APPENDIX A

VARIANCE LETTERS (CD)

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Department of Energy

Portsmouth/Paducah Project Office
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DEC 24 2014

Mr. Todd Mullins
Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

PPPO-02-2711474-15

Ms. Jennifer Tufts
Remedial Project Manager
Federal Facilities Branch
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Mullins and Ms. Tufts:

NOTIFICATION TO RELOCATE TEMPERATURE MONITORING BORINGS ASSOCIATED WITH THE C-400 PHASE IIb TREATABILITY STUDY

Reference: *Treatability Study Design, Design Drawings and Technical Specification Package for the C-400 Interim Remedial Action Phase IIb Steam Injection Treatability Study* (DOE/LX/07-1295&D2/R1)

The U.S. Department of Energy (DOE) requested consideration and approval from the Kentucky Department for Environmental Protection (KDEP) and the U.S. Environmental Protection Agency (EPA) to relocate three temperature monitoring points (TMPs) associated with the C-400 Phase IIb Treatability Study during the Groundwater Projects status conference call on December 18, 2014. DOE specifically requested that the three TMP locations, identified as TMP-08, TMP-10, and TMP-11, be moved to a distance of five feet from the nearest utility conduit line. (See enclosure for approved and proposed TMP locations.) The contracted drilling staff documented a safety concern with the close proximity of the TMPs to the utility line during the initial field walkdown. The proposed locations maintain the same radial distance from the steam injection point; therefore, the technical subject matter experts (SME) stated that the movement of the TMPs would not affect the data generated from the treatability study.

KDEP and EPA expressed that the relocation of the TMPs was acceptable; however, both agencies asked for the opinion of EPA's SME. A follow-up e-mail from EPA on December 19, 2014, stated that EPA's SME had been consulted and the SME was fine with moving the TMPs as proposed and there was no concern with the relocation of the TMPs affecting the outcome of the treatability study results.

The *Treatability Study Design, Design Drawings and Technical Specification Package for the C-400 Interim Remedial Action Phase IIb Steam Injection Treatability Study* (DOE/LX/07-1295&D2/R1) specifies the coordinates of each TMP on Drawing C7DC40000A027 (page A-4). Upon completion of the drilling, Drawing C7DC40000A027 will be revised to capture the final as-built coordinates of the TMPs. The revised drawing will be submitted as a page change to the document.

If you have any questions, or require additional information, please contact David Dollins at (270) 441-6819.

Sincerely,

Jennifer Woodard

Jennifer Woodard
Paducah Site Lead
Portsmouth/Paducah Project Office

Enclosure:
Drawing showing the relocation of the temperature monitoring boring locations

