TETRA TECH

November 20, 2018

Mr. Scott Miller
Beazer East, Inc.
c/o Three Rivers Management, Inc.
Manor Oak One, Suite 200
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Pittsburgh, PA 15220

Subject: **Response to EPA and Stakeholder Comments**
Confirmation Borings in Former Process Area
Former Koppers Wood Treating Site
Gainesville, FL

Dear Mr. Miller:

This letter is in response to the comments provided by the U.S. Environmental Protection Agency (EPA), the Florida Department of Environmental Protection (FDEP) and the Gainesville Regional Utilities (GRU). The Black & Veatch letter dated April 9, 2018 provided EPA's comments on the December 28, 2017 report titled "*Phase III ISGS Spot Treatment Injections and Phase IV Performance Evaluation Confirmation Boring and Aquifer Tests for the Former Process Area, Cabot/Koppers Superfund Site, Alachua County, Florida*". Similarly, GRU's comments were provided via an attachment in an email dated May 9, 2018. The FDEP comments were provided via an email dated May 30, 2018, which referenced the GRU comments and observations.

Response to Comments

There were two main concerns expressed by the EPA, FDEP and GRU:

1) Confirmation borings show less evidence of ISGS treatment at targeted depths greater than approximately 40 ft below ground surface (bgs) compared to more shallow injection intervals; and
2) Concerns that untreated DNAPL impacts within the lower portion of the Upper Hawthorn (UH) deposits could impact groundwater in Lower Hawthorn (LH) deposits.

Concerning the evidence of ISGS reagent, Beazer agrees that the confirmation boring cores showed less observational evidence of ISGS reagent treatment in deeper targeted intervals than in the shallow injection intervals. Seven of the 19 confirmation borings had observational evidence of ISGS treatment below 40-foot depths. The lack of visually-observable evidence for ISGS reagent and precipitate at depth near targeted injection intervals does not necessarily mean that deeper DNAPL impacts remain untreated. Visual evidence of reagent may not be evident in sections of core where all reagent had been consumed in treatment reactions. A chemical analysis of sections of core for manganese (Mn), iron (Fe) and lithium (Li) may show elevated concentrations indicating the presence of ISGS reagent and/or precipitates.

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Regarding the concern associated with potential DNAPL impacts to LH deposits, as anticipated it is acknowledged that some DNAPL impacts were observed in the UH confirmation cores at select depths where evidence of ISGS treatment was not observed. However, most of the DNAPL impacts appear to be at residual saturations with DNAPL ratings of "4" and less. Only 1 of 19 borings contained two small intervals with potentially free-phase DNAPL impacts with a rating of "5". Historically, DNAPL ratings of "4" or less do not typically result in free-phase DNAPL accumulation in TIPs, so it is unlikely that the impacts observed in the confirmation core would result in free-phase mobile DNAPL within multi-phase permeability systems. The concern that observed DNAPL impacts could potentially migrate into the LH is not likely given that most of the observed impacts appear to be at residual saturation. It is believed that the ISGS reagent treatment of the shallower DNAPL impacts has effectively dissipated the DNAPL driving head controlling DNAPL migration. Without this driving head the potential for DNAPL mobility is substantially reduced.

Detailed responses to the EPA and GRU comments are provided in Attachments A and B with this letter, respectively. Note that for ease of review, each comment is repeated in italic font with Beazer's response noted in regular font.

Recommendations

Beazer successfully tested reagent injection via two existing DNAPL recovery TIPs in June 2018. The objective of this test was to evaluate the viability of injecting ISG reagent into the lower portion of the Upper Hawthorn (UH) via TIPs. The results of this injection test were successful and demonstrated that ISGS reagent could be injected via TIPs to treat residual DNAPL impacts in the deeper UH.

