

Implementation of Monitored Natural Attenuation Combined with Source Zone Control and a Technical Impracticability Waiver at Air Force Plant 4

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Background/Objectives. Air Force Plant 4 (AFP4) is a 726-acre government-owned, contractor-operated facility in Tarrant County, Texas. AFP4 has manufactured military aircraft since 1942 and is currently operated by Lockheed Martin Aeronautics. The manufacturing operations and associated processes at the plant have resulted in the generation of waste oils, waste fuels, paint residues, as well as used solvents and process chemicals. Presently, contamination from the disposal of these historical wastes exists in the groundwater beneath the site. After the Third Five-Year Review in 2014, the EPA indicated that the site is not protective in the long term because the cleanup goals for all groundwater beneath AFP4 needed to be updated to meet the MCLs. The EPA indicated the Air Force needed to submit a Record of Decision (ROD) Amendment which identified the maximum contaminant levels (MCLs) as applicable or relevant and appropriate requirements (ARARs) for surface water and groundwater at AFP4 and documented any voluntary or interim remedial actions as part of the final selected remedy.

Approach/Activities. In response to the EPA's findings, the Air Force performed a Complex Site Initiative (CSI) to provide a technical evaluation of the groundwater plume characteristics at AFP4, review existing ROD remedies, identify data gaps, and update the conceptual site model (CSM). The CSI identified several data gaps which needed to be addressed to fully characterize the groundwater plumes across the site. These data gaps were closed during several pilot studies, including a geophysical tomography and hydrological tomography study, a thermal enhanced natural source zone depletion evaluation, and a monitored natural attenuation (MNA) evaluation. The major conclusions drawn from the studies were that MNA was occurring within the various groundwater bearing units and the contaminant mass was not migrating downgradient from source areas at any appreciable rates. The updated CSM showed that there was not a hydraulic connection between the contaminated Terrace Alluvium (shallow groundwater) and Paluxy Aquifer (drinking water source) where the Walnut Formation (limestone aquitard) was eroded. The updated CSM also showed that the Upper Paluxy Sand Channels, which lie under the area where the Walnut Formation is eroded, were isolated channel-fill sands encased in clay and silt (estuarine deposits) and were not a continuous sandy groundwater bearing unit that was acting as a conduit between the Terrace Alluvium and Paluxy Aquifer, as formerly thought.

Results/Lessons Learned. Based on the CSI results, the Air Force submitted a Focus Feasibility Study, which evaluated MNA, enhanced in situ bioremediation, and dense non-aqueous phase liquid (DNAPL) extraction as alternative remedies to the soil vapor extraction (SVE) and pump and treat systems in the current ROD. Based on the new understanding of the complex geological setting, the plume-wide and well-specific statistical analyses of the contaminant concentrations over time, and the evaluation of the treatment system performance over the past 20 years, the Air Force, EPA, and Texas Commission on Environmental Quality (TCEQ) agreed that MNA in the diffuse portions of the five distinct groundwater plumes combined with DNAPL extraction and a Technical Impracticability Waiver to waive the requirement to comply with the ARAR to achieve the MCLs in the DNAPL source area was the appropriate alternative to move forward in the Proposed Plan. Currently, the Air Force is completing the ROD Amendment to document the change in remedy from groundwater pump

and treatment to MNA and change the remedial action objectives from alternate concentration limits to the MCLs.