October 17, 2016

W. Russell Kestle, P.G.
U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

Re: Preliminary Design: Design Track 2
Cabot Carbon/Koppers Superfund Site, Operable Units Two, Three, and Five (Koppers)
Gainesville, Florida

Dear Rusty:

This letter provides comment on the Preliminary Design: Design Track 2 (Design Report), dated July 5, 2016, issued by Tetra Tech for Operable Units 2, 3, and 5 on the Koppers portion of the Cabot Carbon/Koppers Superfund Site ("Site") (Tetra Tech, Inc., 2016). Cabot does not typically receive and/or comment on documents pertaining to the Koppers portion of the Site. However, given the implication of the design and placement of the Koppers subsurface cut-off wall on groundwater quality at the Cabot portion of the Site, we are providing comment on the specific section(s) of the Design Report that pertain to this matter.

The objective of the Design Report was to present the preliminary remedial design for four components of the Koppers' remedy program, one of which is the subsurface cut-off wall. The subsurface cut-off wall is intended to "preclude horizontal and DNAPL movement from the principal source areas" on the Koppers property and encircle "adjacent areas with the highest groundwater concentrations, creating a groundwater containment zone" (Tetra Tech, Inc., 2015; 2016). The EPA ROD for the Site (US EPA Region IV, 2011) provides clear guidance and specific criteria for identifying DNAPL source areas at the Site. As stated in the ROD, "DNAPL source areas would be identified using a combination of indicators potentially including (but not limited to): visual observation of DNAPL in soil cores, photoionization detector readings, odors, and comparison of groundwater concentrations with effective solubility." The ROD-recommended approach is consistent with guidance from US EPA that recommends the use of converging lines of evidence to determine the presence and extent of DNAPL in the subsurface (US EPA, 2009). In addition to the ROD criteria, dye testing and soil concentrations (*e.g.*, total concentrations of semi-volatile organic compounds (SVOCs) or volatile organic compounds (VOCs) exceeding 2,000 mg/kg) are additional lines of evidence, and should be used during future investigations to delineate NAPL.

As discussed in our comments below, applying the DNAPL source zone criteria specified in the ROD and other US EPA guidance to available data demonstrates that the eastern extent of DNAPL source areas at the Koppers Site has not been adequately defined. Therefore, the proposed location of the cut-off wall is not expected to prevent further horizontal DNAPL movement as required by the ROD.

1. The extent of the DNAPL source zone to be contained by the cut-off wall has not been delineated.

Using the ROD-defined and US EPA-recommended definition of a DNAPL source area, there are multiple lines of evidence demonstrating that the eastern extent of the creosote DNAPL source zones has

20 University Road, Cambridge, MA 02138 | 617-395-5000 | www.gradientcorp.com

not been adequately defined. This is especially relevant for two source areas at the Koppers property: the Former Process Area and Former Drip Track Area.

Former Process Area

The presence of mobile DNAPL in this area has been documented in multiple reports and the area is being addressed by ISGS in an attempt to limit DNAPL mobility. The following data demonstrate that the DNAPL has migrated to the east beyond the Koppers property boundary:

- Multiple soil borings (UHB-9, UHB-10, LHB-2[1]) advanced into the Upper HG along the eastern property boundary during the 2009 HG investigation showed the presence of DNAPL at residual saturation at depths ranging from approximately 25 to 53.5 ft bgs (GeoTrans, Inc., 2009) [See attached Figure 1].
- The Deep SPT (Standard Penetration Test) Boring CB-21 (Tetra Tech, Inc., 2016), which was advanced into the Upper HG along the eastern property boundary during the pre-design investigation, showed elevated PID readings (up to 500 ppm) and observations of heavy staining, both of which satisfy the ROD-defined criteria for the presence of a DNAPL source area. These observations are consistent with the findings at borings (UHB-9, UHB-10, LHB-2) discussed above and indicate that DNAPL has migrated to the east beyond the Koppers property boundary.
- Borings and monitoring wells located downgradient of these DNAPL-impacted borings and within the CSX corridor also provide evidence of the presence of DNAPL. For example, when the boring for monitoring well HG-34S was installed, visual DNAPL impacts with a numerical rating of 3 (*i.e.*, elevated PID readings, limited residual DNAPL staining [Tetra Tech, Inc., 2016]), were reported. In addition, naphthalene concentrations of up to 5,000 µg/L (Field & Technical Services, LLC, 2014) (*i.e.*, higher than 1,300 µg/L or 10% of the estimated effective solubility [Gainesville Regional Utilities, 2009; King and Barker, 1999]) have been recorded at this well (Figure 2). Other monitoring wells, such as HG-32S and HG-33S, located along the eastern property boundary in the vicinity of HG-34S also showed naphthalene concentrations (*i.e.*, up to 9,100 µg/L [Field & Technical Services, LLC, 2015]) consistent with the presence of DNAPL (Figure 2).
- The downgradient migration of DNAPL beyond the Koppers property boundary is consistent with the topography of the clay surface, where DNAPL is likely to accumulate and migrate. Elevation contours for the Upper and Middle Clay units (Geo Trans, Inc., 2009) show that the clay surface slopes towards the east/northeast (Figures 3 and 4).
- The spatial extent of the area where naphthalene concentrations exceed 10% of its effective solubility (1,300 µg/L) extends several hundred feet to the east of the Koppers property boundary. For example, naphthalene was detected at concentrations up to 2,600 µg/L at monitoring well HG-26, located more than 200 feet beyond the Koppers property boundary line (Figure 2).

