ipc illinois petroleum council

JIM WATSON
Executive Director

DAN EICHHOLZ
Associate Director

400 W. Monroe, Suite 205 • Springfield, IL 62704 • 217/544-7404 • FAX 217/523-5131

T.A. Holbrook, Chairman
Illinois Pollution Control Board
1021 North Grand Ave E
Springfield, Il 62702-4059

PCB 13

January 31, 2013

Subject: Tiered Approach to Corrective Action Objectives (TACO) (Indoor Inhalation): Amendments to 35 Ill. Adm. Code 742 : Rule for Public Comment; Proposed Second Notice – January 10, 2013

Dear Chairman Holbrook;
The Illinois Petroleum Council (IPC) appreciates the opportunity to comment on the Illinois Pollution Control Board (IPCB)'s proposed amendments to the TACO rules on vapor intrusion. Although the amendments proposed by the IPCB are intended to help address Illinois EPA's concern about site characterization work that is "unnecessary, costly, and intrusive" and "potentially unreliable", the amendments are still rooted in antiquated science, a "one size fits all" approach to petroleum and chlorinated hydrocarbon vapor intrusion, and a vapor intrusion model that is overly conservative for petroleum vapor intrusion application. As an alternative, we urge the IPCB to consider recent research that documents the significance of petroleum hydrocarbon biodegradation and is leading to a paradigm shift in the way petroleum vapor intrusion (PVI) sites are screened and modeled. The research is being used to support U.S. Environmental Protection Agency Office of Underground Storage Tanks (OUST) and Interstate Technology Regulatory Council (ITRC) PVI guidance development. The screening and modeling methods can easily be adapted to fit within the Illinois EPA TACO framework. Their inclusion would likely have a far greater impact on the elimination of unnecessary site characterization than the amendments being proposed by the IPCB. The petroleum industry was actively involved in the development of this research and is willing to discuss it with the IPCB, if the Agency so desires. Please find attached our comments and recommendations for your consideration.

Sincerely,

Dan Eichholz, Associate Director

The following comments are supplemental to those previously submitted to the Illinois Environmental Protection Agency on August 15, 2012 in reference to the Amendments to Title 35.Subtitle G. Chapter I. Subchapter f. Part 742: – Tiered Appproach to Corrective Action Objectives (TACO) - April 29, 2012 (see attached)

SGS Comments IEPA Proposed Amendmen

A) KEY STUDIES IN SUPPORT OF SOURCE-RECEPTOR SEPARATION DISTANCES FOR PETROLEUM VAPOR INTRUSION (PVI) SCREENING:

Two key recent empirical studies are prompting a paradigm shift with respect to PVI screening (US EPA, 2013 - http://www.epa.gov/oust/cat/pvi/PVI_Database_Report.pdf and Lahvis et al., 2013 (in press) – see attached)

Lahvis et al. (2013 - pg 1).pdf

The empirical studies are based on soil-gas and ground-water data collected at hundreds of sites spanning a range of environmental conditions, lithologies, surface covers (e.g., building foundation pavement, open ground) and fuel types (e.g., gasoline (primarily), diesel, kerosene, jet fuel, and gasoline containing the fuel oxygenates methyl tert-butyl ether and ethanol). The studies have helped establish the critical source-receptor (building foundation) separation distance at which the PVI pathway can be considered incomplete. Results show that the screening distances for petroleum hydrocarbons vary from 5 to 18 ft depending on source type (dissolved-phase or liquid non-aqueous phase liquid – LNAPL) and site type [underground storage tank (UST) site or non UST (e.g., terminal, refinery, pipeline) site].

IPCB CONSIDERATION: *These screening distances are far less than the 100 ft screening distance currently proposed in the TACO amendments. Consideration of such screening distances would likely eliminate unnecessary site characterization at numerous petroleum release sites and allow more effective and sustainable use of limited resources.*

B) ATTENUATION FACTORS FOR PVI SITE SCREENING:

Attenuation factors, while perhaps appropriate for non-reactive VOCs (i.e., chlorinated hydrocarbons), have been shown to have limited applicability for reactive VOCs (i.e., petroleum hydrocarbons). Attenuation factors for petroleum hydrocarbons are depth dependent (i.e., vary depending on source-separation distance), not constant as assumed within the TACO Tier I Framework. In particular, the vapor attenuation factor varies by several orders of magnitude within short-vertical distances in the unsaturated zone provided there is sufficient separation distance between the source and building foundation for aerobic conditions to develop. This behavior occurs because rates of aerobic biodegradation are essentially instantaneous relative to the rates of physical transport (molecular diffusion, advection) generally associated with vapor intrusion (Davis et al., 2009).

