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Washington, DC 20460
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Re: National Priorities List, Proposed Rule No. 61
35th Avenue, Docket ID No. EPA-HQ-SFUND-2014-0623
Comments on behalf of Walter Coke, Inc., Alabama Gas Corporation, and Mueller Water
Products, Inc.

Dear Sir or Madam,

NewFields Companies, LLC ("NewFields") has been retained by Walter Coke, Inc., Alabama Gas Corporation and Mueller Water Products, Inc., to conduct a technical analysis on certain aspects of the proposed 35th Avenue Site National Priorities List (NPL) listing.

Attached please find New Fields' *Technical Review of EPA's HRS Analysis of 35th Ave Site, North Birmingham, AL*, submitted on behalf of the above companies. This Technical Review represents only a portion of these companies' comments regarding the proposed 35th Avenue Site NPL listing. NewFields understands that Walter Coke, Inc., Alabama Gas Corporation and Mueller Water Products, Inc. will each also prepare individual submissions to the 35th Avenue docket.

Among NewFields' findings is that EPA has used flawed and biased approaches, inconsistent with EPA policies, practices, and guidance, to derive the "background" concentrations of arsenic and benzo(a)pyrene. These errors improperly inflated the HRS score and invalidate the proposed NPL listing. Using scientifically sound background values results in a score below the NPL threshold.

Thank you for your attention to this matter, and please do not hesitate to contact me if you have any questions.

Sincerely,

Shahrokh Rouhani, Ph.D., P.E.

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Technical Review of EPA's HRS Analysis of 35th Avenue Site, North Birmingham, AL

Executive Summary

NewFields Companies, LLC (NewFields) has reviewed certain aspects of the United States Environmental Protection Agency (EPA) proposal (including the supporting record identified by the proposal) to add the 35th Avenue Superfund Site (the Site) to the Superfund National Priority List (NPL). That review revealed that EPA's proposal is improperly based on biased sampling, flawed decisions, and inappropriate statistical methods, which invalidate the EPA's listing proposal.¹

In particular, the proposal selects and relies on scientifically invalid "background" values for arsenic and benzo(a)pyrene (BaP). EPA's selection of a "background" value for each substance from 2010 sampling conducted in the Robinwood area of Birmingham is flawed and biased for a number of methodological and statistical reasons, and is inconsistent with EPA guidance and practice, as further discussed in this Memorandum.

In the case of arsenic in particular—which is naturally occurring and well documented to exist in Alabama at levels above the background values EPA selected here—the proposal fails to consider a significant body of accepted data on background arsenic levels in the northern Alabama area generated by the U.S. Geological Survey (USGS).

NewFields has applied EPA-recommended, scientifically defensible methods that were available to but not used by EPA, for determining Site-specific background values based on existing data, which resulted in materially higher background values for both arsenic and for BaP.

Applying such defensible background values to the data used by EPA from the Site would result in a HRS score under the 28.5 threshold for eligibility for inclusion on the NPL.

EPA's flawed and biased analysis is not based on sound science, invalidating the NPL listing proposal. A proper scientific analysis of the data used by EPA does not support the placement of the Site on the NPL.

¹ NewFields' scope of review was focused on the key points discussed in this Memorandum. Identification of the flaws discussed in this Memorandum is not intended to suggest that NewFields has comprehensively identified all flaws in the proposal. Individual companies that retained NewFields may provide supplemental comments addressing issues that are not addressed in this submission.

Additionally, NewFields analyzed whether any statistical difference exists between Site samples whose field notes alleged the presence of apparent coal or coal-like fragments and Site samples whose field notes contain no such reference. No statistically significant difference in arsenic or BaP concentrations exists as between these two data sets. To the extent that EPA's "Attribution" theory rests in whole or in part on alleged releases of such coal or coal-like materials as evidenced by such observed materials, it is invalid and unsupported.

Introduction and Background

In September 2014, the United States Environmental Protection Agency (EPA) proposed to add the 35th Avenue Site (the Site) to the Superfund National Priority List (NPL). Three companies requested NewFields'² review and analysis of certain aspects of the proposed listing, with particular attention to the validity of EPA's background determinations.

The Site, as shown in Figure 1, encompasses portions of the area historically known as North Birmingham including the Fairmont, Collegetown, and Harriman Park neighborhoods, as well as portions of Five-Mile Creek and Harriman Park ditch, located in and around Birmingham, Jefferson County, Alabama.

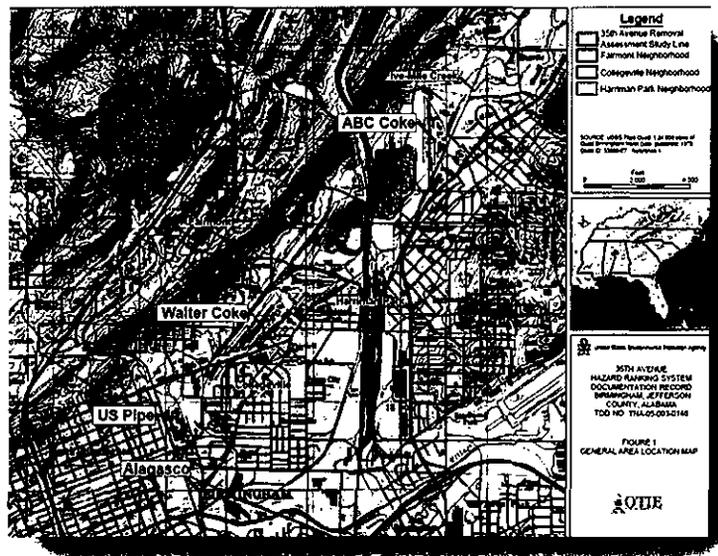


Figure 1. 35th Avenue Site (Source: HRS Documentation Record EPA, 2014)

"ABC Coke" label in the above map reportedly refers to an ABC Coke/Department of Defense facility. Also, KMAC has been identified by EPA as a PRP but is not reflected on this particular map.

² NewFields is a consortium of leading experts in environmental sciences, engineering, toxicology, statistics and decision analysis. Our project experience includes three decades of complex CERCLA and RCRA investigations. More information can be found at www.newfields.com.

The justification for the proposed addition was provided in a Hazard Ranking System (HRS) document referred to herein as the *HRS Documentation Record* or EPA (2014). The HRS Documentation Record was primarily supported by data generated during two investigations, documented in:

- **Removal Report:** Titled "Removal Investigation Report, 35th Avenue Superfund Site." Prepared for EPA by Oneida Total Integrated Enterprises (OTIE). Rev. 0. TDD No. TNA-05-003-0148. Dated December 31, 2013. The Removal Report presents the results of the investigation of 1,116 properties, as indicated on Figure 2, situated within the Site.³
- **Robinwood Report:** Titled "Sampling Investigation Report, Walter Energy, Inc." Prepared by EPA Science and Ecosystem Support Division (SESD), Athens, Georgia. SESD Project Identification Number: 10-0656. Investigations conducted September 22-24, 2010. Final Report Revision 2 Issued on April 05, 2011. The Robinwood Report presents the results of the investigation of 21 properties, as indicated in Figure 2, situated within an area considered by EPA as representative of background conditions.

³ Although OTIE's use of XRF in connection with the Removal Report is not apparently an express basis for the computed HRS score, NewFields notes that OTIE's XRF data are badly flawed and should not be used for listing or for removal or remediation decision making. NewFields has reviewed Walter Coke and EPA prior correspondence on this subject and has independently confirmed that Walter Coke's critique of the XRF data was well-made. In HRS Documentation Record, EPA (2014, page 19) states that it collected "4,767 surface soil samples for x-ray fluorescence (XRF) screenings." The same document also states that fourteen percent of the XRF screening samples (or 677) were also analyzed in a laboratory. NewFields has correlated the XRF screening test results to those obtained from the laboratory analyses and calculated a *coefficient of determination* of 0.0234 for the comparison. In NewFields' professional experience and judgment, given this exceedingly poor correlation, any attempt to use OTIE's XRF screening data to support EPA's proposed listing decision would be scientifically indefensible.

