TETRA TECH

September 23, 2011

Mr. Scott Miller
Remedial Project Manager
U.S. Environmental Protection Agency
Region IV, Superfund North Florida Section
61 Forsyth Street, SW
Atlanta, GA 30303-3104

Subject: Transmittal of the "*Upper Floridan Aquifer Extraction Well FW-32BE Installation Workplan, Koppers Inc. Site, Gainesville, Florida*"

Dear Mr. Miller:

On behalf of Beazer East, Inc. (Beazer), attached is a copy of the workplan titled "*Upper Floridan Aquifer Extraction Well FW-32BE Installation Workplan, Koppers Inc. Site, Gainesville, Florida.*" This workplan describes installation of the proposed UF Aquifer groundwater extraction well FW-32BE along the eastern boundary of the Site. Beazer will implement the workplan upon approval from the EPA and pending driller availability.

Should you require additional information, please feel free to contact me at (303) 665-4390.

Sincerely,

James R. Erickson
Principal Hydrogeologist

James W. Mercer, Ph.D., P.G.
Executive Vice President
Professional Geologist FL #275
Principal Hydrogeologist

Enclosure

cc: W. O'Steen, U.S. EPA
K. Helton, FDEP
J. Mousa, ACEPD
R. Hutton, GRU
M. Brourman, BEI
G. Council, TTGeo

UPPER FLORIDAN AQUIFER EXTRACTION WELL FW-32BE INSTALLATION WORKPLAN KOPPERS INC. SITE, GAINESVILLE, FLORIDA

Prepared For:

Beazer East, Inc.

Prepared by:

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363 Centennial Parkway, Suite 210
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September 23, 2011

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1.0 INTRODUCTION

This workplan describes drilling, well construction and related activities that will be performed at the Cabot Carbon/Koppers Superfund Site (the Site) located in Gainesville, Florida. The work consists of the installation and testing of an Upper Floridan (UF) Aquifer groundwater extraction well. The extraction well will be installed adjacent to existing UF Aquifer monitoring well FW-16B to capture groundwater impacts detected in this well along the eastern Site boundary. Work will be performed under the supervision of a Tetra Tech GEO (formerly GeoTrans) geologist/engineer who is familiar with the Site and objectives of the workplan. Details on the scope of the work and specifications for the drilling/installation of monitoring wells are provided herein.

1.1 OBJECTIVE

The objective of the proposed groundwater extraction well is to mitigate potential off-Site migration of constituent impacts detected in monitoring well FW-16B. In addition, the proposed groundwater extraction well will accelerate remediation of the dissolved-phase plume in this area.

1.2 SITE DESCRIPTION

The Site is located in the City of Gainesville, in Alachua County, Florida (Figure 1). The Site encompasses approximately 90 acres and has been used as an active wood-treating facility for approximately 90 years. Adjacent properties include the former Cabot Carbon portion of the Superfund Site and commercial facilities to the east, private residences to the west and northwest, and commercial facilities and private residences to the north and south.

1.3 SITE HYDROGEOLOGY

The Site is located in the Northern Highlands of Alachua County. Three principal hydrostratigraphic units are present in this area: 1) Surficial Aquifer, 2) Hawthorn Group (HG) deposits, and 3) UF Aquifer (Figure 2).

The Surficial Aquifer consists of approximately 20- to 30-feet of marine terrace deposits comprised of unconsolidated, fine- to medium-grained sand, with thin layers of interbedded silt and clay deposits.

The HG deposits underlie the Surficial Aquifer and consist of a complex sequence of interbedded clays, silts, sands and carbonates, with three low-permeability clay deposits located at the top, middle and bottom of this unit. The HG deposits are approximately 120 to 125 feet thick beneath the Site and separate the overlying Surficial Aquifer from the underlying UF Aquifer.

The UF Aquifer underlies the HG deposits. The two primary formations that comprise the UF Aquifer are the Ocala Limestone and the Avon Park Formation. There are two major water producing zones within the UF Aquifer: 1) Upper Transmissive Zone (UTZ), and 2) Lower

Transmissive Zone (LTZ). The UTZ and LTZ are separated by lower-permeability carbonate deposits referred to as the Semi-Confining Unit (SCU). The regional groundwater flow direction in the UF Aquifer is to the northeast towards the Murphree wellfield (GeoTrans, 2004).

1.4 EXISTING UPPER FLORIDAN WELLS

Currently, there are 36 UF Aquifer monitoring wells completed at or near the Site. Thirty of the monitoring wells are completed in the UTZ and six monitoring wells are completed in the LTZ. Nine of the monitoring wells (FW-1 through FW-5, FW-7 through FW-9, and GRU well MWTP-MW1) are standard single-screen completion monitoring wells. Seventeen of the UTZ monitoring wells (FW-10B through FW-20B, FW-22B through FW-24B, FW-27B, FW-28B and FW-30B) and four of the LTZ monitoring wells (FW-22C through FW-24C, and FW-4C) are completed with Westbay multi-port sampling systems. Six sentinel monitoring wells (FW-25B, FW-25C, FW-26B, FW-26C, FW-29B and FW-29C) are located downgradient from the Site and contain four 10-foot long screens spanning the approximately 100-foot thickness of the UTZ and LTZ. In addition, three UTZ groundwater extraction wells are present on-Site (FW-6, FW-21B, and FW-31BE). Wells FW-6 and FW-21B were converted from monitoring wells to extraction wells. FW-6 is located near the former north lagoon and FW-21B is located near the former drip track. FW-31BE is completed in the northwestern area of the Site and is screened across the approximate thickness of the UTZ with a single continuous well screen.