Beazer's approach to conducting additional work concerning the remaining free-phase DNAPL impacts in the former Process Area will be discussed in a workplan that will propose reagent injection via select TIPs. The workplan will also address an abandonment approach for existing TIPs, collecting additional confirmation cores, and installing new TIPs to monitor for presence of free-phase DNAPL in the retreated areas. Beazer will add enhanced field observation techniques, chemical analyses for Mn, Fe and Li for future confirmation cores to evaluate additional lines of evidence for reacted ISGS reagent. In addition, downhole electrical conductivity testing will be evaluated to develop additional lines of evidence for the presence of ISGS reagent and/or precipitate.

Beazer anticipates submitting this workplan in December 2018.

Sincerely,

James R. Erickson

James R. Erickson
Program Manager

Attachments

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Attachment A
EPA Comments

Comment #1: "*There appears to be a potentially substantial mass of untreated DNAPL-impacted soils near the base of the Upper Hawthorn, which leaves open the possibility of continued impacts to the soil and groundwater at and beneath the Middle Clay Unit*."

Response:

In general, Beazer agrees with the observation that less ISGS reagent and/or precipitate appears to be present in the lower portion of the Upper Hawthorn (UH) targeted for ISGS treatment. This observation was previously noted in the spot treatment and confirmation borings implementation report (Tetra Tech 2017; Section 3.2). Despite the lack of visual evidence of reagent or precipitate in some cores, it is possible that the ISGS reagent migrated to these areas and left no visual evidence or was undetected by the techniques utilized. A workplan is being drafted wherein additional confirmation borings will be installed, where soil samples will be more carefully evaluated in the field using enhanced observational techniques and analyzed for manganese (Mn), iron (Fe), and lithium (Li). Additionally, downhole electrical conductivity testing will be conducted to evaluate additional lines of evidence for the presence of the ISGS reagent/precipitate.

DNAPL ratings of "4" and "5" were not widespread in the deeper intervals of the UH. Most of the intervals identified in the B&V letter represent DNAPL staining, with a corresponding DNAPL rating of "3". DNAPL staining does not represent potentially mobile DNAPL, but rather residual DNAPL that is immobile. In addition, Beazer does not believe that the limited number of DNAPL impacted zones observed with ratings of "4" pose a significant concern for DNAPL migration within the UH and particularly not into the Lower Hawthorn (LH) deposits. The DNAPL impacted zones observed in the confirmation borings were all less than 55 ft bgs, generally 10 to 15 ft above the HG middle clay layer at an approximate depth of 67 ft bgs.

The DNAPL impacts in the Former Process Area were detailed in the 2013 report (Tetra Tech, 2013). One of the observations from this characterization was the presence of a DNAPL lithologic barrier/trap at a depth of approximately 55 ft bgs (approximately 10 to 15 ft above the HG middle clay unit). The characterization report states the following (Section 3.1.1, page 16):

> "*The majority of the mass in the UH was present in a zone between 45 and 55 feet bgs, approximately 10 feet above the HG middle clay unit. Limited observations of DNAPL were present below 55 feet, indicating a potential lithologic barrier, or other combinations of physical factors, limiting the downward migration of DNAPL impacts.*"

This remains one of the major conclusions from previous work. Potential DNAPL mobility into the LH is unlikely because of: 1) DNAPL ratings of "4" and "5" were not widespread in the deeper intervals of the UH; 2) A DNAPL lithologic barrier/trap at 55 ft; 3) DNAPL driving head from deposits above has been cutoff due to ISGS treatment; and 4) Impacted zones with DNAPL

ratings of "4" have historically not produced significant quantities of free-phase DNAPL in TIPs.

Comment #2: "*Black & Veatch recommends that these untreated areas with DNAPL ratings of 4 or 5 be evaluated for further treatment*."