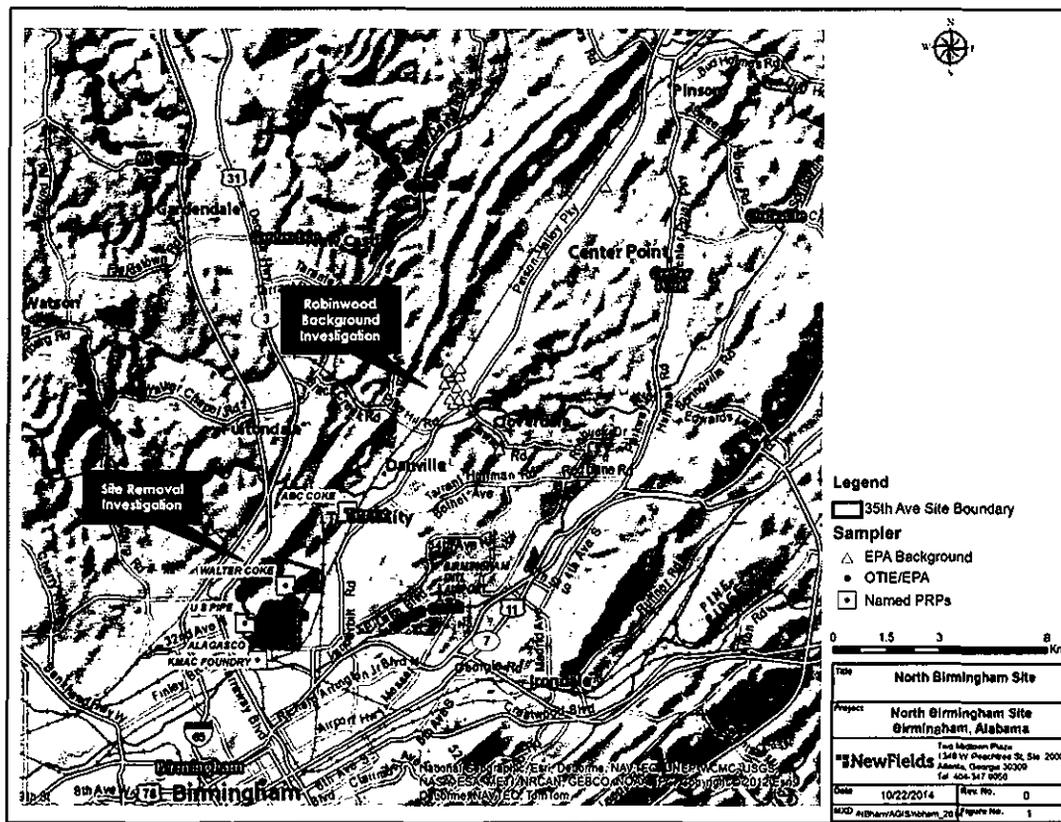


Figure 2. Site Removal and Robinwood (Background) Investigations

The HRS Documentation Record calculated the Site HRS score based on measured soil concentrations of arsenic and benzo(a)pyrene (BaP) from a number of residential yards (EPA 2014, pages 31-42). Consistent with the procedures described in the *HRS Guidance Manual* (EPA, 1992), a concentration is considered to indicate “observed contamination” if it exceeds three times its corresponding background level (3xBG). The HRS Documentation Record determined the arsenic and BaP background levels based on data provided in the Robinwood Report. The HRS Documentation Record calculates a Site HRS score of 50. Any site with an HRS score of 28.50⁴ or greater is eligible for addition to the NPL. Based on the calculated Site HRS score of

⁴ The 28.5 score does not represent a specified level of risk, but is a cutoff point that serves as a screening-level indicator of the highest priority releases or threatened releases.

50, the HRS Documentation Record stated that the Site is qualified to be added to the NPL.⁵ However, as explained further below, EPA's flawed and biased analysis is not based on sound science and contradicts EPA policies, practices, and guidance, invalidating the NPL listing proposal. A proper scientific analysis of the data used by EPA does not support the placement of the Site on the NPL.

Technical Comments

Comment 1: Inflated HRS Score

Our review of HRS Documentation Record, supporting documents and data (including field notes) indicate that the computed Site HRS score is inflated as a result of a number of technical deficiencies related to EPA's determinations concerning background concentrations of arsenic and BaP. A more reasonable and accurate calculated Site HRS score is below the cutoff-score of 28.5, and does not support the placement of the Site on the NPL.

EPA justifies the addition of the Site to the NPL with a claimed HRS score of 50 (HRS Documentation Record: EPA, 2014, page 2), which exceeds the cutoff-score of 28.5. The HRS site score (s) is calculated as the root-mean-square of four scores; each associated with a specific pathway of groundwater (s_{gw}), surface water (s_{sw}), soil (s_s), and air migration (s_a), respectively, as:

$$s = \sqrt{\frac{s_{gw}^2 + s_{sw}^2 + s_s^2 + s_a^2}{4}}$$

⁵ NewFields' review of EPA's record has been hampered by the very poor and disorganized production of documents by EPA. Data and documents provided by EPA in support of the computed Site HRS score were provided on two CDs which contained more than 200,000 pages; these pages were not in order and sometimes mislabeled. Moreover, the documents were principally in the form of hundreds of discrete pdf files, whereas it is clear that EPA had the data in electronic format, imposing on commenters the needless, time consuming and expensive task of converting the files into useable information. The CDs did not contain the Removal Report, which was received subsequent to a specific request for the document following determination that it was not included in the original document production. During the time of preparation of these comments, a number of key items are still missing, including (i) missing field notes at least 9 properties and missing photographic logs for eight 8 of those 9 properties; (ii) incomplete field notes at a number of properties; (iii) missing data from at least 18 properties; (iii) missing laboratory reports for at least 30 properties; and (iv) missing photographic logs from at least 364 properties, including 22 that were used in the HRS calculation process. Some but not all omissions were addressed in an FOIA response NewFields did not receive until January 8, 2015, preventing a thorough review prior to the comment deadline. Other errors included mislabeling of collected samples, reporting incorrect coordinates for sampling points, or linking samples to incorrect properties. Attachment 1 provides examples of mislabeling in the photographic logs.

Each pathway score has a minimum value of 0 and a maximum value of 100. The mathematics of the root-mean-square equation is such that higher-scoring pathways exert a proportionately greater influence on the site score than lower-scoring pathways. Consequently, it is easier to raise a site score by adding points to a high-scoring pathway than by increasing the same to a second lower-scoring pathway.

Each HRS pathway score is the product of the three “factor category” values (likelihood of release or exposure, waste characteristics, and targets) divided by a scaling factor. In general, a high pathway score requires relatively high values for all three factor categories. Often a low value for any single factor category causes the pathway score to drop.

The HRS Documentation Record (EPA, 2014) considered only the soil pathway score, which attained its maximum value of 100. This was done by assigning highly elevated values to the Site soil factor categories:

- The likelihood of exposure was assigned the maximum value of 550 as a result of an area of observed contamination⁶ on at least one resident property.
- The waste characteristics were also assigned their corresponding maximum values.
- The maximum value of 50 was assigned for the resident target as there was at least one resident exposed to concentrations that exceed Level I concentrations (health-based benchmarks).
- The remainder of the points were the result of the number of targets (residential properties with concentrations >3xBG multiplied by 2.48 residents per property).

Review of available data indicates that the Site soil factor-category values and the resulting HRS score provided in the HRS Documentation Record are highly inflated. The primary reason for these inflated results is EPA’s use of biased and inappropriate background levels that have been assigned to arsenic and BaP, as explained below.