2.0 EXTRACTION WELL INSTALLATION APPROACH

Extraction well FW-32BE design, construction, and installation will be similar to the existing on-Site extraction well FW-31BE. The extraction well design will consist of two isolation casings and one 4-inch diameter well casing. The well screen will consist of one continuous 90-foot long, stainless-steel wire-wrapped screen that extends over the approximate thickness of the UTZ. The installation of the extraction well will be performed with a combination of reverse rotary and rotasonic drilling methods.

2.1 EXTRACTION WELL LOCATION

The primary objective for the installation of an extraction well along the eastern property boundary is to capture dissolved-phase impacts in the vicinity of monitoring well FW-16B. The width of the dissolved-phase plume appears to be small in that no other monitoring wells along this property boundary have dissolved-phase impacts. Naphthalene is the only dissolved-phase impact currently observed in monitoring well FW-16B, with concentrations less than approximately 35 µg/L. Hence, the location of the extraction well should to be in close proximity to monitoring well FW-16B to ensure capture of this relatively narrow plume.

The proposed location of extraction well FW-32BE is upgradient and approximately 20 to 30 feet northwest of monitoring well FW-16B (Figure 4). The objective of installing the extraction well upgradient of FW-16B is to pull the plume back on Site and to not allow it to spread further downgradient as a result of groundwater pumping. The groundwater flow direction from the former North Lagoon and FW-21B location is to the north-northeast. Therefore, extraction well FW-32BE will be located to the northwest of FW-16B in approximate alignment with the groundwater flow direction from these potential source areas. The final location for the proposed extraction well may be adjusted slightly in the field to accommodate potential accessibility issues, if any.

2.2 GEOLOGIC CORE

Continuous geologic core will be collected from land surface to the total depth of the extraction well using geoprobe, rotasonic and/or a combination of these methods. The cores will be used to identify lithologic contacts and to investigate the presences of DNAPL impacts, if present. In addition, the geologic core will be used to establish the completion depth for the isolation casings and final extraction well. Geologic cores will be logged by the oversight geologist/engineer to characterize lithology and DNAPL impacts. The core samples will be scanned using a photoionization detector (PID) for evidence of semi-volatile and volatile organic compounds. All cores will be photographed prior to disposal as investigative derived waste (IDW).

Geologic core collection will be performed in three phases and will be sequenced with the installation of the two isolation casings. The objective of sequencing the geologic core collection with the isolation casing installation is to help mitigate the potential for “drag down” of overlying impacts. The first phase of geologic core collection will be from land surface to the top of the HG middle clay unit, at an estimated depth of 70 feet below ground surface (bgs). The second phase of geologic core collection will be from the HG middle clay unit to approximately 5 to 10 feet into the HG lower clay unit, at an approximate depth of 116 feet bgs. The third phase of geologic core collection will be from the base of the second isolation casing to the completion depth of the extraction well, at an approximate depth of 245 feet bgs.

The second phase of geologic core collection will not be performed until the upper isolation casing has been installed and grouted into the middle clay unit. Similarly, the third phase of geologic core collection will not be initiated until the second isolation casing has been installed and grouted. The isolation casing grout will be allowed to cure a minimum of 12 hours prior to the collection of geologic core below the isolation casings.

The first and second phase geologic core collection will be performed with either a geoprobe rig or a mini-rotasonic rig. The core collection during the first and second phases cannot be performed with the drill rig used to install the isolation casings because it will not have coring capabilities. The third phase of geologic core collection will be performed with the rotasonic rig in conjunction with the drilling of the well. Continuous core samples will be collected using the 5 ½-inch rotasonic override (outer) casing with the 3 ½ -inch (inner) rotasonic core barrel. Once the cores have been collected to the total depth of the well, the borehole diameter will be enlarged to accommodate the final well casing and screen.

2.3 DRILLING AND WELL COMPLETION

The design for this UTZ extraction well will consist of three telescoping casings (two isolation casings and one well casing). The telescoping isolation casing installation for this well will be initiated by first manually digging a pilot hole to a depth of approximately 4 feet. The pilot hole will be used to verify that subsurface utilities (particularly the hydraulic-containment system perimeter pipelines) are not present at the location.

To ensure that the majority of the drilling fluids are recovered during well development, all water used during drilling within the well completion interval will be tagged with a sodium-bromide tracer. The tracer will be added to the drilling makeup water reservoir at an approximate concentration of 100 parts per million (ppm), similar to previous well installation at the Site.

The first isolation casing will extend from land surface to the HG middle clay unit at an approximate depth of 70 feet bgs. A 22-inch diameter borehole will be advanced to this depth using the Barber rotary drill method (or equivalent). The final targeted depth will be established based on the depth to competent clay units observed in the geologic core. Upon reaching this depth, a permanent nominal 18-inch black steel isolation casing will be placed approximately 3 to 5 feet into the top of the HG middle clay unit. The 18-inch casing will be tremie grouted to ground surface. The grout will be allowed to cure a minimum of 12 hours prior to performing the next phase of drilling.