Response: Despite the lack of visual evidence of reagent or precipitate in some cores, it is possible that the ISGS reagent migrated to these areas and left no visual evidence or was undetected by the techniques utilized. Beazer will propose a comprehensive program to: 1) Obtain additional information at new confirmation borings in an attempt to identify evidence of ISGS reagent, 2) Provide additional ISGS treatment of deeper zones in the UH through ISGS injection into the TIPs indicating ongoing recoverable DNAPL at rates greater than 0.2 gallons every 2 weeks; 3) Conduct ISGS treatment of the TIP pea-gravel filter pack in TIPs that previously recovered DNAPL; 4) Close all exiting TIPs by injecting grout into the 1-inch diameter PVC casing and filter pack and cutting the casing below ground surface; and 5) Install some replacement TIPs to confirm the presence/absence of free-phase DNAPL in the former Process Area.

Comment #3: "*Black & Veatch also requests that any recent DNAPL recovery information from the Process Area be provided for review.*"

Response: Beazer provided the EPA/Stakeholders with DNAPL recovery graphs for each of the TIPs and wells via an email dated June 8, 2018, as requested in this comment. In addition, tabulated DNAPL recovery data in Excel spreadsheets were provided to the EPA/Stakeholders via an email on June 12, 2018. Updated DNAPL recovery graphs (Figures 1, 2 and 3) through October 2018 are provided with this response letter.

Comment #4: "*Black & Veatch would also like to see the newly collected data (observations of reagent, DNAPL in soils cores, etc.) incorporated onto the cross sections that were used to evaluate the DNAPL impacts and intervals for treatment so that an easy comparison can be made regarding which areas were targeted for treatment, which areas have evidence of reagent and areas where untreated DNAPL impacts were observed.*"

Response: The requested figures and cross-sections are attached to this response letter.

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Attachment B
GRU/FDEP Comments

GRU Comments (FDEP concurred with the general nature of GRU comments and did not provide any additional detailed comments):

"*The key observations are:*

1) *At most locations, the depth intervals of observed ISGS reagent in the confirmatory borings were much thinner than the injection intervals, for the zone above a 40-foot depth.*
2) *At most locations, the depth intervals of observed ISGS reagent in the confirmatory borings were thin or absent, for the zone below a depth of 40 ft even though numerous injection borings were in that depth interval.*
3) *Code 4 or Code 5 NAPL was present in the confirmatory borings outside ISGS reagent zones, in some cases in numerous intervals.*
4) *In a few cases, ISGS reagent was observed at higher elevations than the surrounding injection intervals*."

Response:

The GRU May 9, 2018 email included 19 figures that showed DNAPL impacts and regent intervals for each of the confirmation borings; in addition, the figures showed injection points within 25 ft of the confirmation borings and the ISGS treatment targeted intervals. GRU' consultants did a nice job of compiling a significant amount of data into one comprehensive figure for each of the confirmation borings; however, Beazer believes that some modification/correction may be needed for an accurate assessment.

Tetra Tech reviewed the information provided for the confirmation borings. Tetra Tech has the following comments on the information provided in the GRU figures:

1) The GRU label for DNAPL observations in the confirmation borings states "*Untreated zones of Code 4 or 5 NAPL*". A DNAPL rating of "4" indicates that free-phase DNAPL may be present in the core; however, a DNAPL rating of "4" does not typically correspond to free-phase DNAPL accumulation in wells and TIPs. A DNAPL rating of "5" indicates that free-phase DNAPL is present in the core and that TIPs/wells completed in these zones may produce recoverable DNAPL.

   The GRU label for DNAPL ("*Untreated zones of Code 4 or 5 NAPL*") is misleading in that there was only 1 of 19 confirmation borings (B 420N/300E) with a DNAPL rating of "5", and this rating was only assigned to two small intervals at depths of 21.5 and 40.5 ft bgs. Eighteen of the 19 confirmation borings had a DNAPL rating of "4" or less.

2) Multiple DNAPL intervals depicted on the GRU figures were larger than those reported in the the field boring logs. In most cases the GRU figures combined interbedded DNAPL ratings of "3s" and "4s" into one continuous interval of "4s". Hence, the GRU figures tend to show more DNAPL impacts than were observed in the field.