Comment 1.a. Biased and Dissimilar Background Investigation

The Robinwood Report presents EPA’s basis for establishing background threshold values for arsenic and BaP.⁷ For this purpose, soil samples from the yards of 21 properties in the Robinwood neighborhood were collected, as shown on Figure 2. The HRS Documentation Record (EPA 2014, page 20) justifies the selection of the Robinwood neighborhood by stating that: “ [the Robinwood neighborhood] *was selected because the soil types within the neighborhood were determined to have similar composition to those within the 35th Avenue site area, and the neighborhood is outside the influence of coke production ... Additional similarities between the*

⁶ An observed contamination is referred to a soil sample with concentration equal to or greater than three times the background level (3xBG).

⁷ The Robinwood sampling was conducted in 2010, prior to the involvement of EPA’s CERCLA branch, and no information exists to suggest it was intended to support an HRS scoring effort.

Robinwood neighborhood and the 35th Avenue AOC include: home construction and age; the use and storage of coal for home heating; residential burn barrels in the neighborhood; asphalt shingles on the home; asphalt roads and the nearby rail road line (i.e., non site related factors that could contribute to ambient contaminant levels)...Further, the surficial geology of the Robinwood neighborhood is similar to that of the 35th Avenue site."

The above justifications are crucial because of the requirements of the *HRS Guidance Manual* (EPA, 1992, Section 5.1, page 58) stating that site and background samples must be *similar*, defined as: "*samples from the same environmental medium that are identical or similar in every way (e.g. field condition procedure, analytical technique) except the degree to which they are affected by a site.*"

Contrary to the above rationale and in direct contrast to the Removal Report, EPA's Robinwood investigation was based on biased and dissimilar soil samples, including:

- Robinwood samples were all composite samples based on aliquots collected from 0 to 6 inches below ground surface (bgs). The Removal Report, in contrast, relies solely on aliquots collected from 0 to 4 inches bgs at the Site. This dissimilarity is critical given the fact that the HRS Documentation Record (e.g. EPA, 2014, page 16) repeatedly refers to air deposition as the primary source of contaminants present within the Site. Under the air deposition assumption for Site contamination, the 6-inch Robinwood (background) samples are diluted by 33% compared to the 4-inch Removal Report samples. This difference in depth makes Robinwood (background) and Site samples "dissimilar." Such dissimilar background samples are not appropriate for use to determine whether Site soils have been impacted.
- EPA made significant decisions regarding the investigation of the Robinwood properties that were not replicated in the sampling of the neighborhoods comprising the 35th Avenue Site, creating inherent bias that renders the purported background sampling invalid. Such decisions are apparent in the field notes associated with the Robinwood report, including but not limited to:
 - avoidance of structures on 12 properties;
 - avoidance of perceived impacted areas on 12 properties (including but not limited to from roofing, asphalt shingles, oil staining, yard trash, barbeque pits, and abandoned cars);
 - avoidance of roads and streets on four (4) properties;
 - avoidance of areas open and available for sampling on seven (7) properties; and
 - exclusion of four (4) properties entirely, including in at least one instance (WC-15) due to the apparent presence of dumped materials.

Examples of EPA's biased decisions regarding the collection of "representative" background samples are listed in Table 1.

Table 1. Example of Biased Decisions during EPA's Robinwood Background Investigation
(Source: Robinwood Report and Field Notes)

Property ID	Avoiding Structures	Avoiding Suspect Sources	Avoiding Roads	Ignoring Parts of the Property	Reject "Unacceptable" Properties	Reject "likely impacted" aliquots	Photos Noted	Others
WC-1	X		X	X				
WC-2	X						X	4 aliquot (EPA decided on 5-aliquot before sampling WC-02)
WC-3	X	X	X			X		4 aliquot (EPA decided on 5-aliquot before sampling WC-02)
WC-4	X	X (RR)						
WC-5	X	(RR+Shingles+Siding)						
WC-6		(RR+Shingles+Siding)		X			X	
WC-7	X (multiple houses)							
WC-8	Reject Sample				X			Soil has coal fragments "Potential for Elevated Arsenic and PAHs"
WC-9		X		X			X	
WC-10								
U5 Truck Park					X			No sampling: "environmental issues"
WC-11	X	X					X	
WC-12		X	X		X	X (dark fine soil)		
WC-13	X			X				
WC-14 (J5CC)		X (BBQ pits)		X				
WC-15					X			No sampling: RR and Dump?
WC-15 (Alt)	X	X		X				
WC-16				X				
WC-17		X					X	
WC-18	X	X						
WC-19	X						X	
WC-20	X							
WC-21		X (pole-chimney)	X				X	

- The avoidance of various parts of Robinwood properties (and the exclusion of entire properties in some instances) for sampling is inconsistent with the rationale of similarity

used to justify the Robinwood neighborhood as representative of background. The exclusion of areas for sampling is especially problematic when considering that the Site Removal investigation required sampling on a 5-point grid from any part of an investigated yard regardless of potential impacted soil or location within the property boundary; all open areas at Site properties were sampled; and all samples regardless of their contents were subjected to chemical analysis. Given these significant differences in sample collection approaches, the Site and Robinwood (background) samples do not meet the criterion of similarity as defined by the *HRS Guidance Manual* (EPA, 1992). Ironically, EPA's biased decisions in connection with the Robinwood background investigation were intended to eliminate any potential impact from activities that were identified by EPA as the very factors that made Robinwood similar to the Site.

- The Robinwood Report identifies *"the use and storage of coal for home heating"* as one of the major similarities between the Site and Robinwood neighborhood as the rationale for selection as representative of background. Despite such a declaration, EPA rejected an entire property due to presence of coal fragments in its sample. Sample WC-08-SF *"contained coal fragments and was deemed not suitable for a background sample. This sample was rejected and not submitted for [chemical] analysis"* (Robinwood Report, page 8). The rejection of this property is problematic because during the Site Removal investigation, more than 1,000 soil samples with apparent coal or coal-like fragments were collected and subjected to chemical analysis.
- The Robinwood five-aliquot samples were not collected in a manner consistent with those investigated at the Site. These inconsistencies and dissimilarities are obvious when comparing the Robinwood Property WC-12 to a typical Site Property, CV0859. The HRS Documentation Record (EPA 2014, page 21) considers the WC-12 composite sample as representative of the Site arsenic background concentration. As shown in Figures 3 and 4, the WC-12 composite sample is based on randomly located aliquots collected from the central portion of the yard. The aliquot locations are distant from roads/streets, do not contain any potentially impacted material, and are not close to any suspected impacted locations, such as *"dark coal ash,"* as depicted in EPA's Robinwood Field Notes for WC-12. Even within this biased construct, EPA rejected an original aliquot location containing *"coal fragment"* (Aliquot C-5) in favor of another aliquot location with no visible coal material, potentially skewing the result. In contrast, every part of the yard of the Site property CV0859 was sampled based on a tight grid pattern designated in the sampling work plan for the Site Removal investigation.