Based on the available data it is clear that DNAPL in the Upper Hawthorn Formation has migrated into the CSX corridor (HG-34S). However, the spatial extent of how far the DNAPL zone extends has not been defined. Additional delineation is needed beyond the CSX corridor, an area where DNAPL presence has been confirmed (HG-34S), to define the eastern extent of the DNAPL associated with the Former Process Area.

[1] The vertical extent of DNAPL impacts in the Lower HG has also not been delineated, although it is likely that DNAPL is present in the Lower HG at, or beyond, the Koppers property boundary based on visual observations in boring LHB-2 (GeoTrans, Inc., 2009) and naphthalene concentrations indicative of DNAPL presence (up to 5,400 µg/L) in Lower HG well HG-6D.

Former Drip Track Area

The eastern extent of DNAPL migration associated with the Former Drip Track Area has also not been defined.

- DNAPL accumulates in and is routinely recovered from monitoring well HG-12S, located within the footprint of the Former Drip Track Area (US EPA Region IV, 2011). The detection of naphthalene at concentrations in exceedance of 10% of the solubility limit (1,300 µg/L) indicates the potential presence of DNAPL in the Upper Hawthorn Group unit in this source area.
- Groundwater quality data collected at and downgradient of the Koppers property boundary are consistent with DNAPL presence. Maximum naphthalene concentrations at monitoring wells, HG-4S (7,200 µg/l), HG-38S (2,800 µg/l), and well point WS-32 (2,300 µg/L) exceed 10% of its solubility limit (1,300 µg/l) (Figure 2).
- A soil boring (LHB-1) advanced along the Koppers eastern property boundary near the Former Drip Track area found DNAPL staining within the Lower Hawthorn (GeoTrans, Inc., 2009). Although DNAPL was not encountered in the UHG in property boundary borings in this area, these borings were more than 200 feet apart (Figure 1). Therefore, the current data are insufficient to rule out the presence of DNAPL in the area between these boring locations.

In summary, groundwater quality data at and downgradient of the eastern Koppers property boundary in the vicinity of the Former Drip Track Area strongly suggest the presence of DNAPL. The assumption in the Design Report that the DNAPL terminates at the property boundary is inappropriate, given the presence of elevated naphthalene concentrations well beyond the Koppers property boundary (HG-38S). Additional investigations are needed east of the Koppers property boundary to fully define the eastern extent of the DNAPL source areas.

2. The failure to inadequately delineate the extent of the DNAPL source zone will result in DNAPL beyond the cut off wall that will act as a continual source of groundwater contamination.

An accurate and full delineation of the DNAPL source zone is critical for the success of the proposed cut-off wall and the overall remedial strategy for the Site. US EPA guidance (2009) states that one of the objectives of identification and delineation of the DNAPL source zone is "to facilitate proper design of containment systems involving groundwater extraction and/or physical barriers." As discussed above, the extent of the DNAPL source zone that requires containment has not been adequately defined.

Because the delineation of the creosote DNAPL source zones is not complete, the proposed design and location of the subsurface cut-off wall is not sufficient to meet the ROD-defined remedial goals. Without the proper containment of the DNAPL source zone, it will continue to serve as an ongoing and long-lasting source of creosote related contamination to the Cabot Carbon portion of the Site.

3. The Design Report does not adequately address the effects of the proposed cut-off wall on groundwater hydraulics both inside and outside the proposed cut-off wall.

The installation of the proposed subsurface cut-off wall will have a significant impact on groundwater hydraulics both inside and outside the wall. These anticipated changes can be best understood by using a calibrated groundwater flow model to simulate the effect of the proposed cutoff wall. Modeling results will help understand the anticipated groundwater extraction rates needed within the slurry wall to maintain hydraulic control and to understand the impact of the wall on groundwater flow direction and

transport rates outside the wall. The current Design Report does not include a groundwater model, but one needs to be developed as part of the remedial design process.

