



Emergency Management Issues Special Interest Group Annual Meeting

Changes to the PAC-TEEL Database during 2010 and 2011

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Introduction

- PACs Rev 26 completed
 - Published September 30, 2010
- Expert Review Group recommendations
 - Submitted to DOE NA-41
 - NA-41 issued 18-point update instructions
- PACs Rev 27 to reflect methodology changes
 - Will include revised workbook

PACs Rev 26

- Major changes from PACs Rev 25
 - Toxicity data updated for 785 chemicals
 - Most on PAC list before Sept. 30, 1997
 - Rigid rules for data selection followed
 - Columns of dates first derived, last reviewed and last changed populated
 - Details added to “Source of PACs” column
 - Concentration dependence of toxicity (Y or N) reevaluated for many chemicals

PACs Rev 26 (cont.)

- Columns added include:
 - PAC-TEEL values changed from PACs Rev 25
 - Information previously in “Comments” column
 - NFPA Health Hazard Rating (HHR)
- A few new chemicals added to list
 - Mainly chemicals for which new AEGLs or ERPGs were published in 2010

PACs Rev 27: Time Adjustment

- Review panel established to resolve problems (initially DKC, PYL, JAB)
- All TEELs based on 60 minutes
- All time scaling use ten Berge equation

$$C^n \times t = K$$

where $n = 1$ when extrapolating to longer times and $n = 3$ when extrapolating to shorter times for “Y” chemicals (toxicity concentration dependent)

Rev 27: Toxicities to AEGLs Adjustment Ratios

Human-equivalent concentrations used in the past to compare animal toxicity data to ERPG-2 or ERPG-3 eliminated

- New ratios of toxicity data to AEGLs computed
- More robust because many more data points

Rev 27: Reference Hierarchy

Order of consulting primary references to be changed; only credible studies from

- HSDB (NLM Hazardous Substances Data Bank)
- SAX's Dangerous Properties of Industrial Materials (11th Edition)
- RTECS (NIOSH Registry of Toxic Effects of Chemical Substances)
- MSDSs (Material Safety Data Sheets)
- Other sources

Rev 27: Species Hierarchy

- Species hierarchy changed to:
 - Human, monkey, dog, rat, mouse, rabbit, guinea pig, cat, and pig, no others
- Previously used:
 - Human, rat, mouse, rabbit, guinea pig, dog, cat, pig, hamster, monkey (non-human primate) and other species

Routes of Exposure used for Toxicity Data limited to, in order

- Inhalation (TC_{LO} for TEEL-2, LC_{50} and LC_{LO} for TEEL-3)
- Oral (os), dermal (sk), intraperitoneal (ip), and intravenous (iv), (TD_{LO} for TEEL-2, LD_{50} and LD_{LO} for TEEL-3)
- Significant change from past: inhalation, oral, dermal, subcutaneous (sc), ip and iv

Rev 27: Default Exposure Times

Default exposure times when not specified

- For acute exposures
 - Humans = 15 minutes
 - Rats = 240 minutes
 - Mice = 120 minutes
- For intermittent exposures
 - All species = 360 minutes for least number of days
- For continuous exposures
 - All species = 1440 minutes for least number of days

Rev 27: Exposure Limit Hierarchies

TEEL- derivation methodology changes:

- Input worksheet rearranged
- Exposure limit priorities changed
 - TEEL-0
 - TLV-TWA, WEEL-TWA, MAK-TWA, REL-TWA, PEL-TWA, OTHER-0
 - PAC-1
 - AEGL-1, ERPG-1, TLV-, WEEL-, REL-, PEL-STEL, OTHER-1 and for “N” chemicals only, 3 x TLV-TWA, etc.
 - PAC-2
 - AEGL-2, ERPG-2, EEGL 60 min, LOC, TLV-, WEEL-, REL-, PEL-C; OTHER-2, and for “N” chemicals only, 5 x TLV-TWA, etc.
 - PAC-3
 - AEGL-3, ERPG-3, EEGL 30 min, OTHER-3, 1990 IDLHs

Rev 27: p-chem Data Changes

TEEL- derivation methodology changes:

- Toxicity data rearranged to reflect order of use
 - TC_{LO} , TD_{LO} , LC_{50} , LC_{LO} , LD_{50} , LD_{LO}
- Columns added to physicochemical data section
 - Added under Vapor Pressure, “Volatility, (Y or N)”
 - New: “Solubility in water, (Y or N)”
 - Moved: “Lower Explosive Limit in ppm”
 - New: “Highly acutely toxic, (Y or N)”
 - Moved: “NFPA HHR”

Rev 27: PAC Value Restriction

Special provision

- There can be no instances when $TEEL-0 = TEEL-1 = TEEL-2 = TEEL-3$
- If available data gives $T-1 > T-2$ or $T-2 > T-3$, full review panel to consider all factors and data to determine appropriate TEEL values that reflect definitions for each level
- This will require selective suppression of data

Rev 27: Final Step

Final step in TEEL derivation

- Review panel to apply “laugh test”
- Does application of the default methodology yield TEEL values that are reasonable, and are consistent with the definitions at each level?

Conclusions

- PACs Rev 26 changes from PACs Rev 25 briefly reviewed
- Changes to TEEL derivation methodology as instructed by DOE NA-41 outlined
- Most significant
 - Order of exposure-limit selection
 - Change in time scaling of inhalation data
 - Order of species selection for toxicity data
 - Order & restriction of route of exposure selection
 - Rounding rule and multiplying factors change