Region 9 Need for Short-Term Action Levels and Response Guidelines Addressing Indoor Air Exposures to TCE via Vapor Intrusion

Background: The Remedial program of Superfund typically addresses slowly developing health risks from long-term exposures to contamination (e.g., cancer risks from 25 to 30 year exposures). Therefore investigation and remediation of Superfund site-related risks is typically measured and thorough. Recent evidence indicates a need to much more rapidly assess and respond to health risks posed by indoor air exposures to TCE (e.g., investigate and mitigate on a timeframe of days to weeks). R9's directions to Responsible Parties (RPs) along these lines needs a clear and consistent policy statement with support at the national level in order to respond to push-back from RPs.

Issue: A recent (Fall 2011) reassessment of the toxicity of trichloroethylene (TCE) identified toxic effects to the developing fetus as a significant risk. This risk occurs when pregnant women are exposed to relatively low TCE concentrations in air. The critical period of vulnerability has been identified as between 24 hours and 3 weeks of TCE exposure during early pregnancy. This prompts the need at a number of R9 sites for formalized action levels and response guidelines addressing short-term (days to weeks) TCE exposures when investigating vapor intrusion at homes and businesses.

Congenital Effects of TCE: The TCE Toxicological Review, by EPAs Integrated Risk Information System (IRIS), identified the most sensitive and vulnerable population as women in their first trimester of pregnancy because of the potential for TCE to cause heart malformations in the developing fetus. This determination is supported by both laboratory studies, in which rodents are exposed to TCE, and by studies of the incidence of heart malformations in infants born in communities exposed to elevated concentrations of TCE either in drinking water or by vapor intrusion.

The critical period for this TCE toxic effect is the approximate 3-week period in the first trimester of pregnancy during which the heart is formed and develops in the fetus. Scientific information on the exact duration of exposure for this health impact is not currently available; however, general risk assessment guidelines for developmental effects indicate that exposures over a period as limited as 24 hours may be of concern.

Superfund risk assessment and risk mitigation practices and guidelines are geared towards protecting against risks from long term exposures (e.g., mitigating an increased risk of developing cancer due to a 30 year residential exposure to contamination). Air concentrations of TCE at the lower end of the Superfund risk range (those posing a "10-6 risk" – 1 in one-million increased chance of developing cancer) are protective for congenital heart malformations,. However TCE concentrations at which the risk of congenital heart malformations becomes of concern are only 3 to 5 times higher and thus well within the entire Superfund cancer risk range (which ranges 10-6 [1 in one-million] to 10-4 [100 in one-million]).