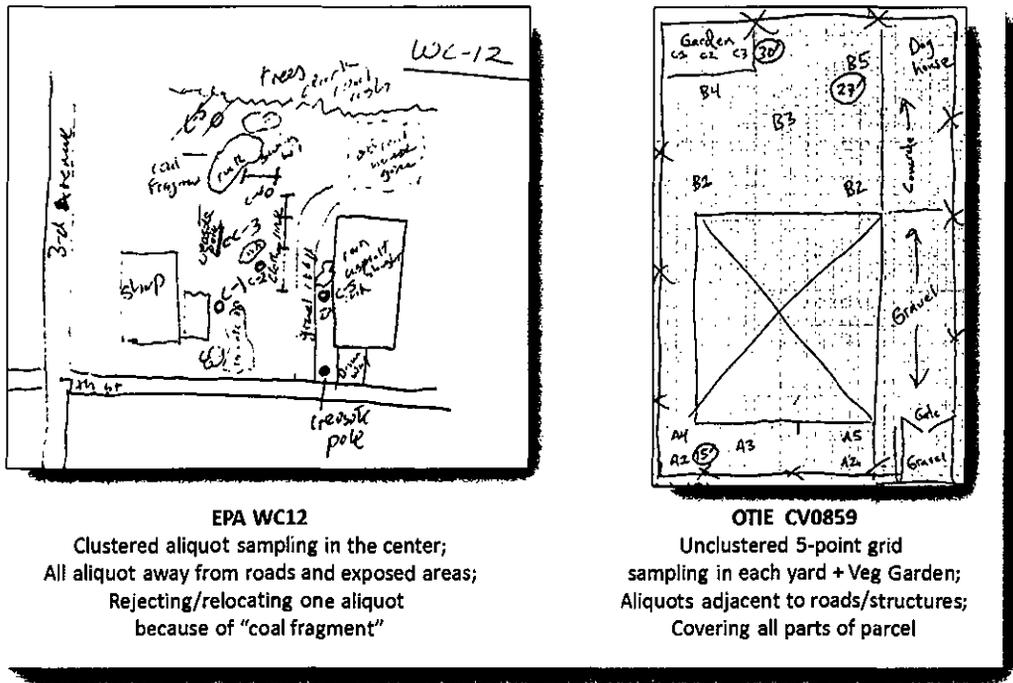


Figure 3. Hand-drawn Field Note Maps of WC-12 (Robinwood) and CV0859 (Site)

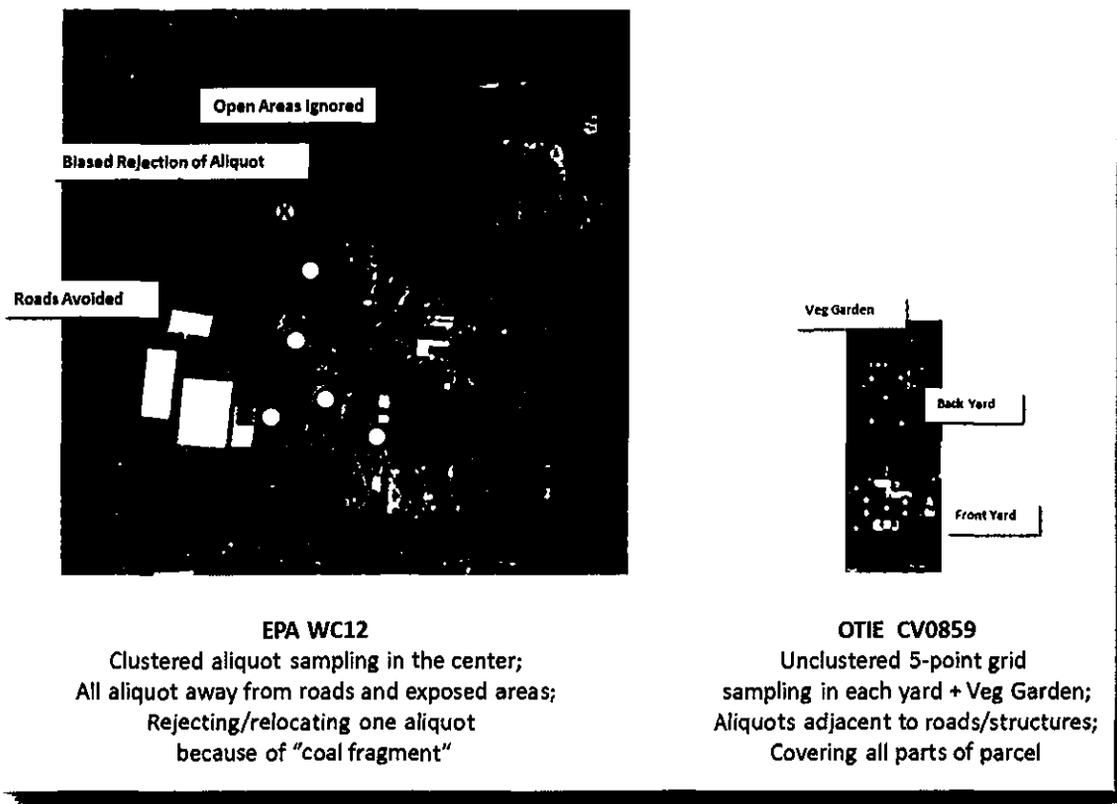


Figure 4. Aerial Images of WC-12 (Robinwood) and CV0859 (Site)

- Despite EPA's statements about the "similarity" of Site and Robinwood soil types, the review of available data indicate significant differences in soil types. In fact, 95% of Robinwood samples, including all samples selected as representative of Site background concentrations (HRS Documentation Record EPA, 2014, page 21), are characterized as having "light to medium-brown" soil. The review of photographic logs from the Site Removal investigation indicates that 94% of Site samples are dark gray/black soil, as shown on Figure 5. As demonstrated in this figure, the Robinwood (background) samples are not the same soil type as the Site samples and therefore do not meet the criterion of similarity as defined by the *HRS Guidance Manual* (EPA, 1992).

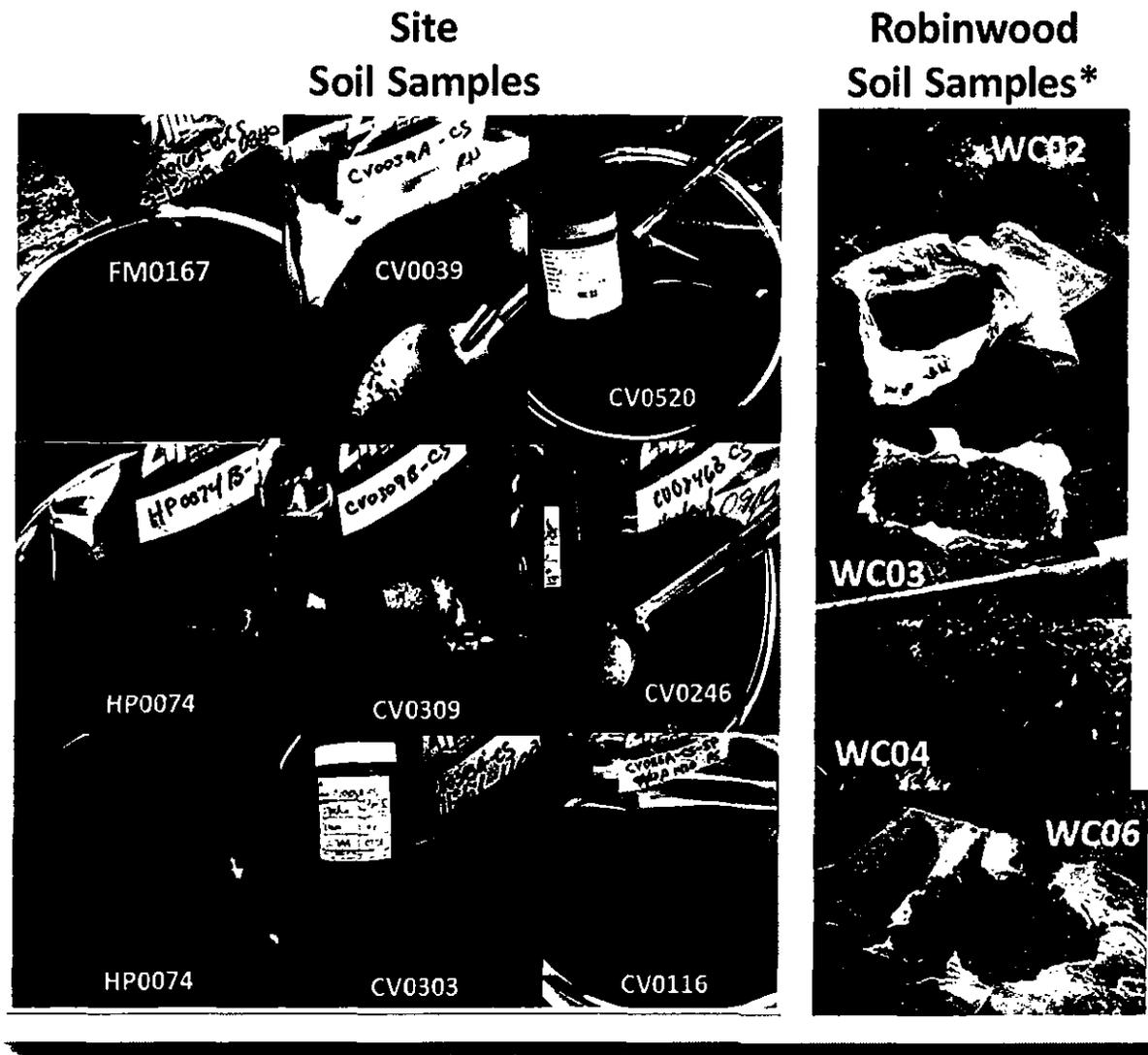


Figure 5. Typical Examples of Site and Robinwood Soil Samples
 (*Displayed Robinwood photos include all soil pictures provided by EPA)