3) Two GRU figures (285N/305E and 300N/180E) did not report ISGS reagent below 40 ft when the field logs identified ISGS reagent below this depth. Confirmation boring 300N/180E had an approximately 7-foot ISGS treatment interval and confirmation boring 285N/305E had two, 1-foot thick intervals of ISGS treatment that were not shown on the GRU figure. Beazer has the following specific comments for the following confirmation boring figures:

<u>B 280N/375E</u>

a) DNAPL interval is over-projected
   - GRU figure shows DNAPL at 28 ft; however, no DNAPL is present in borehole log or field sheets at this depth.

<u>B 285N/305E</u>

a) DNAPL interval is over-projected
   - DNAPL is shown on the GRU figure from 29 to 33 ft bgs; however, there are only two smaller DNAPL seams with a rating of "4" within this interval (29.5-30 and 32-33 ft bgs);

b) Field logs show ISGS reagent at 45-46 ft and 51.5-52.5 ft; however, the GRU figure does not show reagent at these depths;

<u>B 300N/180E</u>

a) DNAPL interval thicknesses incorrect;
   - The GRU figure shows a "4" DNAPL rating from 49 to 55 ft; however, there is 1.5 ft of core within this interval that is not rated as a "4";
   - The GRU figure shows DNAPL present at 41-43 ft; however, the field logs do not show DNAPL at this depth;
   - The GRU figure is missing 0.5 ft of DNAPL with a "4" rating at a depth of 39.5 ft;

b) The GRU figure is missing ISGS reagent at depth intervals 23.5-27.5 and 48-55 ft bgs;

<u>B 360N/375E</u>

a) DNAPL interval thickness is over-projected;
   - The GRU figure shows a DNAPL rating of "4" from 7 to 13 ft bgs;
   - Field logs only show DNAPL rating of "4" in thin seams at depths of 7.5 and 12.5 ft bgs;

B 380N/415E

a) DNAPL interval thickness is over-projected;
   - The GRU figures show a DNAPL rating of "4" from 30 to 36 ft bgs;
   - Field logs show DNAPL ratings of "4" from 30-31 ft; 32 to 33 ft and 34-36 ft; approx. 1/3 of the interval shown is not a DNAPL rating of "4";

B 410N/350E

a) DNAPL interval is over-projected
   - The GRU figure shows a DNAPL rating of "4" from 48 – 53.5 ft bgs;
   - Field logs show DNAPL ratings of "4" at depths of 48-49, 50-51 and 52-53 ft bgs; the remaining 2.5 ft of this interval were rated less than "4".

