

Air Force Institute for Operational Health

Integrity - Service - Excellence

TCE Toxicity Values and Risk Management Issues



**W. Brian Howard, Ph.D.
Health Risk Assessment Branch
AFIOH**

U.S. AIR FORCE

23 May, 2007



- **Disseminate the Air Force's approach for selecting toxicity values and discuss possible risk management options**
 - **OSWER Directive**
 - **AF Guidance**
 - **ECOS Provisional Values Paper**
 - **Application to TCE**



Risk Assessment & Toxicity Values

U.S. AIR FORCE

- Risk used at several stages of project lifecycle
 - Screen sites into or out of program
 - Determine whether response action necessary
 - Develop remedial alternatives
 - Used with ARARs to determine cleanup levels
- Risk = Intake x Potency (Site Risk)
- Carcinogens: Slope factors (SF) and unit risk factors
- Non carcinogens: Reference dose and reference concentration (RfD, RfC)



TCE Background / History

U.S. AIR FORCE

- **1989 TCE MCL set at 5 µg/L**
- **1989: Integrated Risk Information System (IRIS) withdraws cancer potency factors from database**
- **Early 1990s: TCE Issues Group formed; comprised of federal/industry/academic partners**
- **August 2001: EPA released draft chemical risk assessment that has never been finalized nor withdrawn**
- **2003 Interagency Work Group (IWG) tasked NAS to perform review of TCE science jointly chartered by DoD, DOE, NASA, EPA, OSTP, OMB, and CEQ**
- **Tasking was for NAS to perform a review of the critical underlying science issues (not a peer review of the 2001 Draft document)**



- **NAS report was released July 2006**
- **Presents recommendations for future research; studies planned as outcome of review are unknown**
- **NAS report was NOT**
 - **An evaluation of EPA's 2001 draft**
 - **A comprehensive evaluation of the literature**
- **NAS focused on**
 - **New data generated since 2001 draft**
 - **Pertinent older information**
 - **Specific technical questions on mode of action and hazard characterization**
 - **Implications for risk assessment**



What Are Others Doing

U.S. AIR FORCE

- **Actions by other agencies/offices can inform likelihood of 2001 values staying in place; otherwise difficult to predict using NAS report alone**
- **2002 CalEPA issues values that are less conservative**
- **2005 EPA Office of Air Quality and Standards adopts CalEPA value**
- **2006 NY and Indiana develop own toxicity values for TCE**



How Do We Select Toxicity Values?

U.S. AIR FORCE

- **OSWER 2003 Hierarchy**
 - **Tier 1 – IRIS**
 - **Tier 2 – EPA PPRTV, e.g., aldrin**
 - **Tier 3 – Other sources/values e.g., TCE**
- **The OSWER Directive Tier 3 criteria states:**

“In general, draft toxicity assessments are not appropriate for use until they have been through peer review, the peer review comments have been addressed in a revised draft, and the revised draft is publicly available.”
- **EPA’s 2001 draft TCE risk assessment does not meet these criteria**



How Do We Select Toxicity Values?

U.S. AIR FORCE

- **Air Force Guidance: Toxicity Values for Use in Risk Assessments and Establishing Risk-Based Cleanup Levels (2006)**
 - **Parallels OSWER Hierarchy**
- **ECOS paper on toxicity values when none exist in IRIS (DoD, OSRTI, CalEPA)**
 - **Parallels OSWER Hierarchy**
 - **Adds principles to identify Tier 3 values**
- **What other toxicity values/sources are available?**