- Approximately 50% of Site samples are from properties situated within floodplains, as shown on Figure 6 while the vast majority of Robinwood samples (19 out of 21) are collected outside of the floodplain area. As stated in the HRS Documentation Report (EPA, 2014, page 43): “[t]he presence of lead, arsenic, and BaP within the AOC is most likely due to emissions from facility stacks, use of solid waste as fill material, and the likely inundation of properties during flood events (emphasis added).” EPA has therefore theorized that the

Site has been impacted from prior flood events; the Robinwood samples, which have not been impacted by past flooding events, do not meet the criterion of similarity as defined by the *HRS Guidance Manual* (EPA, 1992).⁸

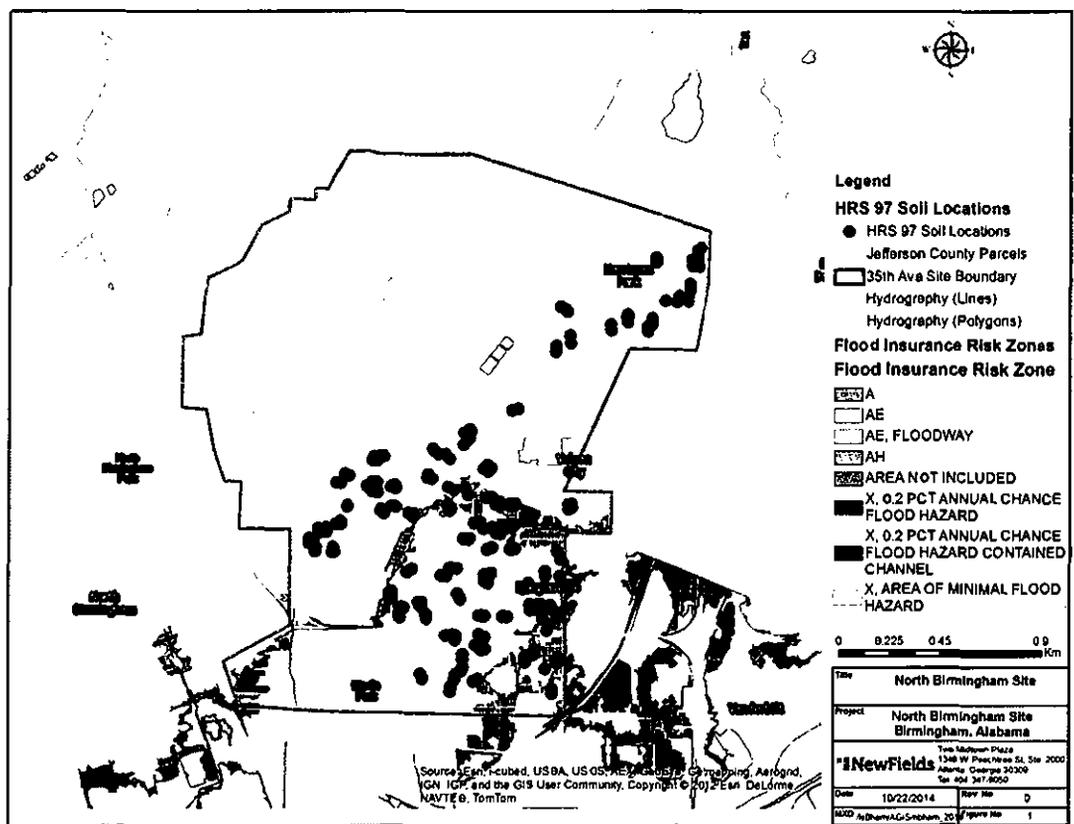


Figure 6. Floodplains with Site Removal Investigation

Comment 1.b Arbitrary Background Levels

Technical biases imbedded in EPA's Robinwood (background) sampling are further compounded by arbitrary decisions made by EPA to determine the background levels based on select data presented in the Robinwood Report. These arbitrary decisions include:

- EPA does not abide by the prevailing guidance documents, including EPA (2002, 2013), DON (2002) and Singh *et al.* (2014), to determine background threshold values for

⁸ Notably, EPA (2014, page 16) asserts that the flooding at issue was from Five Mile Creek, but none of the Site residential properties EPA sampled are situated within the Five Mile Creek Floodplain. Site floodplain is associated with Village Creek, which is neither a tributary, nor connected to Five Mile Creek.

arsenic and BaP. In lieu of following guidance for establishing representative background threshold values, EPA arbitrarily lists a few individual Robinwood sample results as the background levels (HRS Documentation Record: EPA, 2014, page 21,). No method is identified, nor is any justification or explanation provided for the selection of these individual sample results. The listed results do not include the highest measured values obtained from the Robinwood sampling. Such an omission, in conjunction with the numerous biased decisions made during the Robinwood investigation, makes the EPA established background levels unreliable and inaccurate.

- The HRS Documentation Record ignores background levels established at other nearby locations for purposes of environmental investigation/remediation. For example, at the Interstate Lead Co. Site in Jefferson County, Alabama, EPA determined the soil arsenic background level was 13 ppm – more than twice the level established in the HRS Documentation Record (EPA 2014). The five-year review document for the Interstate Lead Co. Site⁹ further states that: *“based upon the impracticability of cleaning up contaminated soil to background arsenic levels, EPA changed the cleanup level for arsenic in OU2 soil from 13 mg/kg to 30 mg/kg.”*
- The HRS Documentation Record also ignores the vast array of regional background data compiled by the United States Department of Energy (DOE) at http://rais.ornl.gov/tools/bg_search.php, and by the United States Geological Survey (USGS) at <http://mrdata.usgs.gov/general/map.html>. This latter database contains more than 390 background soil and sediment samples located within the 50 km radius of the Site, as displayed on Figure 7.

⁹ Skeo Solutions (2011).