A 16-inch nominal diameter borehole will be advanced from the base of the 18-inch isolation casing to 6 to 10 feet into the HG lower clay unit (at an estimated depth of 116 feet bgs) using the Barber rotary drill method (or equivalent). Cement grout will be pumped via a tremie pipe inside the 16-inch temporary casing, creating a reservoir of cement grout in the base of the 10-inch override casing. A PVC end cap will be slipped over the lower end of the 10-inch casing to preclude cement grout from entering the inside of the casing. The 10-inch casing will be lowered inside of the 16-inch temporary casing, displacing the grout and filling the annular space between the 18-inch and 10-inch casing. The 10-inch casing will be centralized at the base of the 16-inch temporary casing. Potable water will be added to the inside of the 10-inch casing to add weight for displacing the cement grout while the casing is lowered into the borehole. Displaced annular fluid will be collected and containerized for IDW disposal. After the 10-inch casing is lowered to its completion depth, the 16-inch temporary casing will be removed by lifting with vibration, causing the grout to flow into void spaces between the 10-inch casing and formation material. During the removal of each approximately 20-foot long section of temporary isolation casing, additional grout is added to the annular space between the 16-inch and 10-inch casing to maintain a constant reservoir of grout between the casings. This process is repeated until all temporary 16-inch casing has been removed from the borehole. The grout will be allowed to cure a minimum of 12 hours prior to performing the next phase of drilling.

The borehole will be advanced to approximately 138 feet (within 5 feet of the Ocala Limestone contact at 143 feet) using standard rotasonic drilling methods. The borehole will be enlarged using the 9-inch override casing. The casing and borehole will be flushed with approximately 300 gallons of potable water to help minimize the potential introduction of impacted drilling fluids into the UF Aquifer. Loss of drilling fluid circulation is routinely encountered at this Site in the upper 10 to 20 feet of the Ocala Limestone. The borehole will be flushed until the majority of the drill cuttings are removed from the borehole, based on visual inspection of the return fluid. Coring and/or reaming will not proceed until this process has been completed. When coring has been completed, the borehole diameter will be enlarged to the targeted well depth using 9-inch rotasonic override casing.

Extraction well FW-32BE will be constructed at an estimated total depth of 245 feet using 4-inch diameter well casing and screen. Stainless-steel casing will be used from an approximate depth of 245 feet to 110 feet bgs. Above 110 feet, carbon-steel casing will be used. The proposed well construction is shown on Figure 5.

The extraction well will have a 90-foot long well screen, consisting of stainless-steel, wire-wrapped, 20-slot screen. A 5-foot well sump will be constructed below the screen. The wellbore annulus opposite the well screen will be backfilled with 12/20 silica filter sand. The 20-slot screen opening with 12/20 filter pack will minimize the production of fine-grained formation materials known to be present in the UTZ, while minimizing potential screen blockage by carbonate precipitation and/or by particulate fouling.

The filter pack will extend approximately 3 feet above the top of the screen. Filter pack sand will be poured through the override casing which will be vibrated as it is withdrawn to consolidate the filter pack. An approximately 5-foot thick bentonite plug will be placed on top of the filter pack. The remainder of the borehole annulus will be backfilled to land surface with bentonite-cement grout, mixed and placed in accordance with ASTM and SJRWMD guidance.

The final 4-inch diameter permanent well casing will extend above grade. The lock for the monitoring well will match existing Site locks. After installation, the ground surface and the top of each inner well casing will be surveyed to within 0.01-foot vertical accuracy.

The extraction well surface completion will consist of a pitless adaptor with a conventional wellhead design to facilitate access to the well, pump drop pipe and discharge pipeline. A 3-foot by 3-foot by 4-inch thick concrete pad will be constructed around the wellhead stickup. The pad will be completed 3 inches above existing grade with the apron tapered 2 inches lower such that precipitation runoff will flow away from the well.

2.4 WELL DEVELOPMENT

The well will be developed by pumping no sooner than 24 hours after installation. The well development will consist of both surging and pumping to remove fine-grained material over the entire 90-foot long screened interval of the extraction well. Primary well development will be performed by targeting 20-foot sections of the screened interval. A K-packer system will be used to surge the well and to isolate individual 20-foot sections of the screen during pumping. A K-packer consists of an approximately 6-inch long pipe with flexible rubber seals (approximately 4 inches in diameter) on the outside of the pipe. The K-packer is attached to a galvanized drop pipe for lowering and installing the K-packer in a well. The rubber seals on the outside of the K-packer fits inside of the 4-inch well casing and effectively isolates the inside of the well casing above and below the K-packer. In addition, the K-packer system will act as a surge block, which will periodically be raised and lowered approximately 3 to 5 feet during the development of individual 20-foot intervals. The raising and lowering of the K-packer system will help to mobilize fine-grained materials from the filter pack into the well so they can be removed through groundwater pumping. Groundwater will be pumped using an electric submersible pump connected to a galvanized drop pipe.

After completion of primary development on the individual 20-foot sections of the well, a submersible pump with be installed in the screened interval for final development. Well development shall consist of pumping of the well at 20 to 40 gallons per minute (gpm) until the discharge water has turbidity of less than 20 NTUs and sodium bromide concentrations below 25 ppm (or have reached asymptotic levels). It is anticipated that all well development (K-packer system followed by pumping the well) will require approximately 4 to 8 hours.

2.5 AQUIFER TESTS AND WATER-QUALITY SAMPLES

The primary objectives of the aquifer tests are to assess the hydrogeologic properties of the UTZ in the vicinity of the extraction well and to optimize pumping rates for hydraulic containment. The aquifer tests proposed include: 1) Step-drawdown test; and 2) Constant-rate test (specific-capacity). Groundwater samples will be collected prior to and at the completion of the aquifer tests to document initial dissolved-phase concentrations. Long-term groundwater sampling will be performed after initial startup of extraction well FW-32BE to monitor performance effectiveness.