In summary, additional DNAPL source delineation work is needed before the correct location of the Koppers cut-off wall placement can be confirmed. Further, the effect of the cut-off wall on groundwater flow direction and rates needs to be assessed using a groundwater flow model as part of remedial design.

We appreciate the opportunity to provide comments on this document. Please let us know if you have any questions or need additional information.

Yours truly,

GRADIENT

Manu Sharma, M.S., P.E.
Principal

Bernie Kueper, Ph.D., P.Eng

References

Field & Technical Services, LLC. 2015. "2014 Second Semiannual Comprehensive Groundwater Monitoring Report, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida." Report to Beazer East, Inc. Submitted to US EPA Region IV. 302p., June 22.

Gainesville Regional Utilities (GRU) DNAPL Team. 2009. "Internal Technical Memorandum to R. Hutton re: Evidence of DNAPL Movement at Koppers Site." 39p., January 30.

GeoTrans, Inc. 2009. "Supplemental 2009 Hawthorn Group Investigation and Monitoring Well Installation Report on CD, Koppers Inc. Site, Gainesville, Florida." Report to Beazer East, Inc. August 14.

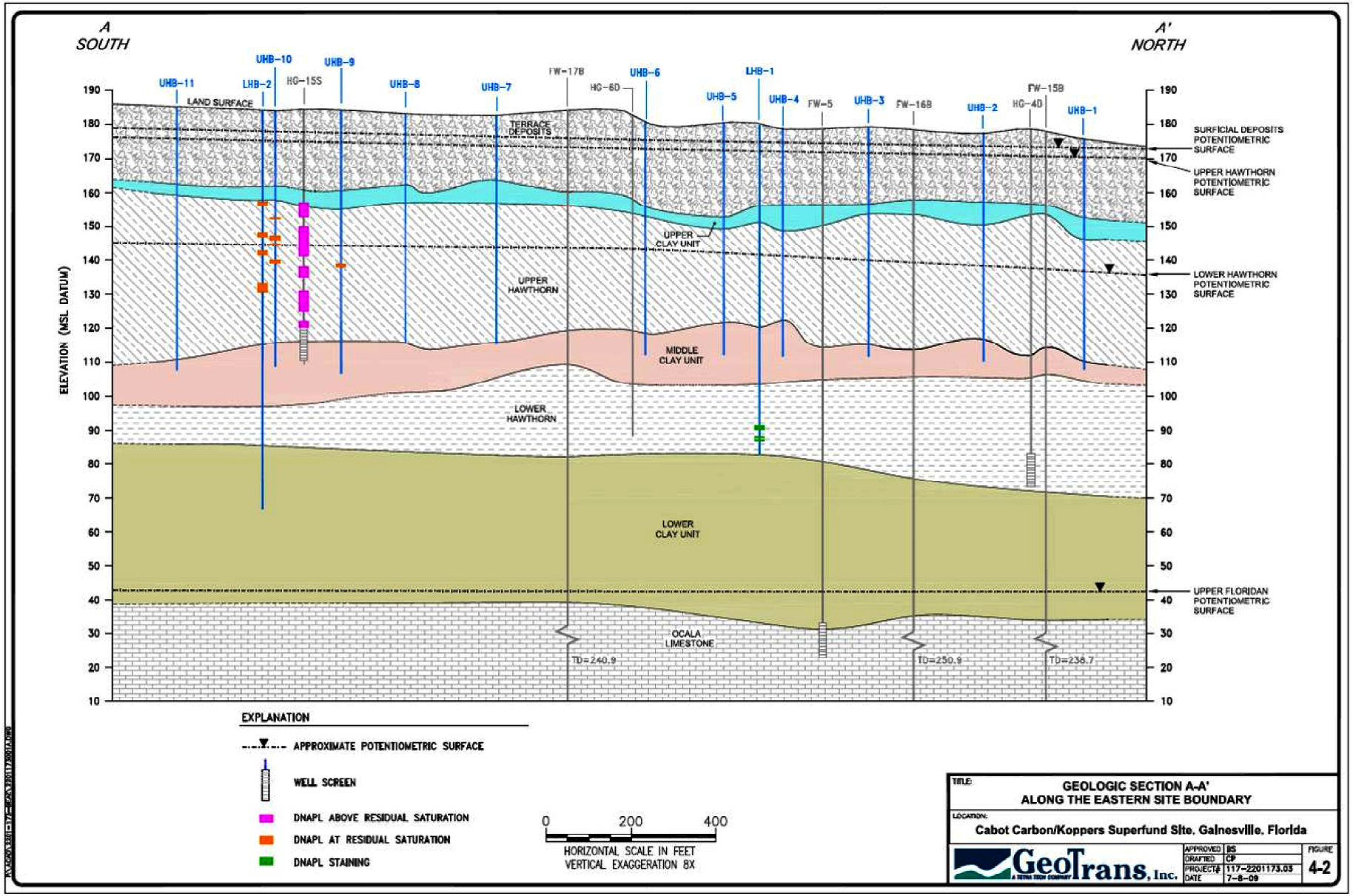
King, MWG; Barker, JF. 1999. "Migration and natural fate of a coal tar creosote plume. 1. Overview and plume development." *J. Contam. Hydrol.* 39(3-4):249-279. doi: 10.1016/S0169-7722(99)00039-X.