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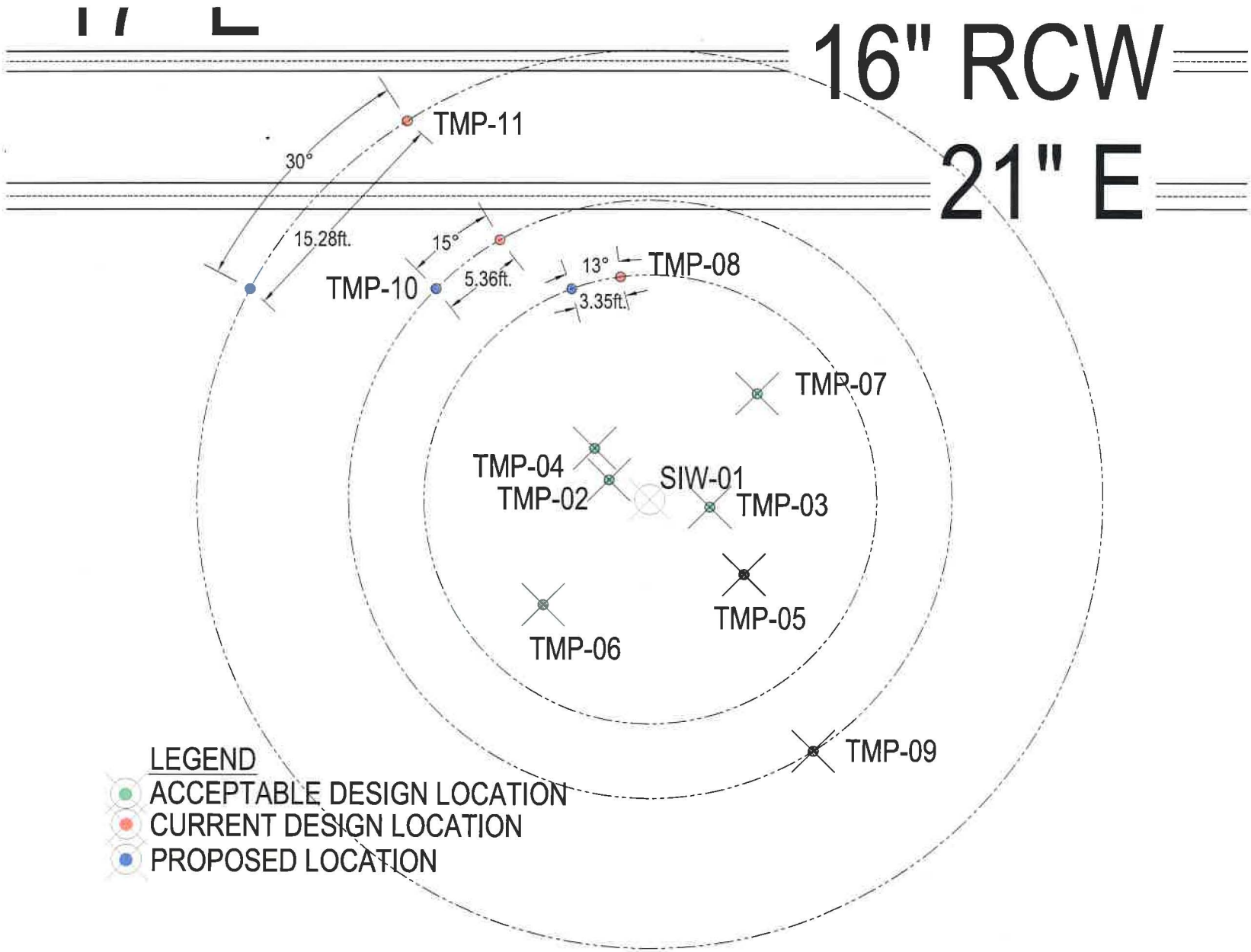
16" RCW
21" E
TMP-11
30°
15.28ft.
15°
TMP-10
5.36ft.
13°
TMP-08
3.35ft.
TMP-07
TMP-04
TMP-02
SIW-01
TMP-03
TMP-05
TMP-06
TMP-09
LEGEND
ACCEPTABLE DESIGN LOCATION
CURRENT DESIGN LOCATION
PROPOSED LOCATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

March 19, 2015

4WD-FFB

Jennifer Woodard
United States Department of Energy
Portsmouth/Paducah Project Site Office
P.O. Box 1410
Paducah, Kentucky 42002

RE: **EPA Response to DOE's Variance Request for Well Abandonment as Specified in the** *Remedial Action Work Plan for Phase IIa of the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion, Plant, Paducah, Kentucky, DOE/LX/07-1271&D2/R2*

Dear Ms. Woodard,

The Environmental Protection Agency (EPA) has received the Department of Energy's (DOE) request, via the March 16, 2015 email (enclosed), for a variance to abandon 94 electrode wells as specified in the *Remedial Action Work Plan for Phase IIa of the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion, Plant, Paducah, Kentucky, DOE/LX/07-1271&D2/R2* (RAWP). Section 11.4.10 Underground Injection Control of the RAWP specifies methodology for abandoning the wells: "…The plugging and abandonment method that will be used to meet the substantive requirements for closure under 40 CFR 144.23(b)(1) is as follows. During installation, all of the electrode borings will have high temperature cement grout installed to a minimum depth of 5.0 ft bgs. This is intended to minimize the potential of infiltration of surface waters along the borehole. Electrode borings that contain screened intervals will have the 2-inch fiberglass pipe perforated down to the screened interval and then filled with grout to the surface. All electrode borings will have grout pumped through the water injection lines into the electrodes that are 53.15 ft bgs and above (53.15 ft bgs is the depth of the electrode nearest the UCRS/RGA interface, which is at approximately 55 ft bgs)….".

