of clay mining, no genuine surface soil profile currently exists at the Property. This condition is illustrated by the soil data listed on Table 2 of the Phase II ESA report showing that concentrations of PAHs and metals are similar in samples collected from either 0 to 1 ft or from 4 to 5 ft below ground surface in each boring.

The earliest activities in any reasonable development scenario will include grade modification for streets or parking areas and excavation and placement of underground utilities. Such activities are expected to again overturn the existing surface soil to depths of at least 5 ft. Later, the construction of buildings will require excavation to depths of at least 4 ft for the placement of foundation footings. With recognition for a redevelopment land use scenario, the IDEM's RISC Technical Guide (2001) states the following on page 1-11 with regard for evaluating soil exposure pathways:

When evaluating potential health impacts to humans from direct contact, the evaluation will depend on the depth of potential activities relative to the exposure pathways. For example, if gardening is evaluated, the top 12 to 15 inches of surface soil (spade depth) should be considered. If construction of, or addition to, a building is anticipated, the top 15 feet of soil should be considered. Soil is often excavated to this depth to install building footers, and excavated soil may be used as fill in a low area.

As a final example, Weaver Boos recalls being directed by the State of Indiana Brownfields Project staff to evaluate surface soil as inclusive of the upper 10 ft for the same reasons provided in our Phase II ESA. Specifically, the State directed Weaver Boos to vertically average the surface soil concentrations measured in samples collected from 0 ft to 10 ft below ground surface at each boring location, and furthermore to compute site-wide surface soil potential exposure concentrations (PECs) by statistically pooling all soil sample results collected from 0 ft to 10 ft below ground surface. The Brownfield site we

were investigating under contract to the Indiana Finance Authority is foreseen by its municipal owner and the State with new industrial construction and a recreational trailhead, similar to the former Brick Yard Property. Weaver Boos reaffirms that the presently integrated evaluation of the upper 5 ft of soil, which vertically averages the soil concentrations at specific boring locations, is most technically correct for quantifying surface soil exposure concentrations under foreseeable future land use.

4. *Total lead was reported in ground water samples WB-9 (10.2 micrograms per liter [ug/L]) and WB-10 (19.91.tg/L); dissolved lead was below laboratory detection limits at both locations. Grab ground water samples were collected and analyzed for arsenic (total and dissolved), lead (total and dissolved) and PAHs. Total lead in one sample exceeded the RISC RDCL; however, permanent ground water monitoring wells have not been installed at the Site. Ground water monitoring wells should be installed based on the high levels of PAHs observed in the soil samples and to account for possible seasonal variations in contaminant concentrations.*

Response: Considering that no measurable impairment of shallow groundwater immediately beneath the Property was found in any of the nine (9) separate groundwater samples collected thus far, Weaver Boos disagrees that there is any need to further characterize the groundwater beneath the Property. High levels of PAHs detected in soil samples are cited as a reason for installing permanent groundwater monitoring wells. Before valuable financial resources are spent on the drilling and sampling of monitoring wells, Weaver Boos believes that it is useful to consider that like lead and arsenic, PAHs compounds are ubiquitous background constituents in soil originating from both natural and anthropogenic sources. The neighboring State of Illinois to the west has studied the issue of combined natural and anthropogenic background concentrations for metals and PAHs in soil and codified metropolitan statistical average background values for benzo[a]pyrene at 2.1 mg/kg and dibenz(a,h)anthracene at 0.42 mg/kg. Only a handful of the 48 soil samples analyzed for PAHs only marginally exceed these relevant background levels computed by the Illinois EPA for its metropolitan counties. For benzo(a)pyrene such samples are limited to WB-2 0 to 1 ft (3.34 mg/kg) and WB-17 4 to 5 ft (3.07 mg/kg in the primary sample and 2.44 mg/kg in its duplicate). For Dibenz(a,h)anthracene, such samples are limited to WB-2 0 to 1ft (1.02 mg/kg), WB-17 4 to 5 ft (0.741 mg/kg in the primary sample and 0.566 mg/kg in its duplicate), and WB-22 2 to 3 ft (0.530 mg/kg). No other PAHs were detected in soil samples from the former

Brick Yard Property at concentrations greater than RISC RDCLs. “High levels” of PAHs is a relative term given that only a few concentrations at the Property are only marginally greater than relevant background levels.

In the event that the IDEM remains concerned about groundwater quality beneath the Property, Weaver Boos notes that the Town of Porter would likely be receptive to establishing an Environmental Restrictive Covenant (ERC) prohibiting the use of potable water wells as provided for in House Enrolled Act 1162. Establishing an ERC would be considerably more cost effective than installing a network of groundwater monitoring wells and sampling them for a minimum of 4 to 20 quarters.