Tetra Tech, Inc. 2015. "Pre-Design Investigation Work Plan: Design Track 2, Cabot/Koppers Superfund Site, Operable Units Two, Three, and Five (Koppers), Gainesville, Florida. (Version 2)." Report to Beazer East, Inc. 38p., August 25.

Tetra Tech, Inc. 2016. "Preliminary Design: Design Track 2, Cabot/Koppers Superfund Site, Operable Units Two, Three, and Five (Koppers), Gainesville, Florida. (Version 1)." Report to Beazer East, Inc. 1545p., July 5.

US EPA Region IV. 2011. "Superfund Record of Decision, Summary of Remedial Alternative Selection, Cabot Carbon/Koppers Superfund Site, Gainesville, Alachua County, Florida." 703p., February.

US EPA; Kueper, BH; Davies, KL. 2009. "Ground Water Issue: Assessment and Delineation of DNAPL Source Zones at Hazardous Waste Sites." US EPA. EPA/600/R-09/119. 20p., September.



File Path: \\camfs\G_Drive\Projects\204079\Graphics\CADGIS\212204079-212_65_Verified DNAPL Presence at Eastern Koppers Property Boundary.mxd

GRADIENT

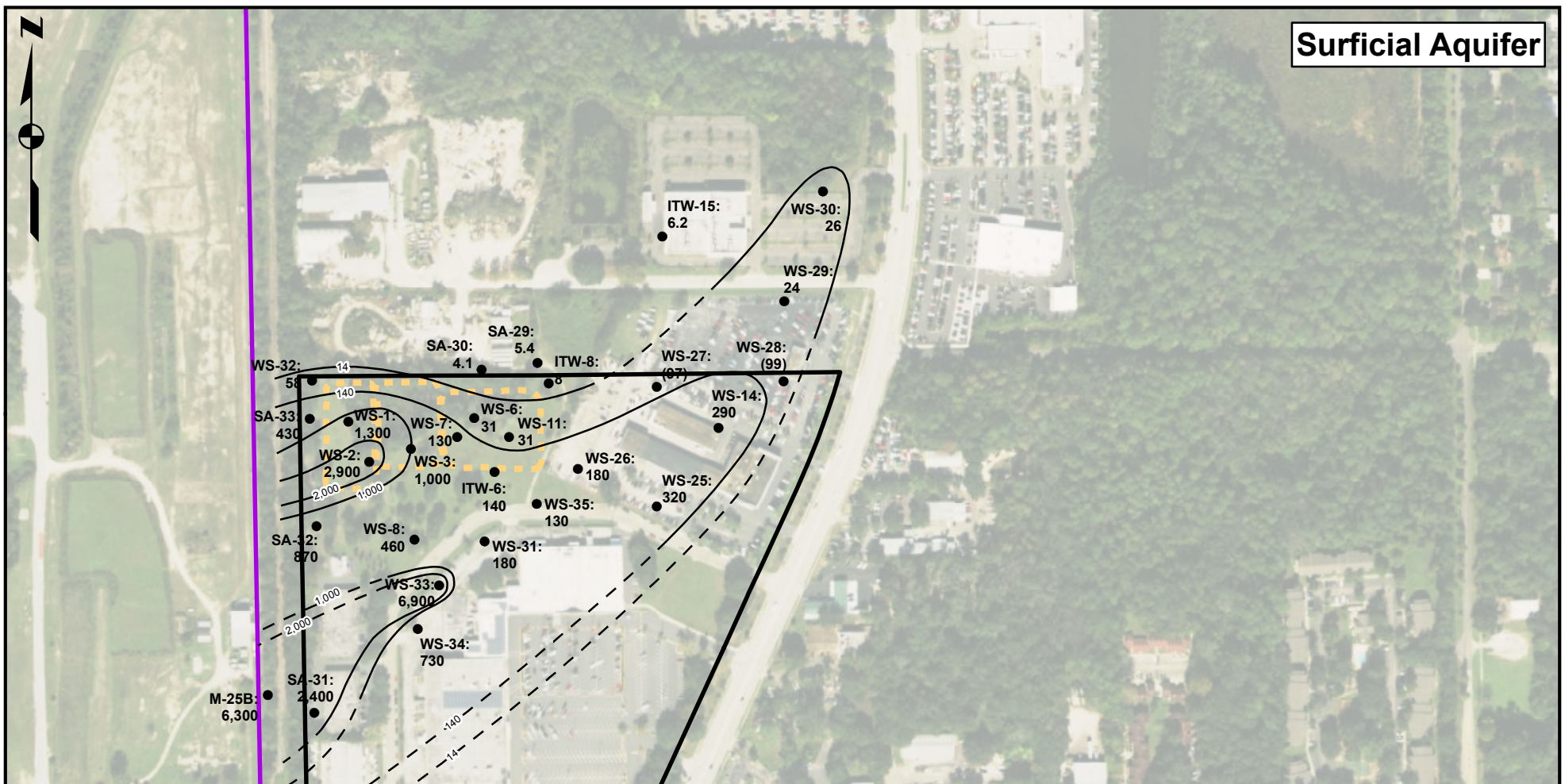
Verified DNAPL Presence at Eastern Koppers Property Boundary