2.5.1 AQUIFER TESTS

An aquifer test will be performed using extraction well FW-32BE as the pumping well. Testing will take place after well development has been completed. A 1.5-inch ID access line will be installed in the well to a depth of approximately 200 feet to allow placement of a data-logging pressure transducer and collection of manual water-level measurements with a water-level probe. A submersible pump capable of pumping up to 20 gpm will be installed at a depth of approximately 200 feet. Data-logging pressure transducers will also be placed in nearby monitoring wells FW-5, FW-15B, and FW-16B. To facilitate collection of water-level readings inside of the monitoring wells equipped with Westbay systems (FW-15B and FW-16B), the uppermost purge port (1.8-inch long screen) will be opened and a transducer placed inside of the Westbay casing. This approach to collecting water-levels in well with Westbay systems is similar to that used during the aquifer testing performed at FW-31BE.

The aquifer test to be performed on extraction well FW-32BE is a constant-rate (specific capacity) test. The constant-rate test will be performed after installation of the permanent pump. Static water level and baseline pressure transducer readings will be collected before initiating the constant-rate test. The pumping rate will be selected based on initial analysis of the step-drawdown test, but is anticipated to be approximately 10 to 20 gpm.

The constant-rate test will be performed for approximately 6 days, or until drawdown is asymptotic. Semi-continuous water-level measurements will be collected with data-logging pressure transducers in extraction well FW-32BE and in wells FW-5, FW-15B and FW-16B. At the completion of the constant-rate test, the pump will be stopped and the recovery of the aquifer will be recorded with the data-logging pressure transducers and by collecting manual measurements with a water-level meter. Recovery data will be recorded until water levels recover to 90 percent of the maximum drawdown or until the water level stabilizes.

Groundwater extracted during the aquifer tests will be pumped to the existing groundwater pretreatment system located on the eastern property boundary.

Data obtained from the aquifer tests will be used to analyze the radial effects of pumping and to estimate aquifer transmissivity in the vicinity of the extraction well. The data will help optimize the pumping rate for long-term groundwater extraction at FW-32BE. The aquifer-test analysis and results will be included in the report documenting the well-installation activities associated with the extraction well installation.

2.5.2 WATER QUALITY SAMPLES

Groundwater sampling will be performed as part of the aquifer testing and during start-up of recovery well FW-32BE. Baseline samples will be collected from FW-16B and FW-32BE prior to the start of aquifer testing and samples will be collected from FW-32BE at the end of the aquifer test. After the initiation of long-term pumping at FW-32BE, groundwater performance sampling will be performed at monitoring well FW-16B and recovery well FW-32BE. The sampling frequency will range from weekly to monthly during the first 4 months of operation. The frequency will then change to semi-annual, consistent with the CGMSAP program (Table 1). All groundwater samples will be analyzed for volatile organic compounds and select semi-volatile organic compounds (Table 2).

Groundwater analytical results from samples collected in the first 4 weeks after start-up of long-term pumping will be included in the report documenting the well installation activities. Subsequent sampling results after the first 4 weeks will be included in the CGMSAP semi-annual and annual monitoring reports for the Site.

Upon completion of aquifer testing, a permanent 4-inch diameter submersible pump will be installed in extraction well FW-32BE, similar to the submersible pump design that was installed in extraction well FW-31BE.

2.6 INVESTGATIVE DERIVED WASTE

All investigation-derived waste will be containerized. Solids will be placed in driller-supplied containment vessels and transported to a centralized staging area for transportation and disposal. Liquid waste removed from wells during drilling and development will be transferred to the on-Site water treatment system.

3.0 REPORTING AND SCHEDULE

3.1 REPORTING

A report documenting the results of activities described in this workplan will be submitted to the Agency and Stakeholders for review after the completion of the well-drilling program and the results of the initial rounds of groundwater sampling are obtained. The report will include a description of well-completion activities, borehole logs, as-built well completion diagrams, aquifer test analysis and groundwater sampling results.