B 420N/300E

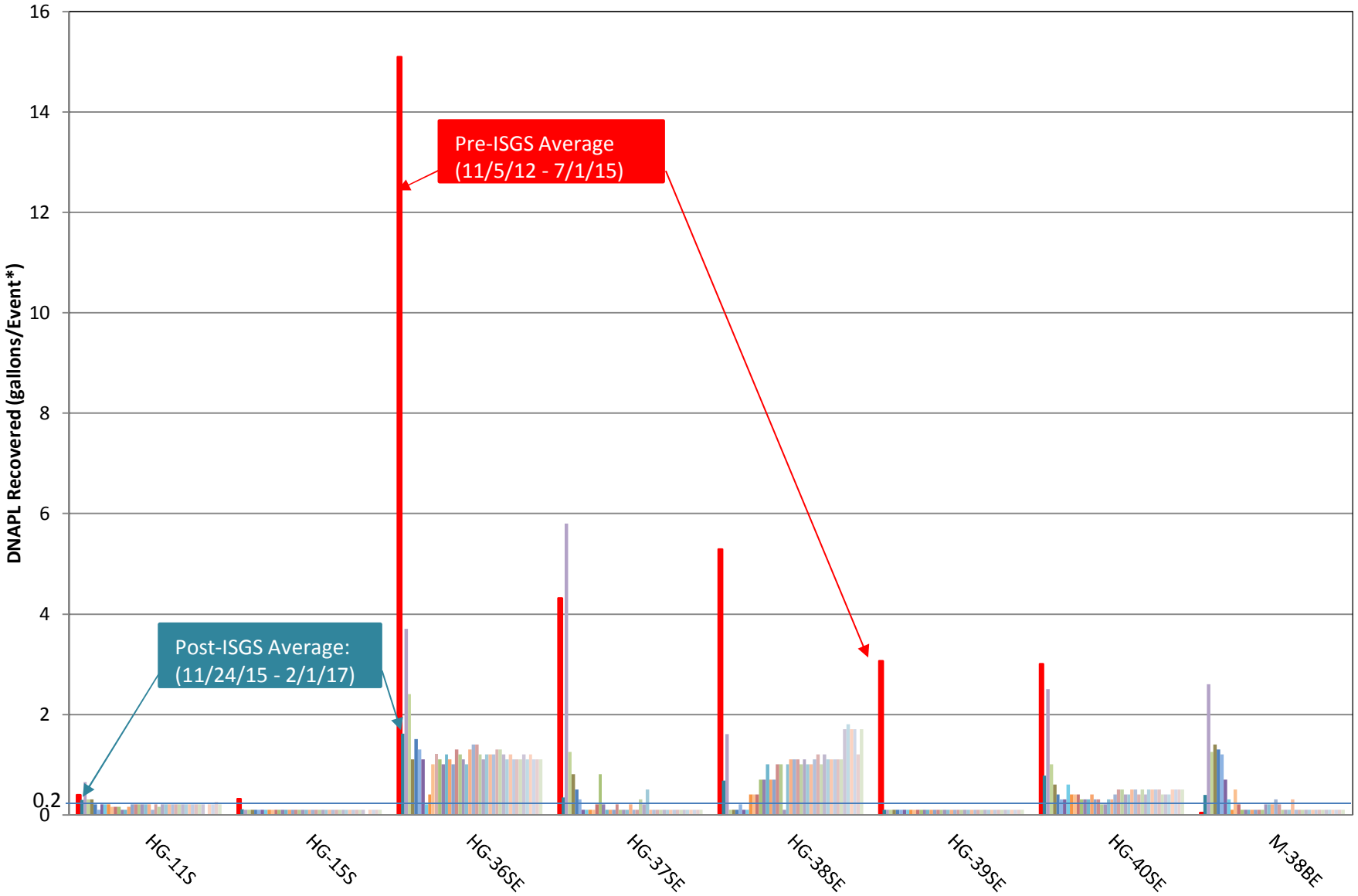
a) This is the only confirmation boring with DNAPL rated zones of "5" at depths of 21-22 ft and 40.5-41 ft bgs;

B 455N/340E

a) DNAPL interval is over-projected
   - The GRU figure shows DNAPL with a "4/5" rating at 29.5 -30 ft bgs; however, borehole logs do not show DNAPL at this depth;