5. *The Report uses Surfer 6 software and kriging (a geospatial statistical tool) to interpolate the areal extent and depth of soil contamination. Weaver Boos did not demonstrate that the data set meets kriging modeling assumptions. This is a concern because (a) the near surface soil profile was altered when mined for clay and replaced with fill, and (b) the sample size (26 borings) is small given the property size of 24 acres. Weaver Boos reports that based on the disturbed appearance and the frequent presence of red brick fragments or occasional cinders, it appears that much of the soil beneath the property has been re-worked to depths of five to eight feet below ground surface. Without meeting assumptions and sample size requirements, there may be insufficient statistical power to rely on the model results and interpolated surface soil concentrations projected as requiring or not requiring remediation. IDEM agrees with Weaver Boos that refinement through the collection of additional surface soil samples in specific areas along the inferred boundaries would be useful. IDEM agrees that additional soil samples should be collected to refine the estimated contaminant boundaries. More accurate delineation of the contamination will result in more accurate remedial planning and could result in cost savings over the long term.*

Response: The Surfer 6 software was utilized under professional judgment to obtain unbiased information from the available data. A statistical power demonstration of the type referred to in this comment might be technically or academically interesting, but is unlikely to enhance the evaluation in proportion to the level of effort required. Some uncertainty will always remain in areas not directly sampled no matter how many samples are collected or analyzed. As a way to further reduce such uncertainty, the Phase II ESA already recommends that additional samples be collected and analyzed before remedial plans are finalized in support of redevelopment. The timing of such additional

investigation is not crucial so long as it is done before redevelopment actually takes place.

6. *IDEM suggests that the Town of Porter conduct a risk assessment for proposed future land use scenarios in order to ensure that any planned development is protective of human health. Prior to conducting the risk assessment, IDEM suggests that the Town of Porter determine in advance which areas of the Site will be used for various land uses. The risk assessments should be performed for each subsection that vary according to proposed land use (i.e. residential, commercial/industrial, recreational). Until future use(s) are confirmed, the most conservative use (residential) should be assumed when assessing risk. Please keep in mind that significant land disturbance (grading for redevelopment purposes) may redistribute contaminants and render previous analytical results inapplicable to an assessment of risk under the new conditions. Therefore, it may be necessary to resample surface soils and reassess risk if the property is extensively graded.*

Response: Quantitative risk assessment is certainly a useful tool for the evaluation of this (or any) Property. As we understand the present economic situation; however, the Town of Porter is not positioned to determine which areas of the Property will be used for various land uses. Financial resources are scarce and only very little residential or commercial development is currently being planned or pursued in northern Porter County. Active planning or development of the Property is unlikely to occur for an indefinite period of time. Although likely to be useful to support remediation and redevelopment, quantitative risk assessment involves variables that can only be determined after land use has been established. Weaver Boos believes that it would be premature to undertake a quantitative risk assessment at this time.

7. *The laboratory indicated that the samples collected on July 7 and 8, 2011 had ice melt water from the cooler that leaked into the some of the soil samples. It was not clear which soil samples were affected. Therefore, the results from the soil samples are all considered estimates. Since Weaver Boos proposes to conduct additional sampling, the adverse impact of the initial estimated soil sample results is minimal. IDEM soil sampling guidance recommends that cooler ice as well as individual samples should be placed in sealed plastic bags as part of good field sampling practices. IDEM strongly recommends that this sampling guidance be followed for all future sampling.*

Response: Each soil sample collected from the Property included two separate 4-ounce wide-mouth vials. Water from melted ice in the cooler was reported by the laboratory to affect several specific 4-ounce wide-mouth soil vials. As indicated on the Sample Condition Upon Receipt form for Pace Analytical project 5050539, both containers comprising the samples were so affected only in soil samples WB-17 (0-2 ft) and WB-19 (0-1 ft). We therefore instructed the laboratory to discard these samples and replacements were collected and submitted in their stead. Because the laboratory had sufficient sample volume available from at least one 4-ounce container unaffected by cooler water (or replacement containers) for all samples, Weaver Boos believes it is inappropriate to qualify any of the results as “estimated” as stated in this comment.