3.2 SCHEDULE

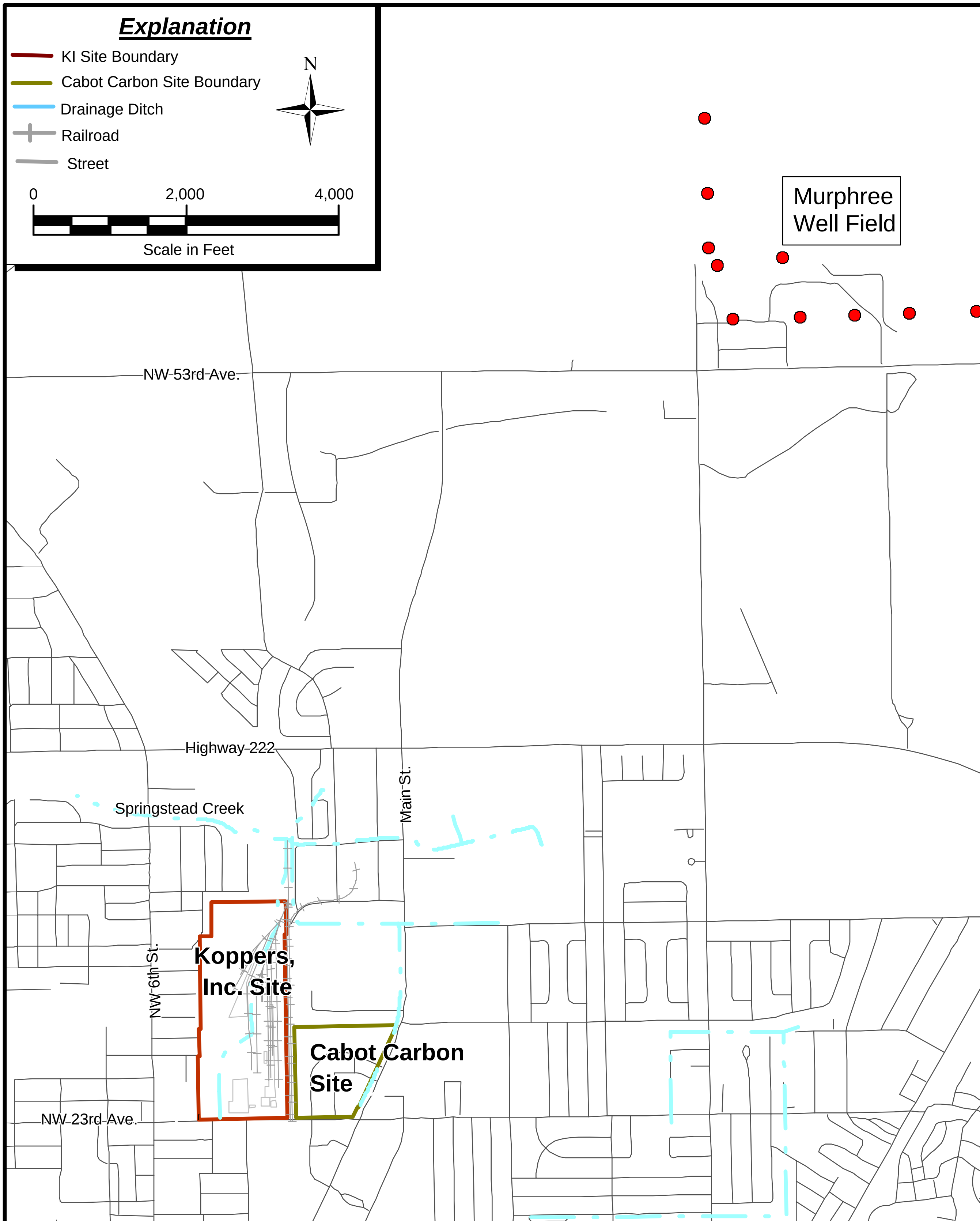
The schedule for implementation of this workplan will be dependent on Agency approval of the workplan. In addition, the schedule for the well installation will be dependent on driller availability. It is anticipated that once approval of the workplan is approved, it will require approximately 1-2 months for a driller to mobilize to the Site.

4.0 REFERENCES

GeoTrans 2004, Addendum 6: Groundwater Flow and Transport Model, Draft Report, Koppers, Inc. Site, Gainesville, Florida, October, 2004.

FTS and GeoTrans, 2010. Comprehensive Groundwater Monitoring and Sample Analysis Plan: Cabot Carbon / Koppers Superfund Site, Gainesville, Florida. August 4, 2010.

FIGURES



TITLE:	SITE LOCATION MAP
LOCATION:	Cabot Carbon/Koppers Superfund Site, Gainesville, Florida

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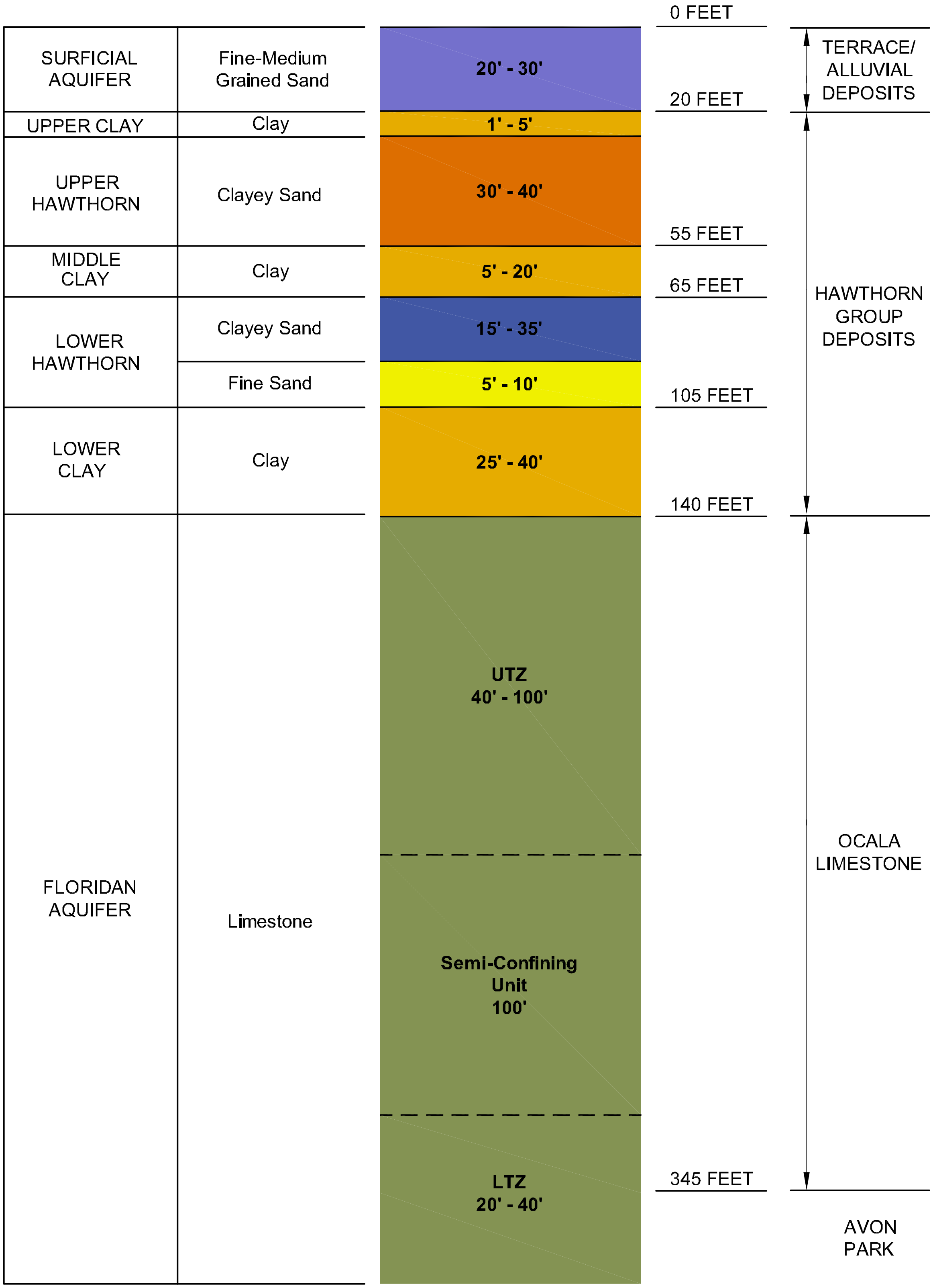

