TITLE: **Uncertainty Analysis Under the VAP**

DATE EFFECTIVE: March 2009

HISTORY: New Addition to the Technical Guidance Compendium

KEYWORDS: Uncertainty, Property-specific risk assessment (PSRA)

RULE/ AUTHORITY: 3745-300-09(D)(3)(d)(iii)

QUESTION: Is an uncertainty analysis required for a property-specific risk assessment under the VAP? What should be included in an uncertainty analysis for a property-specific risk assessment under the VAP?

ANSWER: An uncertainty analysis is used to estimate the degree of confidence that is placed on the risk to a receptor determined through a property-specific risk assessment. The cancer risk and hazard index goals are viewed as applicable standards in the VAP, without taking into consideration any uncertainty associated with the risk values. The previous version of OAC 3745-300-09 required an uncertainty analysis as part of a property-specific risk assessment. Per the 2009 rule revisions, OAC 3745-300-09 no longer requires an uncertainty analysis. However, the property specific risk assessment may include an uncertainty analysis to support a demonstration that a property is protective of human health, safety, and the environment, and meets applicable standards. The uncertainty analysis may include a qualitative description and/or quantitative evaluation.

The analysis may evaluate the uncertainty associated with any of the following:

- The initial selection of the chemicals of concern (COCs) and the determination of the exposure point concentration for each COC, including sampling, analysis, and fate and transport modeling;

- The estimation of the chemical-specific intake factor, including the quantification of point values or distributions for each exposure factor;

- The identification of existing and reasonably anticipated exposure pathways, including but not limited to land use

assumptions, exposure factor point values or distributions, contaminant concentrations derived from fate and transport assumptions, applicability or exposure models, and the impact of institutional controls or engineering controls on the elimination or alteration of complete exposure pathways;

- Toxicity criteria for the evaluation of non cancer effects, including any uncertainty factor or modifying factor, and low-level dose extrapolation, and confidence level associated with the derivation of each criterion;

- Toxicity criteria for the evaluation of cancer effects, including the weight-of-evidence classification, low-level dose extrapolation, and confidence level associated with the derivation of each criterion;

- The additive or antagonistic effects of exposure to multiple COCs through one or more complete exposure pathways;

- An evaluation of site-specific studies, or any other epidemiological or health studies, using accepted scientific protocol and methods, which may be available and are relevant to the exposure scenarios and COCs at the property.

A quantitative uncertainty analysis may also utilize the following methodologies:

- Multiple deterministic estimates or risk or hazard, for each receptor population, based on central tendency, upper-bound or other estimates of exposure, and an evaluation of the factors listed above;

- A probabilistic evaluation of multiple quantified chemical-specific intakes, or multiple quantified estimates of incremental cancer risk or non cancer hazard, using a Monte Carlo simulation or other appropriate probabilistic analysis.

OHIO EPA CONTACT: For any questions concerning this issue, please contact the VAP central office at (614) 644-2924.