IPCB CONSIDERATION: *The Agency is urged to consider the application of screening distances as an **alternative** to attenuation factors for site screening at PVI sites (similar to the proposed use of the 100-ft "inclusion distance" by the IPCB). If attenuation factors are to be retained for screening purposes, then use of a "bioattenuation" factor to account the additional attenuation resulting from biodegradation should be considered. The California Low-Threat Closure Policy invokes a 1,000x "bioattenuation factor" for use in PVI screening (see pg 15 of the attached -* http://www.waterboards.ca.gov/ust/lt_cls_plcy.shtml):

Cal Low-Threat Closure Policy.pdf

The bioattenuation factor was based on the recent findings of Lahvis et al. (2013)[1]. The bioattenuation factor applies to soil-gas concentrations measured within 5 ft of a building foundation provided aerobic conditions in the unsaturated zone (i.e., oxygen concentrations in soil gas are > 4% vol/vol) and the lack of an unsaturated zone petroleum source (i.e., TPH concentrations < 100 mg/kg soil) can be demonstrated. Application of a 1,000x bioattenuation factor would increase the Tier 1 Soil Gas Remediation Objectives (ROs) values listed in Table H by several orders of magnitude. For example, the residential vapor intrusion screening level for benzene in soil gas recommended in the California Low-Threat Closure Policy based on the bioattenuation factor (85 mg/m^3) is over 2 orders of magnitude greater than the proposed IEPA value of 0.37 mg/m^3. Application of the bioattenuation factor would likely have a far greater impact on the elimination of unnecessary site characterization than the amendments proposed by the IPCB.

C) REGULATORY ACCEPTANCE OF SOURCE-RECEPTOR SEPARATION DISTANCES FOR PVI SCREENING:

The empirical studies referenced in A) are now being used to establish screening distances for the US EPA OUST (US EPA, 2012) (see attached), ITRC (http://www.itrcweb.org/teampublic_PVI.asp), and CRC for Contamination Assessment and Remediation of the Environment in Australia (Wright, 2013).

OUST Update on PVI_November 2012.

IPCB CONSIDERATION: *The IPCB should consider a stay in the issuance of the proposed amendments until the US EPA OUST (in particular) publishes their guidance in the coming months. This federal guidance will capture the latest science on site screening and modeling and provide the regulatory framework that many states will likely follow.*

D) USE OF THE JOHNSON AND ETTINGER MODEL (JEM):

The Johnson & Ettinger Model (JEM) is used in the TACO program for both the development of Tier I screening criteria and Tier II/III site specific applications. The JEM has been found, however, to vastly over-predict indoor air concentrations at field sites where petroleum hydrocarbons are present (Fitzpatrick and Fitzgerald 1996, Sinke 2001, Ririe et al. 2002, Hers et al. 2003, Golder Associates 2008, Davis 2009). The discrepancy has been linked to the exclusion of biodegradation in the model. The conservatism has been recognized by the U.S. EPA (Tillman and Weaver 2005) and ITRC (Interstate Technologies and Regulatory Council 2007). The potential for over-prediction has been found to be greatest at sites with low-level contamination in soil and groundwater (US EPA 2013, Lahvis et al., 2013).

The JEM model has been recently updated to include biodegradation (BioVapor - http://www.api.org/Environment-Health-and-Safety/Clean-Water/Ground-Water/Vapor-Intrusion/Biovapor-Form.aspx) (DeVaull, 2007), which is a critical process affecting transport of petroleum hydrocarbons and PVI risk assessment. As noted in the Comment C, the US EPA OUST is finalizing the recoding of BioVapor and planning to make the code available to the public later this year.

For IPCB Consideration: *The IPCB should consider the use of field data [i.e., the empirical studies of US EPA (2013) and Lahvis et al. (2013)] to support the development of screening criteria for petroleum hydrocarbons rather than the JEM, which does not consider biodegradation nor is validated by field data. If the IPCB does not desire to base screening criteria on the empirical studies, then BioVapor (which includes biodegradation) should be considered for the development of the screening criteria. BioVapor could be applied in a similar fashion to JEM using conservative input for risk assessment purposes. A substantial amount of work has been done by US EPA Office of Research and Development to validate the model assumptions and default input values (see attachment - Comment C).*

REFERENCES:

California State Water Resources Control Board. 2012. Low-Threat Underground Storage Tank Case Closure Policy (http://www.waterboards.ca.gov/water_issues/programs/ust/lt_cls_plcy.shtml)

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[1] It is important to note that the screening distances defined in the California Low-Threat Closure Guidance were agreed *a priori* by a group of stakeholders in advance of supporting technical (model and field) data. The technical data were later used to justify the conservativeness of the proposed criteria.

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Golder Associates. 2008. Report on evaluation of vadose zone biodegradation of petroleum hydrocarbons: Implications for vapour intrusion guidance, Research study for Health Canada and the Canadian Petroleum Products Institute, Report 06-1412-130, Golder Associates Ltd., Burnaby, British Columbia, July, 2008: pp. 94.

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US EPA. 2013. Evaluation of empirical data and modeling studies to support soil vapor intrusion screening criteria for petroleum hydrocarbon compounds. Report EPA 510-R-13-001, United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C., January, 2013: pp. 72. http://www.epa.gov/oust/cat/pvi/PVI_Database_Report.pdf

Wright J., 2013. Petroleum Vapour Intrusion (PVI) Guidance. CRC CARE Technical Report No. xx, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.