Cabot Carbon/Koppers Superfund Site - Gainesville, Florida

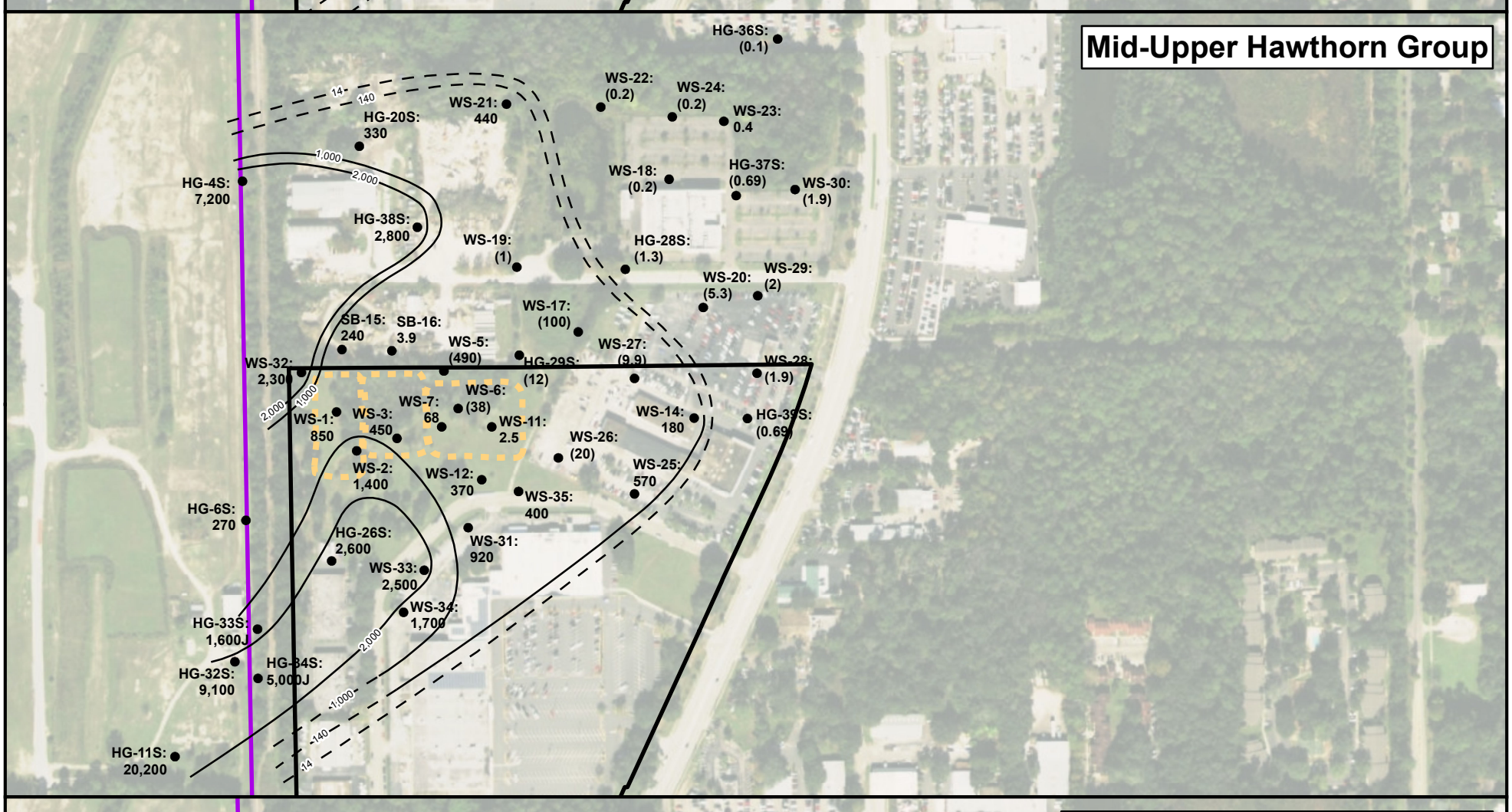
FIGURE 1

Date: 10/17/2016

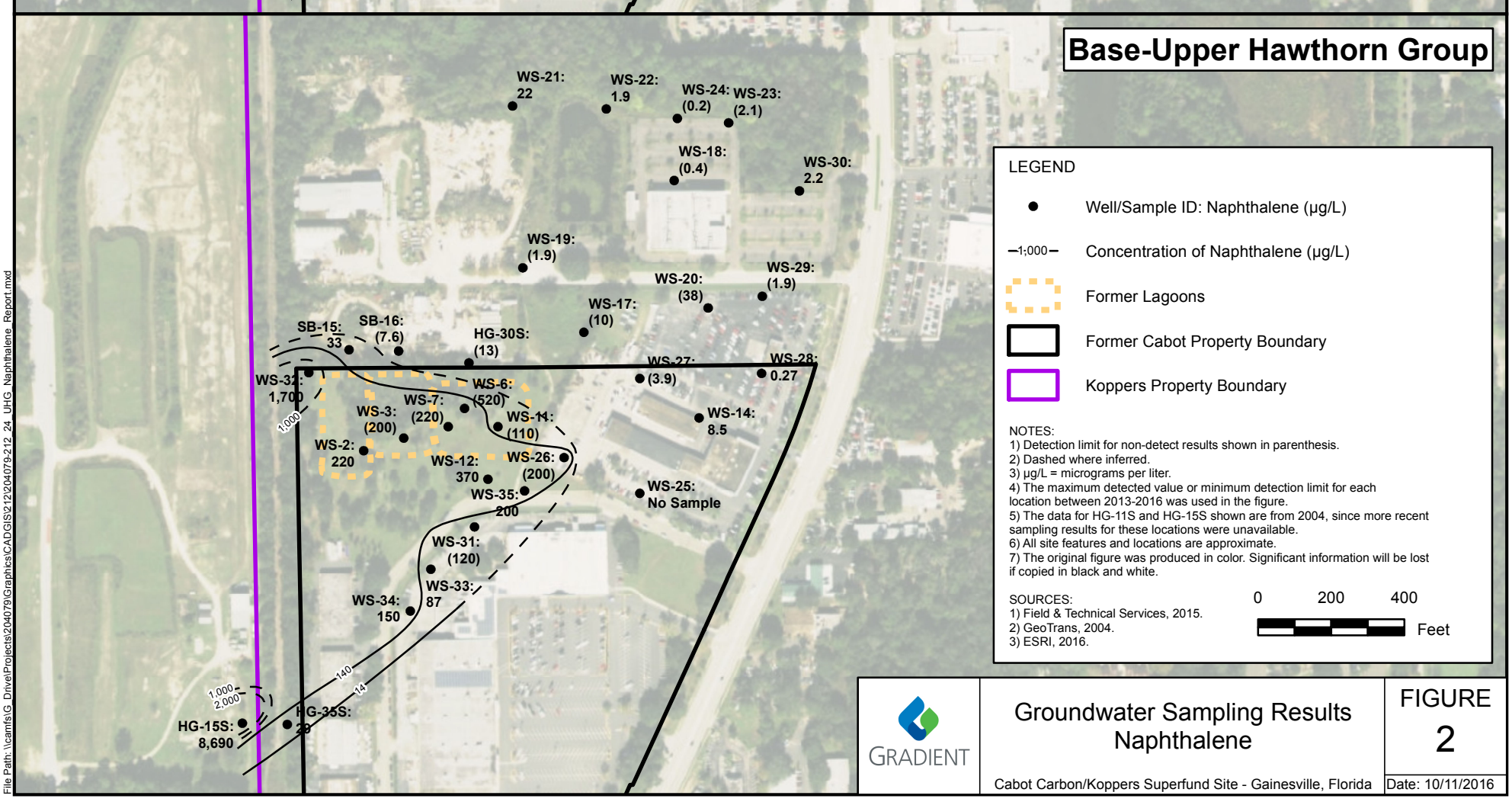
Surficial Aquifer



Mid-Upper Hawthorn Group



Base-Upper Hawthorn Group



LEGEND

- Well/Sample ID: Naphthalene (µg/L)
- 1;000 — Concentration of Naphthalene (µg/L)
- Former Lagoons
- Former Cabot Property Boundary
- Koppers Property Boundary

NOTES:
1) Detection limit for non-detect results shown in parenthesis.
2) Dashed where inferred.
3) µg/L = micrograms per liter.
4) The maximum detected value or minimum detection limit for each location between 2013-2016 was used in the figure.
5) The data for HG-11S and HG-15S shown are from 2004, since more recent sampling results for these locations were unavailable.
6) All site features and locations are approximate.
7) The original figure was produced in color. Significant information will be lost if copied in black and white.