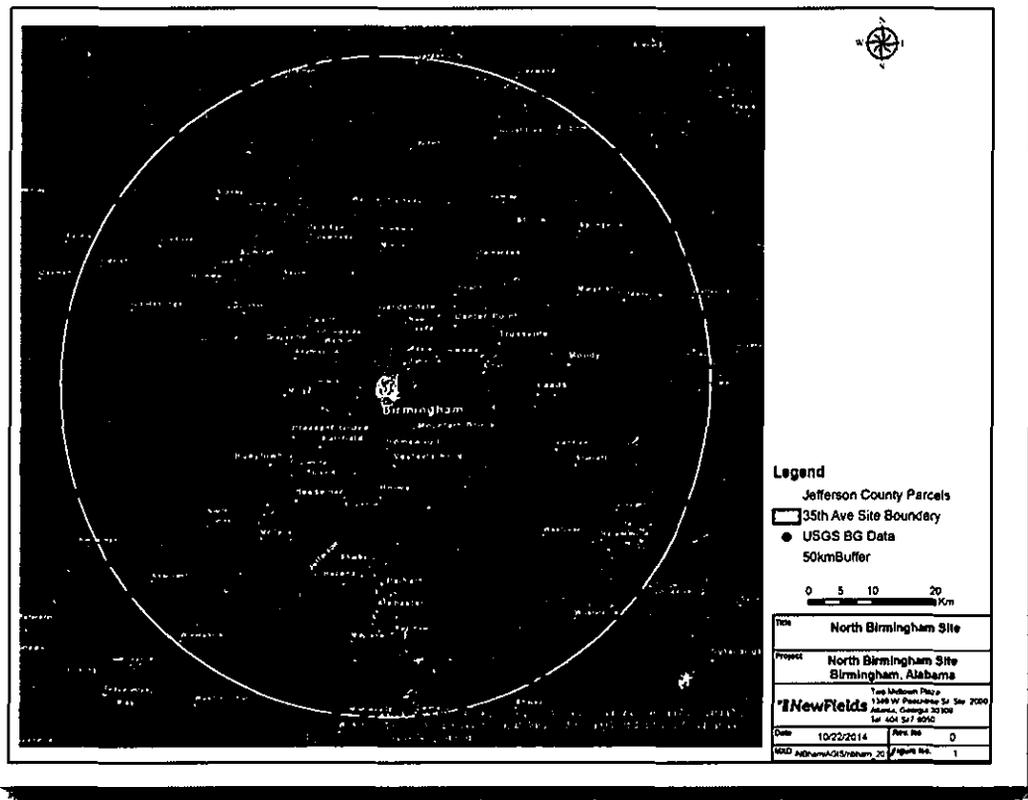


Figure 7. USGS Regional Background Soil and Sediment Samples Situated within 50 km Radius of the Site

Comment 1.c Appropriate Background Levels

Appropriate soil background levels for arsenic and BaP should be determined, consistent with the prevailing guidance documents such as EPA (2002, 2013), DON (2002) and Singh *et al.* (2014), through the following approach:

- Available Site data can be subjected to probability plot analyses, as recommended by EPA (2002), DON (2002) and Singh *et al.* (2014). The probability plot analyses results in background levels of 34 and 1.259 ppm for soil arsenic and BaP, respectively, as provided in Figures 8 and 9, respectively.

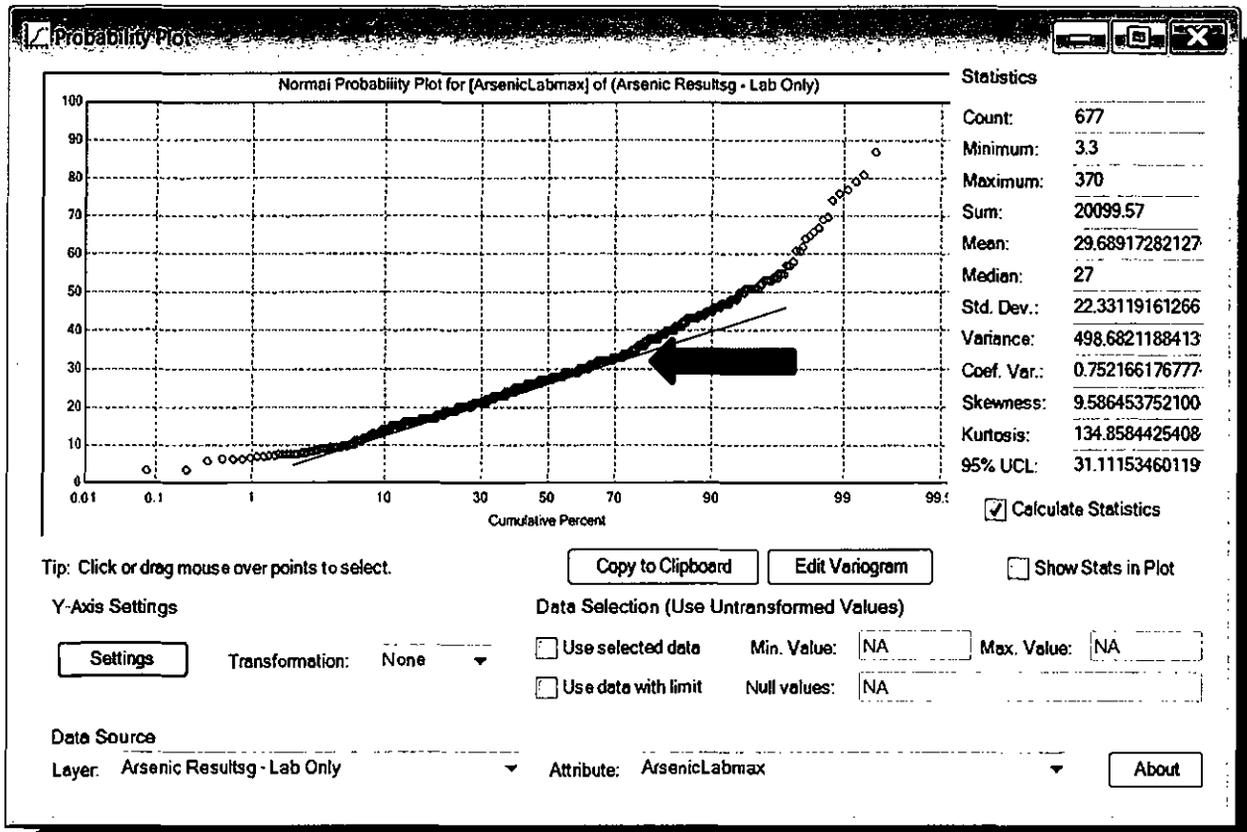


Figure 8. Normal Probability Plot of Site Arsenic (Laboratory Analyzed) Data Less than 100 ppm

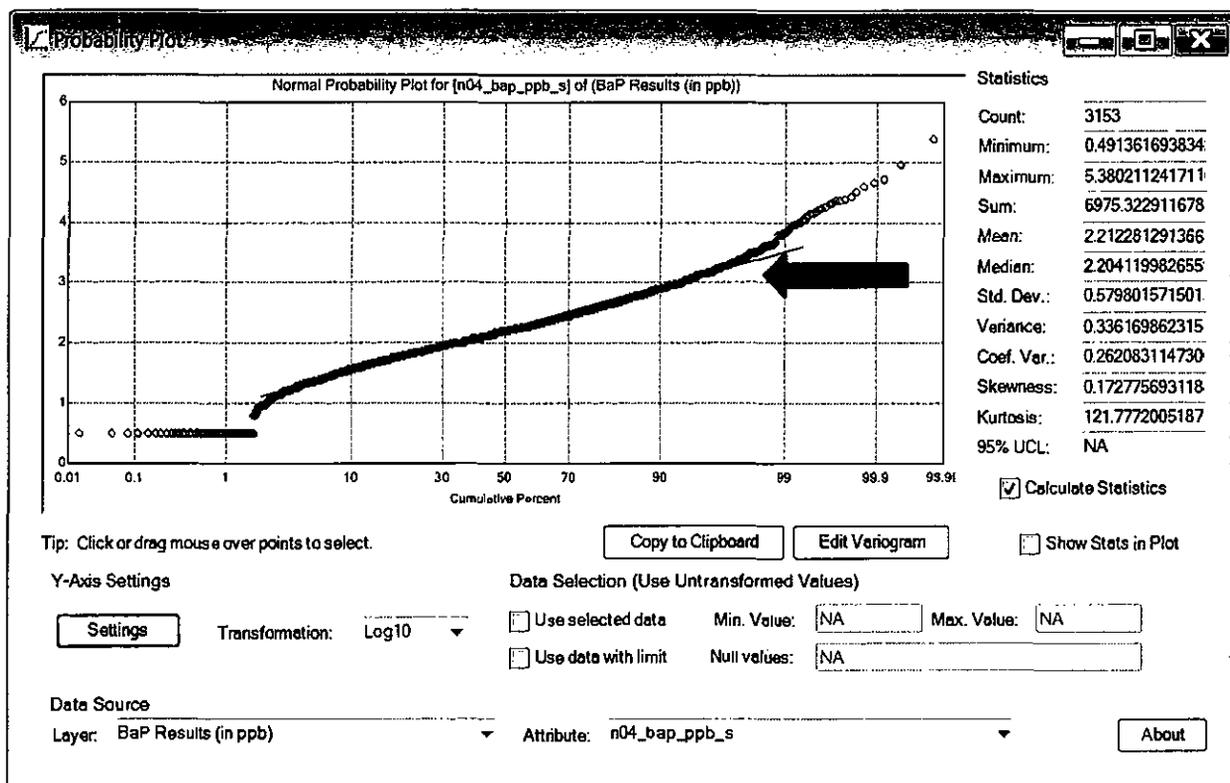


Figure 9. Log-normal Probability Plot of Site BaP Data

- Pursuant to the above cited guidance document, e.g. DON (2002, page 44), to ascertain the appropriateness of Site background threshold values, they were compared to the available published regional background data. The USGS regional background dataset provides such information for arsenic concentrations in soil and sediment samples situated within the 50-km radius of the Site, which range up to 31 ppm.¹⁰ Such an upper range confirms the appropriateness of the Site arsenic background threshold value of 34 ppm.

