Abstract: Maximum Allowable Concentration, Residual Saturation, and Free Product Mobility Technical Background Document and Recommendations

ADEC requires "the recovery of free product to the extent practicable" and has incorporated a "maximum allowable concentration" criterion into Footnote 14 of Table B2. Footnote 14 relates the maximum allowable concentration to product mobility and risk to human health, safety, welfare, or the environment, but allows the maximum allowable concentration to be exceeded if the responsible party demonstrates the hydrocarbon will not migrate and will not pose a significant risk to human health, safety, welfare, or the environment. Because the above description relates the maximum allowable concentration to "the concentration above which there is an increased risk of hazardous material migration" and because the numerical values chosen for GRO, DRO, and RRO maximum allowable concentrations are drawn or modified from a section of an American Petroleum Institute publication (API 1628) dealing with the concept of residual saturation, the term "maximum allowable concentration" is commonly interpreted to be related to the concentration at which the hydrocarbon product becomes mobile as a separate phase and to be similar to the term "residual saturation."

The maximum allowable concentration criteria and the requirement to recover product if taken out of context have the potential to greatly influence site investigation, remediation, and closeout actions without significantly reducing the risk posed by spilled hydrocarbon. This document:

- Provides background information on the flow and trapping of non-aqueous-phase liquid (NAPL) in soil pores
- Contains photographs of NAPL from published laboratory porous media studies to help visualize the field occurrence of NAPL
- Provides terms to describe NAPL in the soil environment
- Provides background information on the residual saturation values contained in the API 1628 document
- Relates the ability of NAPL to migrate downgradient into previously uncontaminated saturated zone soils, to the oil pressure in the formation using the Charbeneau equation

The information in this document may be used to help a responsible person assess whether the hydrocarbon concentrations measured at a particular site pose an increased human health or migration risk, and depending on the assessment results, to demonstrate that the petroleum hydrocarbon will not migrate as required in Footnote 14 of Table B2. The four-phase calculator (described in other technical background documents) will help assess whether the petroleum hydrocarbon poses an acceptable risk to human health, safety, or welfare as required in Footnote 14 of Table B2.

Note that the maximum allowable concentration criteria are also used by ADEC to address environmental criteria, including but not limited to, aesthetic criteria such as soil staining and/or noxious odors; anti-degradation, public opinion that pollution is bad (e.g. a public outrage factor); pollution prevention issues; and phyto-toxicity issues; and that these issues are not directly addressed in this paper.