SOURCES:
1) Field & Technical Services, 2015.
2) GeoTrans, 2004.
3) ESRI, 2016.

0 200 400 Feet

GRADIENT

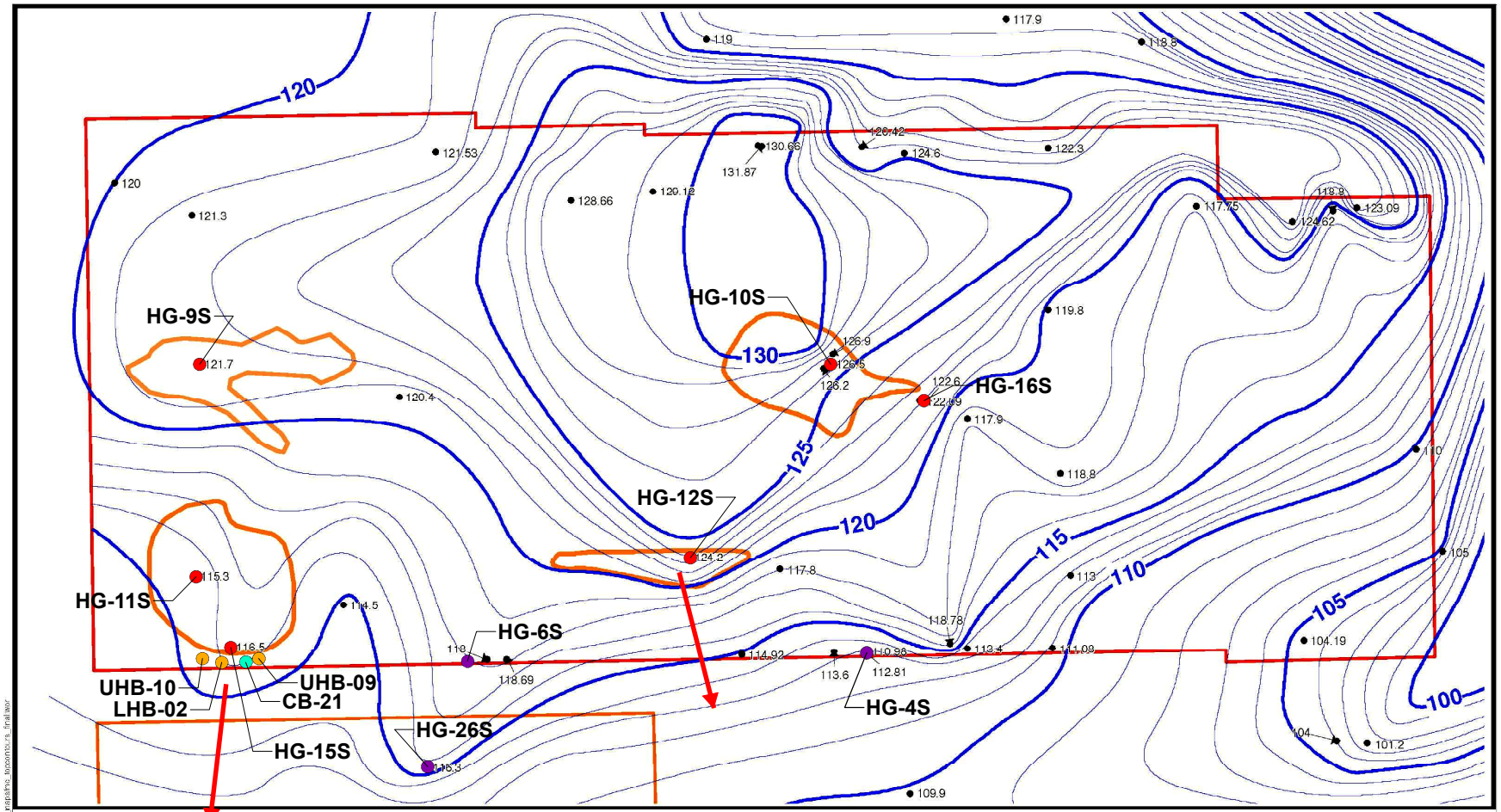
Groundwater Sampling Results Naphthalene

Cabot Carbon/Koppers Superfund Site - Gainesville, Florida

FIGURE 2

Date: 10/11/2016

File Path: \\camfs\G_Drive\Projects\204079\Graphics\CADGIS\212\204079-212_24_UHG_Naphthalene_Report.mxd



File Path: \\canfs\G_Drive\Projects\204079\Graphics\CADGIS\212204079-212_63_DNAPL_Presence_UHG.mxd

