INFORMATION SHEET

ORDER NO R5-2007-XXXX
UNITED STATES AIR FORCE
BEALE AIR FORCE BASE
IN-SITU CHEMICAL OXIDATION TREATABILITY STUDY
FOR REMEDIAITON OF VOLATILE ORGANIC CONSTIUENTS AT SITE 32
YUBA COUNTY

The United States Air Force (hereafter Discharger) owns and operates Beale Air Force Base in Yuba County. Beale Air Force Base is an active Air Force Base approximately 40 miles north of Sacramento and 10 miles east of Marysville. Site 32, the location of a proposed full-scale in-situ chemical oxidation (ISCO) treatability study, is in the north-western portion of Beale AFB in the Flight Line Area. Site 32 contains several active maintenance buildings, former underground storage tanks (USTs), washracks, an oil water separator and an industrial waste line that have been associated with spills and leaks, which caused groundwater and soil contamination in this area.

Contaminants of concern (COCs) identified in soil and groundwater during the Feasibility Study (FS) include volatile organic compounds (VOCs) and Total Petroleum Hydrocarbons, Diesel Range (TPH-D). The majority of groundwater contamination at Site 32 is in the upper aquifer zone, which extends from approximately 60 to 80 feet below ground surface. The groundwater cleanup project is being conducted as part of a performance based contract between the Discharger and CH2MHill. CH2MHill will construct and operate the treatability study.

The full-scale ISCO treatability study will be conducted in two phases and will utilize potassium permanganate ($KMnO_4$). $KMnO_4$ is a treatment enhancing substance, which is intended to provide an environmentally beneficial and efficient cleanup and has the ability to permanently reduce contaminant mass in the subsurface in a much shorter timeframe than traditional groundwater pump-and-treat remediation systems.

The area to be treated by $KMnO_4$ is divided into a treatment zone area and a transition zone. The treatment zone area includes injection wells that will deliver the amendment ($KMnO_4$) into the subsurface. The transition zone area is downgradient of the treatment zone area and is the area where extremely aerobic conditions, created by the $KMnO_4$, will return to natural aerobic conditions. Injection of $KMnO_4$ in groundwater may have some secondary effects such as increases in total dissolved solids (primarily increases in potassium and chloride) and manganese. The addition of $KMnO_4$ may also temporarily mobilize redox sensitive metals. In addition, $KMnO_4$ contains low concentrations of impurities, including chromium, and is known to oxidize trivalent chromium (CrIII) found in soil to the more soluble hexavalent form (CrVI). It is expected that the

oxidized metals within the transition zone area, including hexavalent chromium, will be reduced and precipitate, thereby becoming immobile.

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A pilot-scale treatability study (pilot study) performed at Site 32 by the Discharger in 2005 demonstrated that ($KMnO_4$) has the ability to provide significant mass reduction of VOCs in groundwater. The pilot study also evaluated the secondary effects on groundwater quality related to the presence of soluble metals during treatment study. Analytical data in the Site 32 pilot test area indicates that TCE concentrations, which ranged from 1050 to 1090 ug/L prior to pilot test, were reduced to below or near detection limits. The data collected during the pilot study provided the Discharger with sufficient data to design the proposed full-scale treatability system. The pilot-scale treatability study for ($KMnO_4$) showed that some metals increased above baseline concentrations and above the respective primary and secondary maximum contaminant levels (MCLs) for these metals. However, the metals sampling performed in the pilot study area after completion of the study showed that the concentrations of these metals reduced to baseline concentrations. The pilot study data suggest elevated metals concentrations induced by ($KMnO_4$) are transient in nature. This Order requires that the Discharger monitor for dissolved metals and other pollutants and assure that water quality is not adversely impacted by the ISCO system outside of the treatment areas and that the dissolved metals and other pollutants that are generated by ISCO are reduced to pre-treatment conditions inside of the treatment area

Any adverse byproducts, such as dissolved metals, created by the full-scale treatability study, that are outside of the defined treatment areas are to be addressed by the Discharger's Contingency Plan. The Contingency Plan requires that the Discharger perform corrective action to address any violation of this Order. The Contingency Plan states that the Discharger will operate an Enhanced Bioremediation System. Operation of the Enhanced Bioremediation System may include injection of amendments such as sodium thiosulfate, sodium lactate and/or emulsified oil and cheese whey to achieve reduction of dissolved metals concentrations at the downgradient edge of the treatment area. These Waste Discharge Requirements will be modified, as necessary to address the Enhanced Bioremediation System if the Discharger is required to implement the Contingency Plan.

1/16/2007 RRR