TITLE: HYDROSTRATIGRAPHY OF DEPOSITS BENEATH SITE

LOCATION: Cabot Carbon/Koppers Superfund Site, Gainesville, Florida

TETRA TECH GEO

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FILE	hydrostat column	
DATE	03/03/11	

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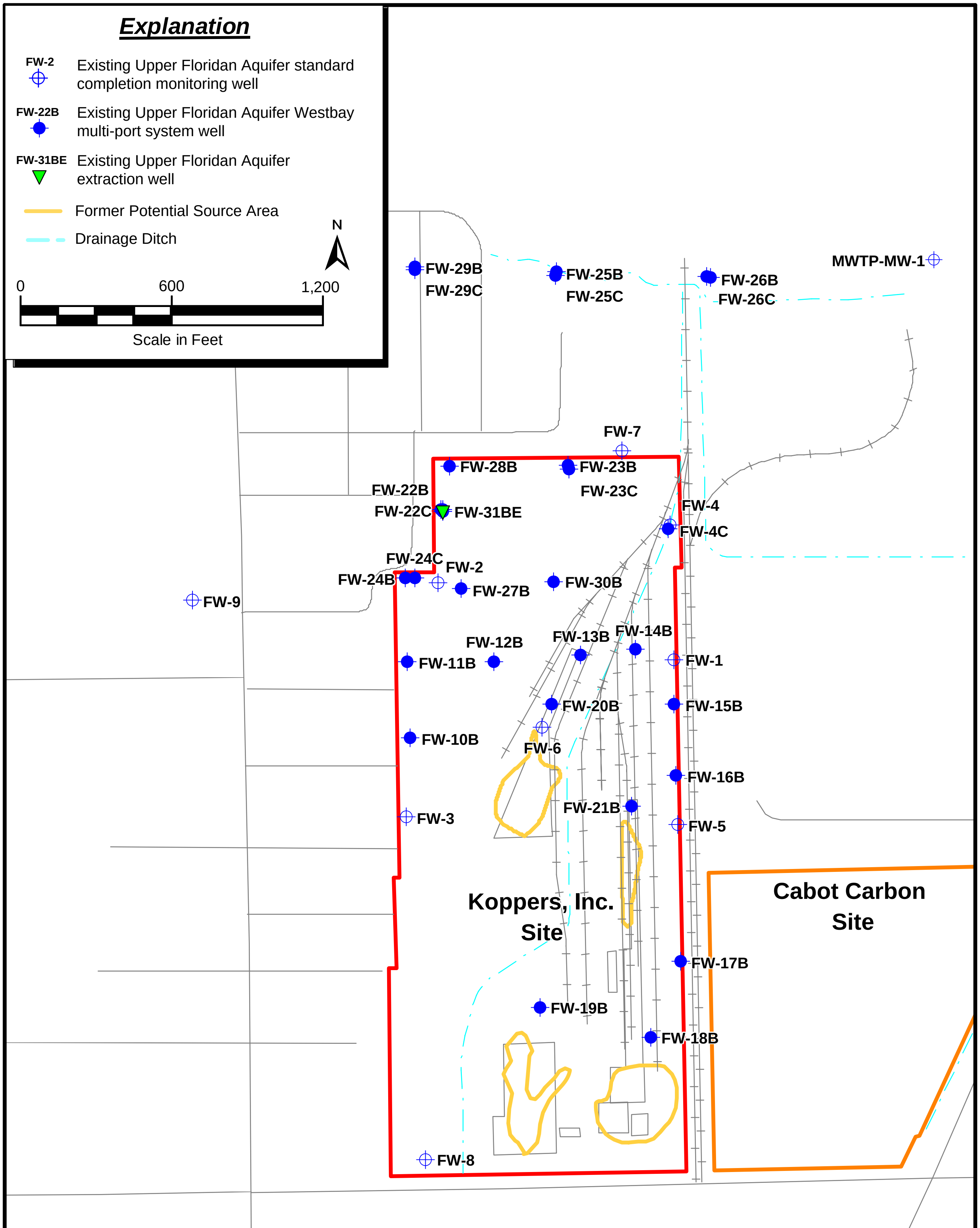

TITLE:	LOCATIONS OF EXISTING UPPER FLORIDAN AQUIFER WELLS
LOCATION:	Cabot Carbon/Koppers Superfund Site, Gainesville, Florida