Legend

- DNAPL staining in core samples
- DNAPL at residual saturation
- GW >1,300 ug/L Naphthalene
- Mobile DNAPL recovered in well
- Direction of clay surface slope

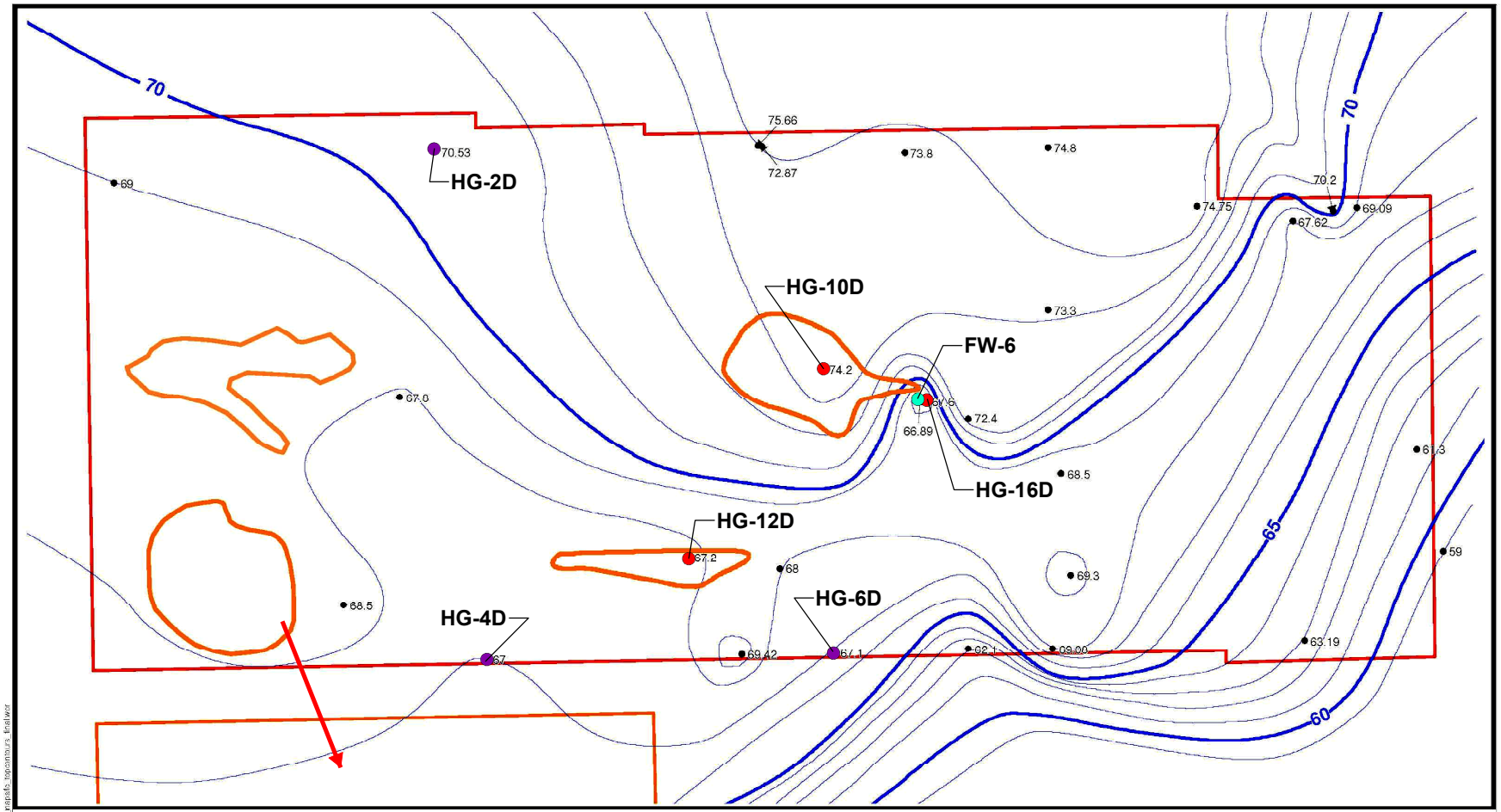
GRADIENT

DNAPL Presence in Upper Hawthorn Group

Cabot Carbon/Koppers Superfund Site - Gainesville, Florida

FIGURE 3

Date: 10/17/2016



Legend

- DNAPL staining in core samples
- Mobile DNAPL recovered in well
- GW >1,300 ug/L Naphthalene
- Direction of clay surface slope

GRADIENT

DNAPL Presence in Lower Hawthorn Group

Cabot Carbon/Koppers Superfund Site - Gainesville, Florida

FIGURE 4

Date: 10/17/2016

File Path: \\canfs\G_Drive\Projects\204079\Graphics\CADGIS\212204079-212_64_DNAPL_Presence_LHG.mxd