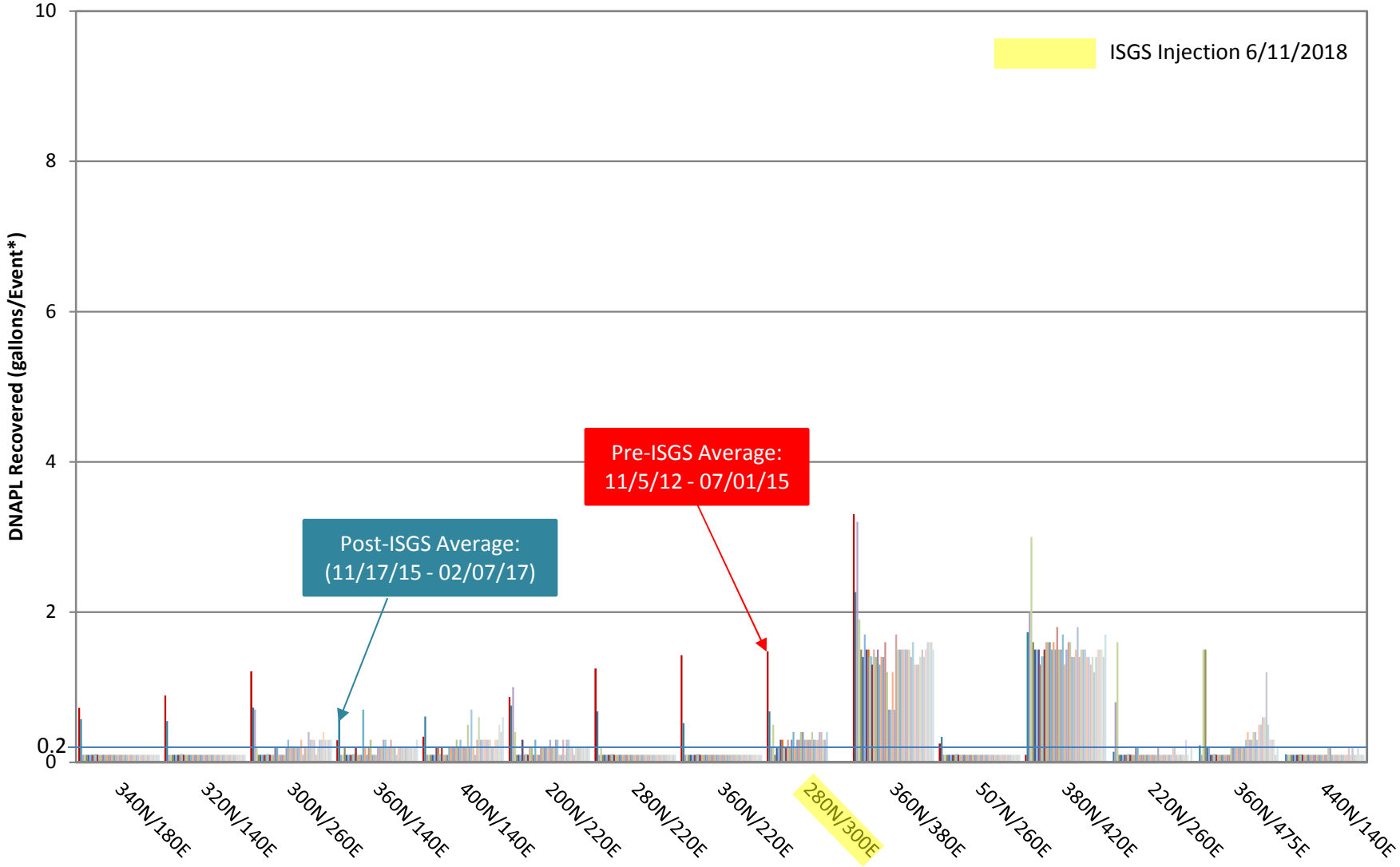
Additionally, as stated in the response to USEPA comments above Beazer will propose enhanced field observation techniques, a comprehensive program to obtain additional soil/water chemistry data (Mn, Fe and Li) at future confirmation borings in an attempt to identify evidence of ISGS reagent and precipitates and downhole electrical conductivity testing will be conducted in an effort to evaluate additional lines of evidence for the presence of ISGS reagent/precipitate.