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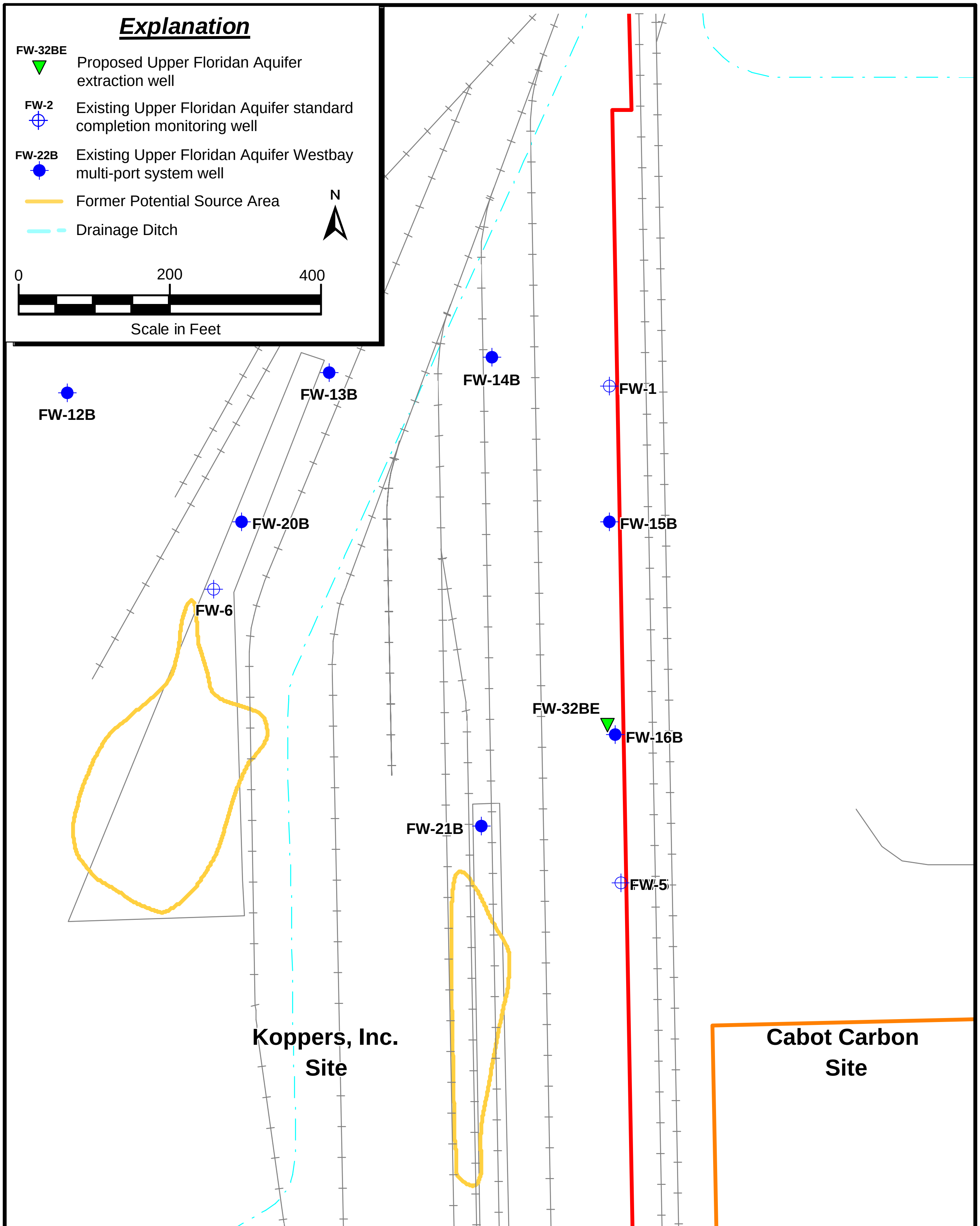

TITLE: LOCATION OF PROPOSED UPPER FLORIDAN AQUIFER EXTRACTION WELL FW-32BE

LOCATION: Cabot Carbon/Koppers Superfund Site, Gainesville, Florida

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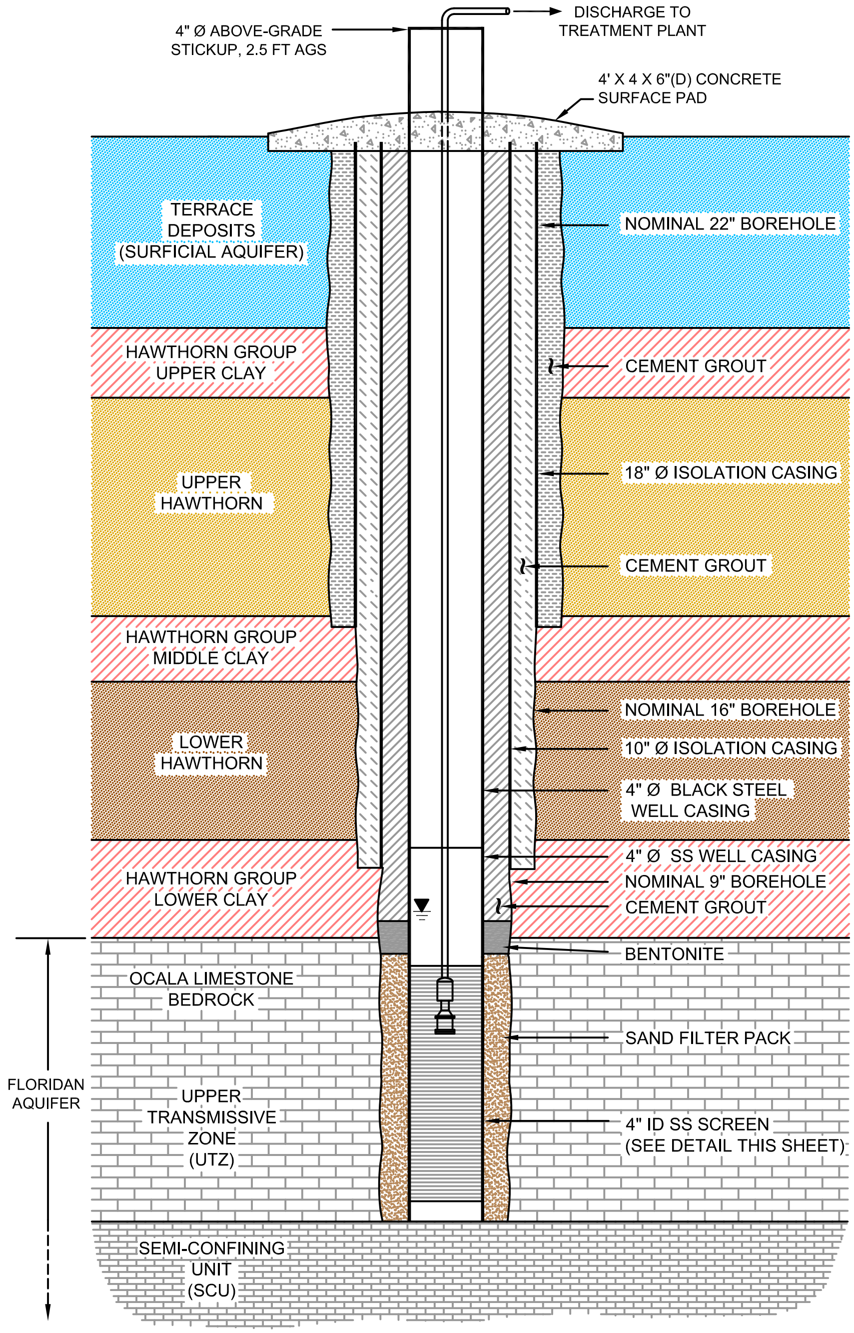