DOE was unable to abandon the wells as specified in the RAWP due to the high viscosity of the grout pumped into the 3/8 inch diameter water injection lines. Therefore, DOE has recommended that the 94 electrode wells be abandoned by cutting the water injection lines a minimum of 2 ft. bgs, plugging the end of each line with stainless steel screws, and filling the borings with grout to grade. EPA is concerned with abandoning the wells in this manner due to several factors, but the main issue being that the well is constructed in such a way that the annular space is not plugged/sealed from 5 feet below land surface to the upper zone of the RGA. The sand/graphite pack placed in the well has a vertical permeability that could be several orders of magnitude greater than UCRS soils. Therefore, groundwater in the UCRS has a direct conduit via

the well annular space to the RGA. The preferential flow pathway creates potential issues regarding contaminated groundwater mixing between the UCRS and RGA, and also potential adverse impact to the success of Steam Enhanced Extraction (SEE) if selected as the remedy for RGA sources. These issues are discussed below.

EPA's concern regarding residual chlorinated solvent contamination present in the UCRS soils is that groundwater will continue to leach and/or migrate from the UCRS to the RGA along the annular space of the wells. Evaluation of UCRS soil sample data in the area of Electrical Resistance Heating (ERH) treatment is necessary to determine potential impact to the RGA. It is possible that treatment of the UCRS has resulted in concentrations in UCRS soils/groundwater to levels that will not impact RGA groundwater. However, if it is determined that soil/groundwater concentrations are a potential continuing source of contamination to RGA groundwater, then the wells should be abandoned in a manner that seals the annular space to protect the RGA.

Another concern is in regard to full scale implementation of SEE. Given the large number of electrode wells to be abandoned (94), the diameter of the borings (14 inches), the spacing of the borings (~20 feet), and well construction that does not include a seal in the annular space, abandoning the wells as DOE has proposed could result in the SEE steam bubble being short-circuited by the wells, preventing SEE implementation from being effective. If SEE is the selected remedy for RGA sources, SEE experts should be consulted to determine if the well construction is problematic for SEE implementation. If SEE experts recommend sealing the wells before implementation, then the work can be completed as part of SEE full scale implementation.

As discussed in the March 18, 2015 meeting, in the interest of keeping the SEE Treatability Study (TS) on schedule, EPA approves DOE's request for a variance to the electrode well abandonment process in the RAWP in order to abandon 12 electrode wells as specified in DOE's March 16, 2015 email. It is EPA's understanding from the March 18 meeting that the 12 wells are located in the C-400 area needed for equipment set-up for the SEE TS. However, until DOE/FFA parties can obtain more information from ERH vendors regarding well abandonment methodology that includes information regarding sealing the well annular space, the remaining 82 electrode wells should not be abandoned. The FFA parties discussed additional time of no longer than 2 to 3 weeks to complete research: during that time work to abandon the 12 electrode wells, and other types of ERH wells (vapor extraction, digitam, multiphase, etc) will continue. Once information is obtained from the vendors, the FFA parties will determine the best path forward for abandoning the remaining 82 electrode wells.

Until more information is provided regarding UCRS soil/groundwater concentrations and SEE project information, abandonment of the electrode wells in accordance with the proposal in the DOE March 16, 2015, variance request should be considered an interim measure to keep the SEE Treatability Study on schedule. Although EPA has granted a variance for abandoning the 12 electrode wells, the final electrode well abandonment for the 94 electrode wells must comply with 40 CFR § 144.23(b)(1) where "prior to abandoning any Class IV well, the owner or operator shall plug or otherwise close the well in a manner acceptable to the Regional Administrator."

A copy of this correspondence should be included in the Remedial Action Completion Report (as proposed in the March 16 variance request) and the C-400 Phase 2b SEE Treatability Study Report. If you have any questions or require additional information, please contact me at (404) 562-8547.

Sincerely,

Julie L. Corkran

Julie L. Corkran, Ph.D.
Senior Remedial Project Manager
Federal Facilities Branch
Superfund Division

Enclosure (as stated)

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Kelly Layne, LATAKY – Kevil, Kelly.Layne@lataky.com