Figure 1. DNAPL recovery for wells post-ISGS spot treatment.(03/29/17-10/23/18)



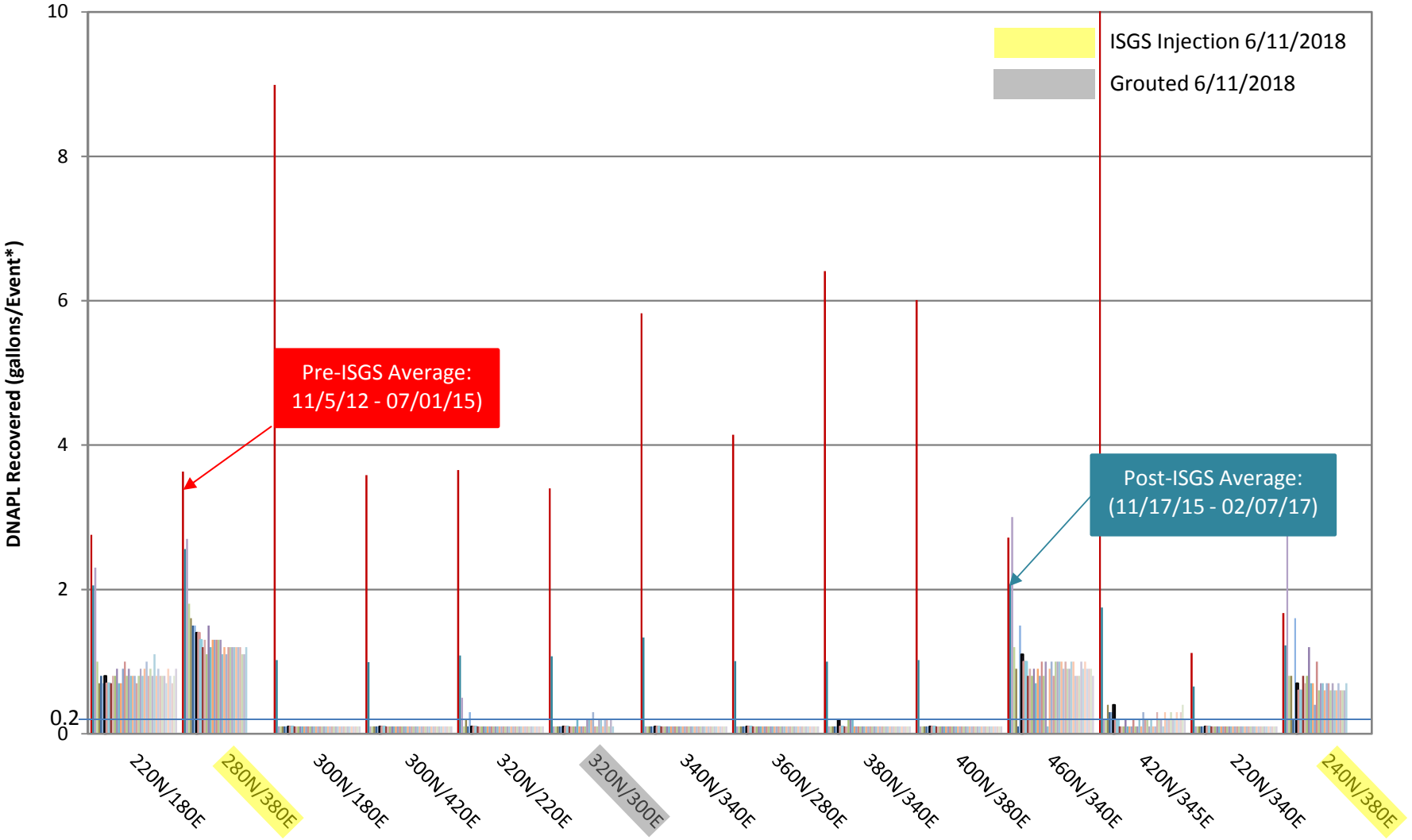
*Events occur every two weeks.

Figure 2. DNAPL recovery for TIPs post-ISGS spot treatment implementation (04/04/17 - 10/30/18).



*Events occur every two weeks.

Figure 3. DNAPL recovery for TIPs post-ISGS spot treatment implementation (04/04/17 - 10/30/18).



*Events occur every two weeks.