Douglas A. Ducey
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Misael Cabrera
Director

via e-mail

June 19, 2018
FPU18-248

Ms. Catherine Jerrard
AFCEC/CIBW
706 Hangar Road
Rome, NY 13441

RE: WAFB – ADEQ Request for Supplemental Data and Evaluation Metrics – ST012 Enhanced Bioremediation Pilot Study Implementation; former Williams Air Force Base, Mesa, Arizona

Dear Ms. Jerrard:

Arizona Department of Environmental Quality (ADEQ) Federal Projects Unit (FPU) and ADEQ contractor UXO Pro, Inc. are requesting supplemental data and evaluation metrics be incorporated into the Enhanced Bioremediation (EBR) pilot study at the former Williams Air Force Base in Mesa, Arizona.

The supplemental data and evaluation metrics are requested as part of the collaborative process inferred within the February 2018 informal dispute resolution path forward agreed upon by the U.S. Air Force (USAF), U.S. Environmental Protection Agency (EPA) and Arizona Department of Environmental Quality (ADEQ). The supplemental data acquisition and evaluation metrics should be incorporated and appended to direct referenced and associated documents:

- *Final Pilot Study Implementation Work Plan for Operable Unit 2, Revised Groundwater Remedy, Site ST012, Former Williams Air Force Base, Mesa, Arizona*; prepared for AFCEC/CIBW; Lackland AFB, TX; prepared by Amec Foster Wheler [sic] Environment & Infrastructure, Inc., Phoenix, AZ; document dated April 5, 2018 (*Pilot Study Implementation Work Plan,* (April 2018))

- *Final Remedial Design and Remedial Action Work Plan, Former Liquid Fuels Storage Area, Site ST012, Former Williams Air Force Base, Mesa, Arizona*; prepared for Air Force Civil Engineer Center (AFCEC/CIBW), Lackland AFB, TX; prepared by AMEC Environment & Infrastructure, Inc., Phoenix, AZ; document dated May 20, 2014 (*Remedial Design and Remedial Action Work Plan,* (May 2014))

ADEQ's requested supplemental data and evaluation metrics follow.

1. Provide a complete acronym list [example = "RAO"].

2. The *Pilot Study Implementation Work Plan* (April 2018) baseline and subsequent geochemistry analyses should include:
- Temperature
- pH
- ORP
- DO
- Ferrous Iron
- Total Iron
- Phosphorous
- Hydrogen Sulfide
- Methane
- Alkalinity
- Arsenic

(a) Please add Phosphorous, Methane, and Ferrous Iron to the analyses.
(b) Please ensure that the Section 4.2.3–referenced analyses are added to both Table 5-1 and to the Decision Matrix (Appendix J).

> If sulfate-reducing bacteria (SRB) populations are to be "inferred" by indirect evidence, then baseline and geochemical parameter that might support "inferred" evidence lines (like the list above) should be collected before EBR and during EBR to support the presumption that SRB are present and active.

3. The *Pilot Study Implementation Work Plan* (April 2018) should include baseline studies:
(a) Targeting benzene-degrading microbes.
(b) Measuring stable (baseline population) microbe colonies (new BioTrap® sampler structures will show opportunistic "growth" populations as microbes move onto and multiply on a "newly" installed BioTrap® sampler).
(c) Measuring the sulfate nutrient impact on microbe colony populations after "Time Zero" population data is acquired.

> The above items assist in providing information. The April 2018 *Pilot Study Implementation Work Plan* (as interpreted) does not appear to confirm that benzene degraders exist, does not provide "Time Zero" population data, does not provide nutrient confirmation, and does not provide enhanced microbe populations after nutrient injections. The BioTrap® sampler use, quantitative polymerase chain reaction (qPCR) assessments, and Total Eubacteria (EBAC) testing for only sulfate reducing bacteria and total microbial population sizes will not confirm that indigenous benzene biodegraders are present. The April 2018 *Pilot Study Implementation Work Plan* (as interpreted) will also not confirm that any present benzene degraders are also sulfate-reducers. Benzene degradation and sulfate reduction are independent activities.

4. The *Pilot Study Implementation Work Plan* (April 2018) should include baseline quantitative polymerase chain reaction (qPCR) assessments using a one-time, discrete interval groundwater sample from each targeted groundwater monitoring well.

5. Obtain baseline data if Stable Isotope Probe (SIP) assessments are to be conducted. Assessments at proposed 3-12 months post-injection may not be helpful to assess contaminant biodegradation with no corresponding baseline data.

6. Provide expected, specific data trends which will demonstrate progress toward Remedial Action Objectives (RAOs).

7. Provide the expected decision points and supporting data required to commit to full-scale implementation.

8. Detail how collected pilot test data will be incorporated into remediation models.

9. Demonstrate that the existing monitoring well network will provide statistically valid data sets for evaluating EBR progress.

10. Revise Section *6.1 Requirements for EBR System Shutdown* (*Pilot Study Implementation Work Plan* (April 2018)) to include updated transition criteria. Section *4.3.3 Transition to Monitoring* (*Remedial Design and Remedial Action Work Plan*, (May 2014)) is no longer a valid reference. Include *Appendix F* and *Appendix J* updates (*Pilot Study Implementation Work Plan* (April 2018)).

11. Include a contingency plan outline to move to different terminal electron acceptors. Information was provided that some areas without depleted sulfate exist, which is interpreted as potential areas not under the influence of sulfate reduction.

12. Include an outline for an aerobic bioremediation contingency plan. Prior comment responses have indicated the use of aerobic methods cannot be totally ruled out for future remediation in specific areas. However, the reviewers note that aerobic degraders may not survive after high sulfate concentration injections to stimulate sulfate-reduction.

13. Include detailed plans and timelines to perform additional characterization and address contaminant plume areas unaffected by EBR. The post-SEE (steam enhanced extraction) soil boring and well installation results indicated areas likely requiring characterization and groundwater monitoring.

14. Provide soil boring, groundwater well installation and sampling plans to confirm tracer transport model.

Closure

ADEQ may add or amend comments if evidence to the contrary of our understanding is discovered; if received information is determined to be inaccurate; if any condition was unknown to ADEQ at the time this document was submitted; if other parties bring valid concerns to our attention; or site conditions are deemed not protective of human health and the environment within the scope of this Department.

Thank you for the opportunity to comment. Should you have any questions regarding this correspondence, please contact me by phone at (602) 771-4121 or e-mail miller.wayne@azdeq.gov.

Sincerely,

Wayne Miller
ADEQ Project Manager, Federal Projects Unit
Remedial Projects Section, Waste Programs Division

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