



BEI[®] Committee Update Feasibility Assessments

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Topics for discussion

- BEI[®] Committee Activities
- Basis of BEIs[®]
 - ✓ TLV[®]-CS
 - ✓ Health effects
- BEI[®] development process
- Feasibility assessments
- Examples



BEI[®] Committee Activities

- 45 substances with BEI[®] determinants
- 17 substances with negative feasibility assessments

2005 Actions

- 14 substances and 3 other issues Under Study (as of 4/3/06)*
- 6 NIC (2 for new substances, 4 to update BEIs[®])

*Refer to the ACGIH[®] website for the up-to-date list. This list is evergreen and can change during the year.



BEI[®] Committee Activities

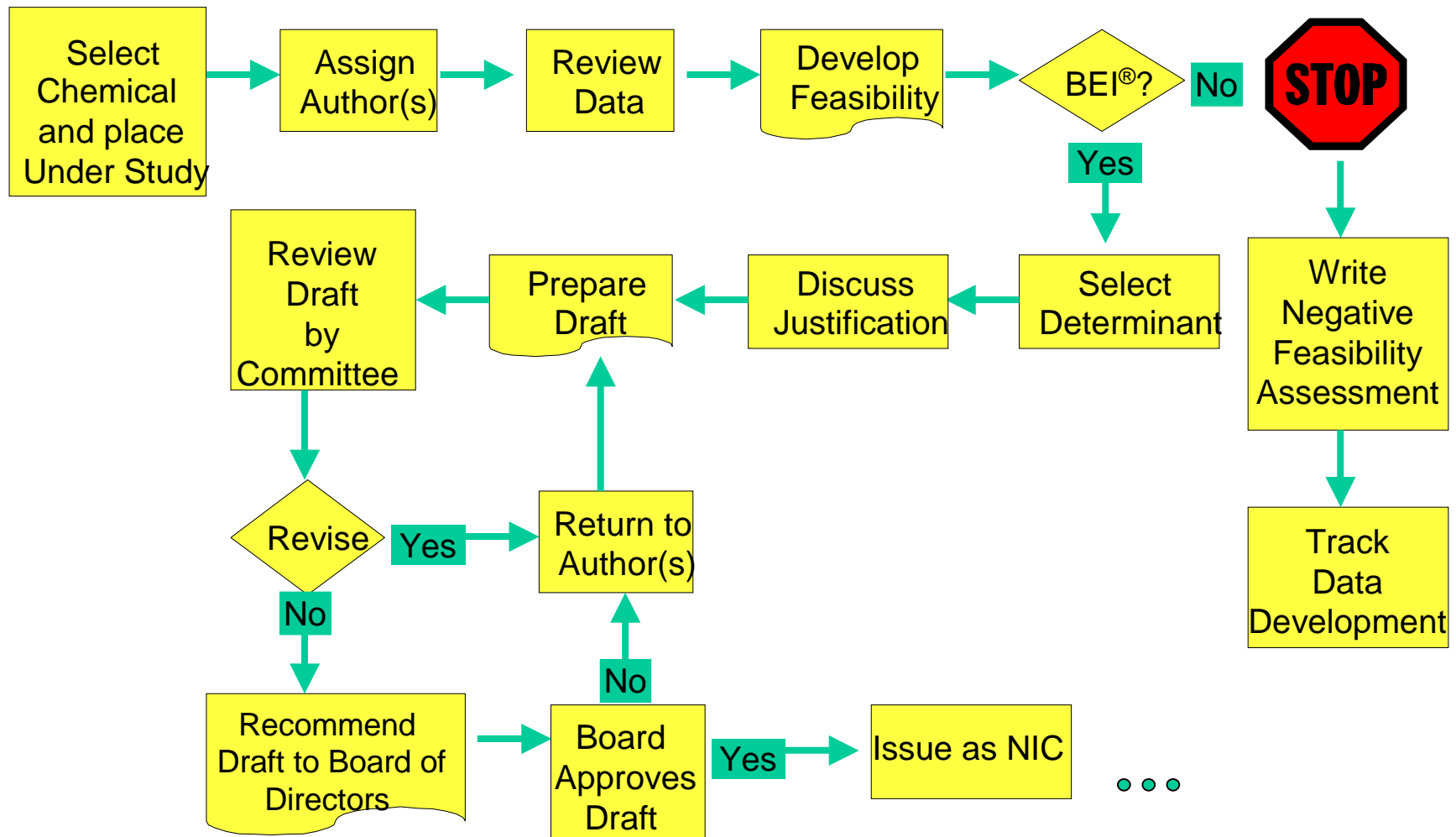
2005 Actions (cont.)