Use of the above appropriate background levels results in an HRS score of 13.4, which is less than the cutoff-score of 28.5 and invalidates the EPA NPL listing proposal.

Comment 1 Summary: The HRS score presented in the HRS Documentation Record (EPA, 2014) is inflated as a result of biased and inappropriate arsenic and BaP background levels used in the scoring process. The background levels were derived from the biased and dissimilar Robinwood soil sample data. The intentionally-biased nature of the Robinwood data renders them unacceptable representatives of Site background conditions. These biases are further

¹⁰ For this analysis, any regional soil or sediment sample identified by USGS as being near a potential source was excluded.

compounded by the arbitrary selection of individual sample concentrations as representative background levels. EPA ignored prevailing guidance documents, published regional background levels, as well as available regional background data, when they assigned their background levels. Use of the appropriate, Site-specific background levels, determined based on prevailing guidance documents, results in an HRS score lower than the cutoff-score of 28.5, which do not qualify the Site for placement on the NPL.

Comment 2: Statistical Analysis of Samples Sorted by Field Note Descriptions

Field notes from EPA's contractor, OTIE, purport to describe the soils associated with samples OTIE collected at the Site. An unusually large number of samples were described as containing coal or coal-like fragments. NewFields conducted a statistical analysis of the concentrations of arsenic and BaP in samples described as containing such observed materials and samples not described as containing such observed materials. No statistically significant difference exists between the two data sets.

As stated in the HRS Guidance Manual (EPA, 1992, page 55): "[e]stablishing an observed release (or observed contamination) by chemical analysis generally requires attributing the hazardous substance to the site, and also requires determining background, demonstrating that the concentration of the hazardous substance in a release sample is significantly increased above background, and attributing some portion of the significant increase to the site." EPA (1992, page 55) defines this major component of the HRS process as "Attribution: The determination that a hazardous substance in a release is likely to have originated in one of the sources at a site. Attribution usually requires documenting that at least one hazardous substance found in a release at a concentration significantly above background (or directly observed in the release) was produced, stored, deposited, handled, or treated at the site; and at least a portion of the significant increase could have come from a source at the site."

The HRS Documentation Record purportedly establishes attribution at least in part by repeatedly stating a hypothesis, hereinafter referred to as the "Coal Hypothesis," which consists of the following elements:

- The primary source of arsenic and BaP at the Site is identified as coal from local mines. According to the HRS Documentation Record (EPA 2014, page 16): "*[c] oal from mines in the Birmingham area and the Black Warrior Basin in west Alabama and the central Appalachians is known to have arsenic levels as high as 1,500 milligrams per kilogram (mg/kg)... BaP is a known contaminant from coke ovens and foundries; arsenic, while also high in local soils, is present at high concentrations in the coal from Birmingham and north Alabama, the same coal used in many of the coke furnaces; lead is a known contaminant from foundries and other industrial plants."*

-
- The contamination pathways to the properties within the Site are then described: *“Air is the primary source of deposition within the 35th Avenue site AOC, from smokestacks and windblown particles from process fines and other stockpiled material; flooding from Five Mile Creek is another source of deposition. Aerial deposition of lead, arsenic, and BaP throughout the 35th Avenue site is supported by the variability in wind direction as documented in the Wind Rose graphs from 1950-1955, 1970-1975, 1990-1995, and 2008-2012 that indicate considerable wind variability in the area ... Another source of deposition of material includes the sediments of Five Mile Creek, which have been shown to contain lead, arsenic, and BaP, and are known to be in a flood prone area (EPA, 2014, page 16).”*

Remarkably, throughout all EPA investigations as documented in the Robinwood, Removal and HRS Documentation Record reports, EPA fails to present even the most rudimentary evaluation of the Coal Hypothesis. Rather than conducting a systematic hypothesis testing, the HRS Documentation Report (EPA 2014, page 50) summarily dismisses the need for any evaluation of the hypothesis by providing a confused and convoluted statement: *“Uneven spatial distribution of contaminants within the AOC is likely due to the length of time since initial contamination deposition, variations in wind and weather patterns, and the proximity to Five Mile Creek ... In the 100-plus years since operations began in the area, many of the residential yards have been disturbed by landscaping, sidewalk placement, gardening, and even total redevelopment. Additionally, the historical wind direction for the 5-year periods between 1950-1955, 1970-1975, 1990-1995, and 2008-2013 indicates considerable wind variability in the area ... This data further supports the aerial deposition and commingling of lead, arsenic, and BaP contamination in the soil within the AOC from multiple likely and possible contributors.”* Such a convoluted dismissal of a systematic hypothesis evaluation is not only arbitrary, but also contrary to the principles of *Scientific Theory* (Popper, 1963).

The extensive Site data collected as part of the Site Removal investigation provides a means for systematic testing of the Coal Hypothesis. In fact, as the available data indicate, 1,055 Site Removal samples contain coal or coal-related debris versus 2,027 samples that have no coal or coal-related debris.¹¹ If the Coal Hypothesis is true, then samples containing coal or coal-related debris, on average, should have higher concentration of arsenic and BaP.

To test the above Coal Hypothesis, more than 3,000 unseived, laboratory-analyzed soil samples were subjected to a series of systematic tests, as listed in Table 2 and shown in Figure 10. The results of the systematic testing indicate that samples containing coal or coal-related debris are statistically indistinguishable from those without debris. Consistent with principles of Scientific Theory, such results indicate that the Coal Hypothesis must be rejected.

¹¹NewFields notes that OTIE's work may reflect problematic sampler bias given the numerous OTIE field notes containing apparently prejudicial descriptions of 'coal' or 'coal fragments'. In NewFields' experience, objective field observations would tend to avoid drawing such specific and definitive conclusions about the source of components of soil samples, and instead would use objective terms describing the material, whether by color, physical nature, or other properties. Further EPA's own standard operating procedures for field documentation specifically addresses this issue, "*Field documentation contains only facts and objective observations because they may be used as documentary evidence in civil or criminal hearings, Revision 1*" (USEPA, 2013. *Field Operations Group, Guidelines for Field Activities*). The nature and consistency of OTIE field note descriptions that purport to specifically identify coal in sample aliquots raises serious potential concerns over the objectivity of the work performed.

