Generic Assumptions
Additives for Water-Based Metalworking Fluids

Greg Macek
Chemical Engineering Branch
March 31, 1997

Revised: May 13, 1999 - references added

SCENARIO: METALWORKING FLUID USE

APPLICATION: PMN CHEMICAL IS AN ADDITIVE

1. SMALL SHOPS

- 20% used in small shops (ILMA, 1990)
- bath volume = 25 gallons (CEB, 1991)
- bath discharge = 12 times per year (CEB, 1991)

Assumptions:

- Concentrate is diluted by a factor of 10 at use site (Macek, 1997)
- amount lost on carry-off = 1% (Macek, 1997)
- days/yr = 250 (CEB, 1997)

Use rate = amount lost from bath discharge + amount lost on carry-off

Amount lost from rinsate:

= 25 gallons x 3.78 kg/gal x .01 x bath concentration x 250

Amount lost from bath discharge:

= 25 gallons x 3.78 kg/gallon x bath concentration x 12

Number of sites = (PV x .2)/(amount lost from rinsate + amount lost from bath discharge)

Releases:

1. Rinsate

25 gallons x 3.78 kg/gal x .01 x bath conc. =

Media of release: POTW

2. Bath discharge

AD 20

25 gallons x 3.78 x bath conc. =

Media of release: wastewater treatment (oil-water separation then discahrge to POTW or Incineration

2. **Large Shop**

Assume:
- 25000 gallons (Basis: CEB, 1991)
- 80% of PV used in large shops (ILMA, 1990)
- bath discharge 2x/yr (CEB, 1991)

- Concentrate is diluted by a factor of 10 at use site (Macek, 1997)
- amount lost on carry-off = 1% (Macek, 1997)
- days/yr = 250 (CEB, 1997)

Amount lost from rinsate:

= 25000 gallons x 3.78 kg/gal x .01 x bath concentration x 250

Amount lost from bath discharge:

= 25000 gallons x 3.78 kg/gallon x bath concentration x 2

Number of sites = (PV x 0.8)/(amount lost from rinsate + amount lost from bath discharge)

Releases:

1. Rinsate

25000 gallons x 3.78 kg/gal x .01 x bath conc. =

Media of release = on-site wastewater treatment

2. Bath discharge

25000 gallons x 3.78 x bath conc. =

Media of release: oil-water separation with oil layer incinerated or recycled and water layer going to further wastewater treatment

WORKER EXPOSURE

Number of workers = 5/site for small shops (Macek, 1997)
20/site for large shops (Macek, 1997)

Inhalation: mist

AD21

typical: 1.2 mg/m3 (CEB Manual p. 4-11) x 1% conc. x 1.25 x 8 = 0.1 mg/day
high-end: 5 mg/m3 (OSHA oil mist PEL) x 1% x 1.25 x 8 = 0.5

Dermal:

routine immersion 2 hands (CEB, 1991)

6500 - 18200 x bath concentration (CEB, 1991)

REFERENCES

1. CEB, 1991. Preparation of Engineering Assessments - Volume I: CEB Engineering Manual. USEPA, Office of Toxic Substances, Chemical Engineering Branch. Pages 4-11, 4-12, 4-36, 5-17, and 5-18.

2. CEB, 1997. Revised Draft Compilation of CEB Guidance Memoranda, (1992 - January, 1997). As complied by CEB contractor, Eastern Research Group as guidance in preparing engineering assessments.

3. ILMA, 1990. Waste Minimization and Wastewater Treatment of Metalworking Fluids. Article: A Recommended Profile for Determining the Environmental Fate of Metalworking Fluids. Independent Lubricant Manufacturers Association. Alexandria, VA.

4. Macek, 1997. Professional Engineering Judgement, Greg Macek, USEPA, Chemical Engineering Branch, derived from various assessments of metalworking fluids in New Chemicals program, assessment for chlorinated paraffins and site visits conducted by Kin Wong of CEB.

AD23