- 2 new *Documentation* updates w/o change to BEIs[®]
- 2 Adaptations
 - ✓ 1,3-Butadiene
 - ✓ 2-Propanol
- 1 new feasibility assessment – Methyl Formate

Basis of BEIs[®]

- Relationship between airborne exposure at TLV[®] and biomarker of exposure
 - ✓ Most volatile organics, some metals
- Relationship between health effects and biomarker of exposure
 - ✓ Lead, Cadmium, Mercury

BEI[®] Development Process





What are feasibility assessments?

- An initial assessment of the quantity and quality of data for a possible BEI[®]
- An initial written assessment
 - ✓ Is there sufficient data to establish a BEI[®]?
- A means to manage critical Committee resources



Criteria for feasibility assessments

- Use and use trends
- Availability of data for a BEI[®] basis
- Data on occupational routes of exposure and the selection of determinants
- Data on metabolism and rates of excretion
- Health risks
- Analytical methods

What now?

- Positive feasibility assessment
 - ✓ Proceed with the development of a BEI[®]
- Negative feasibility assessment
 - ✓ Listed in the *TLVs[®] and BEIs[®]* book – chemical considered
 - ✓ Stimulate interest and new data for possible future BEIs[®]



Negative Feasibility Assessments

- Acrylonitrile (1994)
- Antimony (1996)
- Beryllium (2002)
- Chlorpyrifos (1996)
- 1,4-Dichlorobenzene (1994)
- 2,4-Dichlorophenoxyacetic acid (1994)
- 2-Ethyl hexanoic acid (2001)
- Hydrazines (1994)



More negative FAs

- Inorganic borates (1995)
- Manganese (1995)
- Methyl t-butyl ether (1993)
- Methyl n-butyl ketone (1995)
- Methyl formate (2005)
- Nickel (1996)
- Selenium (1995)
- Trimethylbenzene (1999)
- Vinyl chloride (2002)



Format for BEI[®] Feasibility Assessment Document

- Occupational exposure and use
- Health risks
- Toxicokinetics
- Biological sampling and methods
- Relationship to TLV[®] or health risks
- Summary
- References



Methyl Formate (2005)

- Use and occupational exposure
 - ✓ Increasing use as catalyst, binding agent
 - ✓ Traditional use: fumigant, solvent, intermediate
 - ✓ Vapor pressure 476 torr, inhalation risk
 - ✓ Standards/guidelines
 - OSHA PEL 100 ppm
 - ACGIH[®] and NIOSH TLV[®]/REL TWA: 100 ppm, STEL: 150 ppm
 - German MAK 50 ppm, no BAT

Methyl Formate-Health risks

- Animals
 - ✓ Narcotic and pulmonary irritant, LD₅₀ 1600 mg/kg, rabbit
 - ✓ Variety of acute studies, most with no serious effects below 1500 ppm
- Humans
 - ✓ One study (1958) visual disturbances, narcosis, irritation at 1500 ppm

Methyl Formate, Toxicokinetics

- No skin notation, but dermal exposure expected
- Metabolized to methanol and formate resulting in 2 formate molecules
- Metabolism not linear
- Elimination expected to be passive
- Kinetics: elimination complete 16 hrs after end of exposure

Methyl Formate

Biological sampling issues

- End of shift sampling indicated
- Both metabolites (methanol and formate) produced endogenously, a background level or “B” notation
- Formate elevated in smokers, and after eating high protein and carbohydrate meals

Methyl Formate and TLV[®]

- Berode et al. study of 2000
 - ✓ Two foundries
 - Foundry 1, n=9, median exposures 58 ppm
 - Foundry 2, n=19, median exposure 47 ppm
 - ✓ Volunteer study
 - N=20, median exposure 100 ppm
 - ✓ Pre-, post-shift and next morning urine samples for MeOH and Formic acid

Results

- Formic acid in urine
 - ✓ Pre-shift samples higher than controls
 - ✓ Post-shift samples similar in both foundries and volunteers, no dose response
- Methanol in urine
 - ✓ No difference in pre-shift specimens from controls
 - ✓ Post-shift specimens similar in both foundries and volunteers. No dose response

Methyl Formate and Health Risks

- No studies found

Summary

- No BEI[®] proposed due to:
 - ✓ Insufficient data on small numbers
 - ✓ Lack of a dose response
 - ✓ Non-linear kinetics
 - ✓ High background due to exogenous metabolism

References

- 10 references to original research
 - ✓ 7 before 1985
 - ✓ 3 recent but with limitations
- 3 references to NIOSH or ACGIH[®] documents