Table 2. Statistical Testing of Coal Hypothesis
(Insignificant differences at 5% levels)

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Bap	.002	.967	-.262	3073	.794	-.05067	.19372	-.43050	.32917
			-.301	2984.446	.763	-.05067	.16818	-.38042	.27909
Arsenic_Lab	.886	.347	-1.881	330	.061	-4.99073	2.65339	-10.21043	.22897
			-1.672	178.067	.096	-4.99073	2.98567	-10.88258	.90112

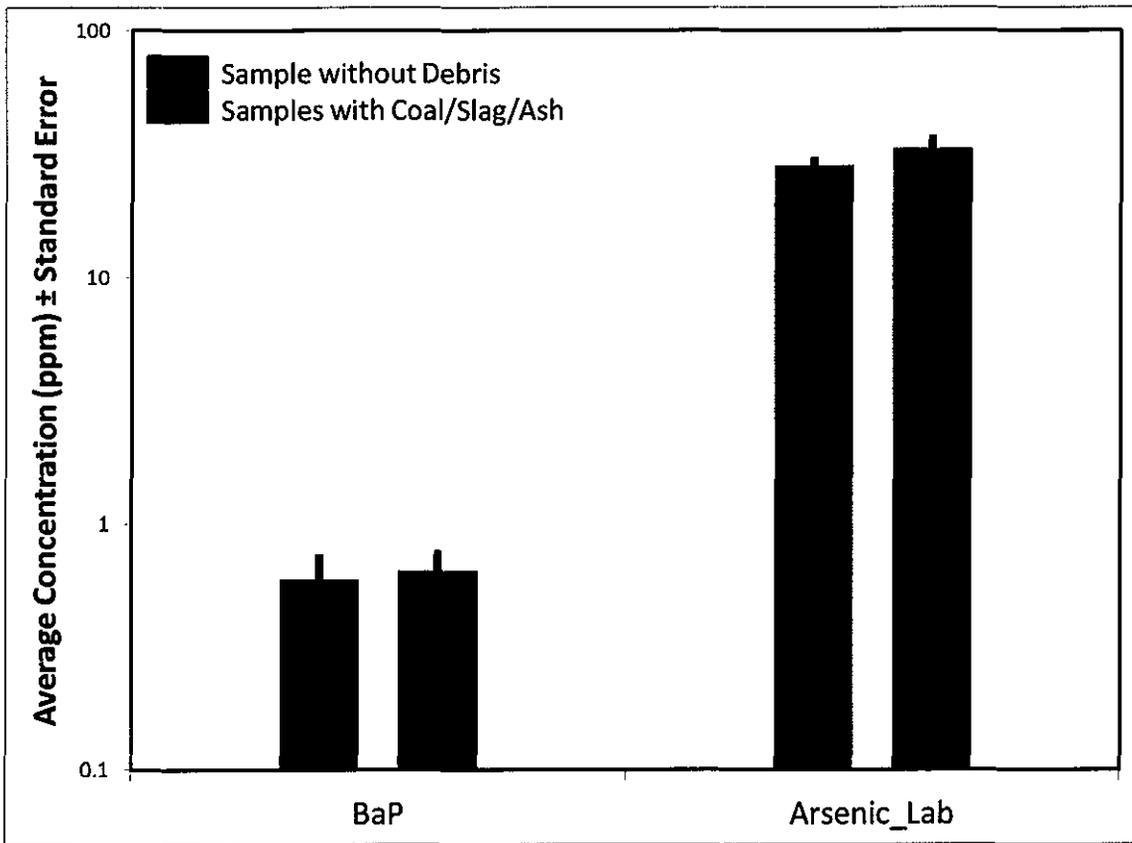


Figure 10. Average Concentrations of BaP and Arsenic in Site Removal Samples with and without Coal Debris (± 1 standard error)

Comment 2 Summary: EPA's HRS Documentation Record's "Attribution" is based on an untested Coal Hypothesis. Despite the importance of Attribution in the HRS scoring process, EPA failed to present even a rudimentary evaluation of the Coal Hypothesis. The utilization of an unsubstantiated hypothesis to determine the mechanism and sources of Site contamination is contrary to principles of Scientific Theory.

If the Coal Hypothesis was in fact valid, then the more than 1,000 soil samples from the Site Removal investigation containing coal or coal-related debris should have contained higher concentrations of arsenic and BaP than the samples that do not contain coal material. Statistical tests, however, indicate that EPA's Coal Hypothesis is false and must be rejected. Alternative hypotheses for the concentrations of arsenic and BaP present in Site soils include naturally occurring and anthropogenic background sources.

Summary

The review of HRS Documentation Record, supporting documents and data indicate that the computed Site HRS score is inflated due to a number of technical deficiencies. More reasonable and accurate calculated Site HRS score is below the cutoff-score of 28.5, and does not support the placement of the Site on the NPL.

Additionally, to the extent that HRS Documentation Record is based on the "Coal Hypothesis" as defined above, it is not only inconsistent with the requirements of *HRS Guidance Manual* (EPA, 1992), but also contrary to principles of Scientific Theory. Statistical tests of Site soil samples with and without coal-debris indicate that EPA's Coal Hypothesis is false and must be rejected. Alternative hypotheses for the concentrations of arsenic and BaP present in Site soils include naturally occurring and anthropogenic background sources.

References

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- U.S. Environmental Protection Agency (EPA). *"ProUCL Version 5.0.00 Technical Guide."* EPA 600/R-07/041. Washington, DC: USEPA Office of Research and Development. September 2013.
- U.S. Environmental Protection Agency. *"HRS Documentation Record: 35th Avenue."* 2014.

Attachment 1. Examples of Mislabeled Samples in Site Removal Photographic Logs

Property ID Noted	Property ID Pictured	Sample ID Pictured
CV0317	CV031	CV031A-CS-SP
CV00385	CV0035	CV0035A-CS-SP
CV0087	CV0060	CV0060B-CS
CV0724	CV072	CV072A-CS-SP
CV0491	CV0078	CV0078B-CS-SP
CV0691	CV0165	CV0165B-CS
CV1301	CV0182	CV0182B-CS-SP
CV0680	CV0380	CV0380B-CS
CV0680	CV0380	CV0380A-CS
CV0491	CV0419	CV0419C-CS-SP
CV0150	CV0501	CV0501A-CS-SP
CV0150	CV0501	CV0501B-CS-SP
CV0520	CV0560	CV0560A-CS-SP
CV0520	CV0560	CV0560B-CS-SP
CV0621	CV0629	CV0629A-CS-SP
CV0621	CV0629	CV0629B-CS-SP
CV0902	CV0903	CV0903A-CS
CV0902	CV0903	CV0903B-CS
CV00860	CV0904	CV0904A-CS
CV0860	CV0904	CV0904B-CS
CV0008	CV0971	CV0971TT-CS
CV0986	CV0992	CV0992B-CS
CV1163	CV1015	CV1015B-CS
CV1301	CV1164	CV1164B-CS
CV1177	CV1165	CV1165B-CS
CV1227	CV1228	CV1228A-CS
CV1227	CV1228	CV1228B-CS
CV1301	CV1242	CV1242B-CS
CV0696	CV1248	CV1248B-CS + Dup
CV1237	CV1322	CV1322A-C5
CV1344	CV1334	CV1334A-C5
CV13350	CV1350	CV1350B-CS
HP0068	CV1358	CV1358A-CS
FM0252	FM0249	FM0249A-CS
CV1001	FM0337	FM0337A-CS
CV1001	FM0337	FM0337B-CS
HP0077	HP0079	HP0079B-CS
HP0222	HP0110	HP0110A-CS
HP0222	HP0110	HP0110B-CS
FM0112	HP0112	HP0112A-CS
FM0112	HP0112	HP0112B-CS
FM0104	HP0156	HP0156A-CS
FM0104	HP0156	HP0156B-CS
CV0561	HP0159	HP0159A-CS-SP
CV0561	HP0159	HP0159B-CS-SP
HP0098	HP0175	HP0175B-CS-SP
HP0098	HP0175	HP0175C-CS-SP
HP0209	HP0219	HP0219A-C5
HP0051	HP0320	HP0320B-CS
HP0032	HP0332	HP0332A-CS-SP

Site: 35th Avenue Removal
 Contract: EP-W-05-053
 TDD: TNA-05-003-0148
 OSC: Jeffery Crowley

Property ID: CV0680
 Date: April 2, 2013
 Time: 0940
 Photographer: Britney Brown

Official Photograph No. 3496
 Sample CV0680A-CS.



Property ID Noted: CV0680

Property ID Pictured: CV0380

Sample ID Pictured: CV0380A-CS