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Catherine Jerrard
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706 Hangar Road
Rome, New York 13441

SUBJECT: Biodegradation Model for Enhanced Bioremediation to Address Remaining Contamination at Williams ST12 Fuels Spill Site, Mesa AZ

Dear Ms. Jerrard:

The US Environmental Protection Agency (EPA) and Arizona Department of Environmental Quality (ADEQ) technical team for the Williams AFB Superfund Site has jointly developed independent biodegradation model estimates (attached to this memorandum) for Time of Remediation (TOR) for the ST-12 Fuels Spill Site to assist in resolving different understandings of subsurface conditions and processes at the WAFB Site, and enable AF to appropriately plan for future project needs.

These EPA/AZDEQ independent analyses and models differ from those developed by AF and its contractors by providing:

(1) a more in-depth, detailed approach to modeling WAFB Site subsurface conditions and processes,

(2) greater reliance on data and parameters measured at the ST-12 Fuels Spill Site rather than literature or assumed values,

(3) an evaluation of a range of rates of dissolution of benzene and other contaminants of concern (COCs) from the gasoline and jet fuel light non-aqueous phase liquids (LNAPL) into groundwater, and

(4) sensitivity analysis to evaluate impact of input parameter variability upon TOR estimates and to enable critical review.

The rate of dissolution of the COCs from the LNAPL into groundwater is an important parameter that can strongly affect how long the LNAPL continues to supply COCs to groundwater, the ability of the Site microorganisms to degrade the contaminants, and the potential for COC groundwater plume expansion. It is necessary to carefully evaluate how differences in this dissolution rate can affect remedy effectiveness and timeliness. The attached technical memorandum evaluates a range of possible rates of dissolution of benzene and other COCs from the LNAPL into groundwater, leading to a more realistic range of estimates for remedial timeframe. In contrast, the modeling efforts presented in the Addendum II EBR workplan assume only an unlimited rate of dissolution of COCS from LNAPL into groundwater, which biases the AF model results toward rapid remediation timeframes which may be overly optimistic.

The attached simulation also employs a Monod biodegradation modeling approach that allows for consideration of the growth and activity of the microbial population responsible for degradation of the COCs, whereas the model presented in the Addendum II Workplan did not account for the expected changes in microbial populations, and the effect on COC degradation of these microbial population changes. The same estimates of remaining LNAPL and COC mass previously provided by the AF were used for both EPA/ADEQ modeling exercises, but note that EPA/ADEQ have significant concerns about how accurately those mass estimates reflect current conditions at the Site.

Even small changes in these values and parameters can markedly affect the estimates of Site remedial timeframes. With that caveat, the EPA and ADEQ technical team have concluded that realistic remedial timeframes for enhanced bioremediation to degrade contaminants remaining at the ST-12 Fuel Spill site range from 100 to 200 years for the Upper Water Bearing Zone and 30 to 50 years for the Lower Saturated Zone.

Please incorporate these updated modeling results into the next version of the Addendum II EBR workplan. We look forward to continued discussion to determine the most appropriate path forward to address current site conditions.

Sincerely,

Carolyn d'Almeida
Remedial Project Manager, EPA

Wayne Miller
Remedial Project Manager, ADEQ

cc: Ardis Dickey, AFCEC

Attachments