Possible Tier 3 Sources for TCE

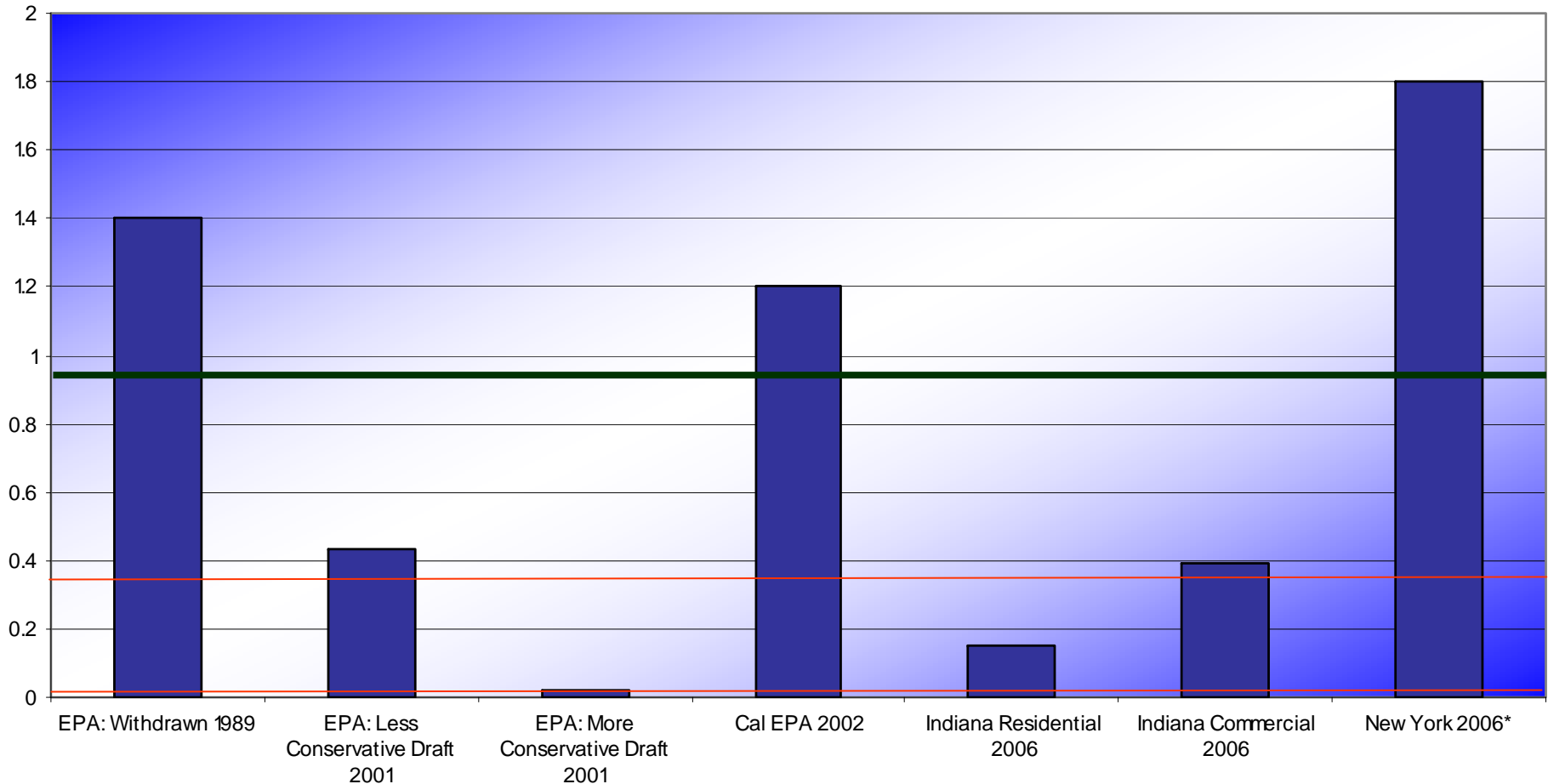
- Possible Tier 3 “Other values” for TCE
 - ATSDR
 - Does not provide slope factors (MRL)
 - New York
 - Does not provide slope factor; only air criteria guidance (TBC; slope factors were derived in document)
 - Does not use previously established methodology
 - Not informed by the NAS review
 - Indiana
 - Relies on the 2001 Draft – derives one value from the range of values in the 2001 Draft
 - California
 - Meets all the criteria set forth in OSWER Directive and ECOS PV Paper and provides slope factor



U.S. AIR FORCE

How Values Compare

TCE Concentrations in Air at 1-06 Risk



Red lines: Detection limits scan and SIM mode
Green line: Mean outdoor air, EPA BASE study

*Uses most potent value for liver.



Appropriate Toxicity Value

- **California EPA's TCE toxicity value is the appropriate value to use in evaluation of indoor air risk assessment**
- **Risks should be managed at level that will remain in an anticipated acceptable risk range when a new IRIS value is available (2010?)**
 - **Avoids re-evaluating sites subsequently**
 - **Reduces conflict for RPMs**
 - **Moves restoration program forward to meet goals**
 - **Provides for national consistency**
- **Conceptual support for this approach within EPA and the DoD**



Risk Management Options

U.S. AIR FORCE

- Develop Presumptive Remedies for Vapor Intrusion
- Technical Impracticability Waivers
- Cost/Benefit Analyses
- Alternatives to Long Term Cleanup
- Natural Attenuation Default Concentrations
- Groundwater Classification/Re-Classification
- MCLs as Relevant and Appropriate Requirements
- Alternative Points of Compliance
- Aggressive and Innovative Technologies