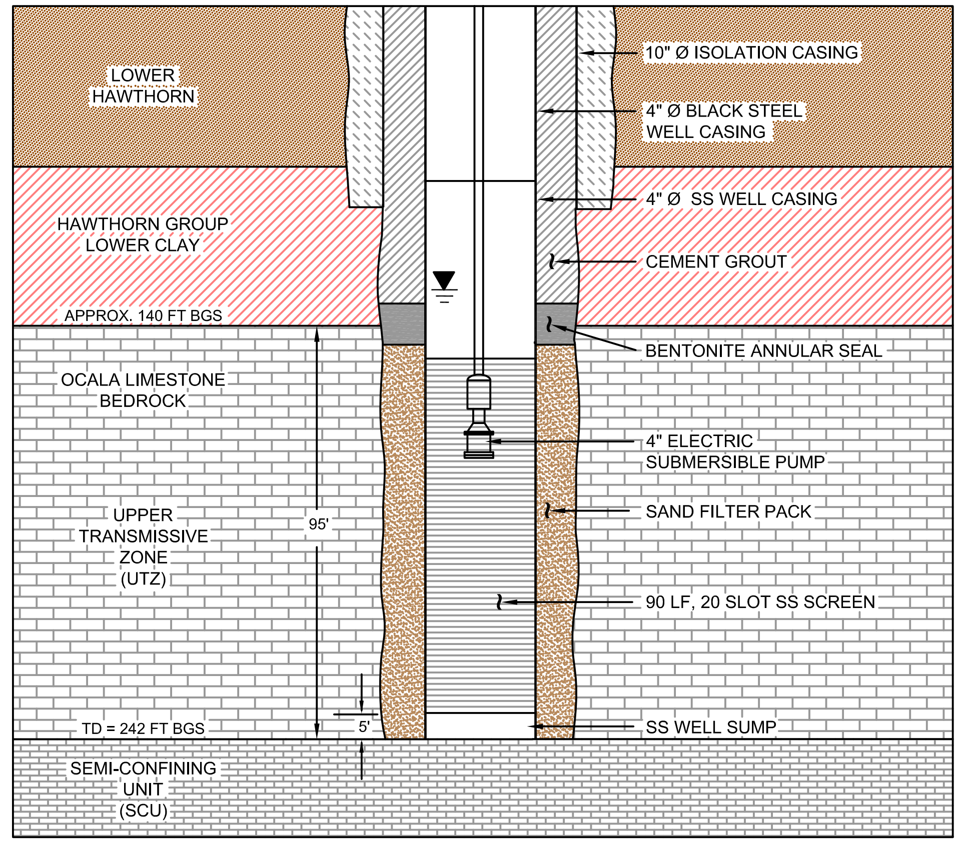

NOT TO SCALE

TITLE: CONCEPTUAL DESIGN FOR THE UPPER FLORIDAN AQUIFER UTZ RECOVERY WELL

LOCATION: Cabot Carbon/Koppers Superfund Site, Gainesville, Florida

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TABLES

Table 1. Sampling Frequency.

	FW-32BE	FW-16B
Baseline (pre-startup)	X	X
IRM Start-Up Extraction at FW-32BE		
Week 1	X	
Week 4	X	X
Week 8	X	X
Week 16	X	
Semi-Annually as part of CGMSAP	X	X

Notes:
CGMSAP = Comprehensive groundwater monitoring sampling and analysis plan.

Table 2. List of Analytes.

VOCs by SW846-8260	
benzene	toluene
ethylbenzene	xylenes (total)
SVOCs by SW846-8270C	
2,4-dimethylphenol	dibenzofuran
2-methylnaphthalene	fluoranthene
2-methylphenol	fluorene
3/4-methylphenol	naphthalene
acenaphthene	pentachlorophenol
acenaphthylene	phenanthrene
anthracene	phenol
carbazole	pyrene