8. *IDEM agrees that additional sampling of soil and ground water is necessary to accurately delineate the extent of contamination. However, depending on the analytical results, additional samples may be needed for completion of the nature and extent evaluation. Results submitted in support of the completion of the nature and extent evaluation (contamination delineation) needs to be accompanied by full quality assurance/quality control (QA/QC) documentation. The requirements for full QA/QC can be found in the RISC Technical Resource Guidance Document, Appendix 2 that is available on the website: www.in.gov/idem/files/risctechguidance.pdf.*

Response: Weaver Boos would like to point out that the Phase II ESA report recommends additional sampling of soil before final remedial or mitigation plans can be prepared to support as yet undefined redevelopment. Remediation may be integrated with re-development as stated in the report (e.g., placement of clean fill or pavement sections can be used to mitigate exposure to surface soil). However, our report does not recommend further sampling of groundwater. It is our opinion that the groundwater has been adequately characterized and that no adverse impacts have been detected. Weaver Boos specifically requested that Pace Analytical Services, Inc. (who is also a contractor for the IDEM) provide the QA/QC documentation listed in the referenced guidance document. The laboratory report for 2011 includes 28 pages of QA/QC documentation. Please let us know if specific additional information is needed and we will request it from the laboratory.

Comment:

Conclusions

Additional soil samples should be collected as proposed by Weaver Boos to refine the estimated contaminant boundaries. Surface soils (zero to six inches below grade) should be analyzed independently of sub-surface soils. Weaver Boos should demonstrate that assumptions required to utilize the geostatistical tool kriging have been satisfied; otherwise, an alternate statistical method will need to be used to evaluate soil contaminant distribution. Permanent ground water monitoring wells should also be installed to obtain representative ground water samples and to account for possible seasonal variations in contaminant concentrations. Further, IDEM suggests that the Town of Porter conduct a risk assessment for proposed future land use scenarios in order to ensure that any planned development is protective of human health and the environment. Prior to conducting the risk assessment, the Town of Porter should determine which areas of the Site will be subject to various land uses. The risk assessments should be performed for each subsection that vary according to proposed land use (i.e. residential, commercial/industrial, recreational). The risk assessment may be included as part of the FSI Report.

The FSI Report should be submitted to IDEM within 60 days from the date of this correspondence to the address below. Reports should be submitted in accordance with the document submittal guidelines found online at: www.in.gov/idem/6578.htm. Additionally, IDEM should be provided a minimum of one week advance notice for field activities.

Response: With regard for the technical portion of the IDEM's above conclusion, Weaver Boos agrees that additional soil sampling will be useful. However, such additional data is nonessential until redevelopment plans can be established. With regard for the kriging tool used to evaluate the available data, quantitative statistical analyses should await additional data. A number of data nearer to 40 will likely be required for such a demonstration. The limitations of the interpolated contour maps are adequately discussed in the report and no representation has been made that they are definitive. Weaver Boos disagrees that the upper six inches of soil warrants separate investigation for the reasons provided in response to Comment #3 and that until definite redevelopment plans indicate otherwise, we reaffirm our opinion that surface soil is best defined as the upper 5 ft of soil for evaluation of exposure concentrations. Weaver Boos disagrees that there is any need for the installation or monitoring of permanent groundwater monitoring wells. No indications of groundwater contamination or other significant groundwater conditions have been found in any of the nine (9) groundwater samples collected from beneath the Property.

Ms. Aunna Huber
December 19, 2011
Page 11

Such an undertaking would be an unjustified and imprudent expenditure of scarce financial resources. In the event that the IDEM remains concerned over groundwater quality beneath the Property, Weaver Boos notes that the Town of Porter would likely be receptive to establishing an Environmental Restrictive Covenant (ERC) prohibiting the use of potable water wells as provided for in House Enrolled Act 1162. Establishing an ERC would be considerably more cost effective than installing a network of groundwater monitoring wells and sampling them for an extended period of typically of 4 to 20 calendar quarters.

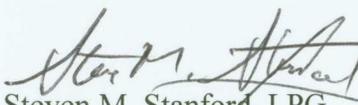
With consideration for the lack of imminent human health risk and very limited financial resources presently available for the Town of Porter to further investigate or redevelop the former Brick Yard Property, Weaver Boos believes it would be reasonable for the IDEM to grant the Town of Porter indefinite relief from the 60-day schedule specified above. If such a request cannot be granted at this time, Weaver Boos would like to suggest that the interested parties focus together to identify any truly essential FSI work that might be needed to further investigate or mitigate near term human health or environmental risk. As we have stated in the Phase II ESA, Weaver Boos believes that there is no need for further investigation until future land use has been identified and defined.

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Weaver Boos trusts that this information is sufficient for the current needs of the Indiana Department of Environmental Management. If you should have any questions or comments concerning this information, please do not hesitate to call me at 574-271-3447.

Very truly yours,

Weaver Boos Consultants, LLC


Steven M. Stanford, LPG
Senior Project Manager



Indiana LPG #968
Expires July 31, 2013

cc: **Town of Porter Redevelopment Commission**
c/o Matt Keiser
303 Franklin Street
Porter, IN 46304