Session E:
C1-C4 halogenated chemicals NOL: A focus on refrigerants
Overview

Planners will have a new category of reportable chemicals to consider in calendar year 2019: C1-C4 halogenated hydrocarbons/halocarbons not otherwise listed.

This session will touch upon the listing process for this category and the hazards associated with these substances.

We will then focus on the alternatives associated with one of the common uses of chemicals in this category - refrigeration.
Origination of C1-C4 Halogenated Hydrocarbons

• Stemmed from SAB review of nPB for listing in 2009
• It was noted that 2-bromopropane more hazardous than 1-bromopropane
• Also noted that other halogenated substances would likely be similar
Structures

• Bromochloromethane (C1)

• 1-bromo-2-chloroethane (C2)

• 1,3,3,3-Tetrafluoropropene (HFO-1234ze(E)) (C3)

• 1 bromo butane, n butyl bromide (C4)
Defining a potential category

- 4 or fewer carbons
- At least one halogen
- Only hydrogen as other constituent
- (Yes) there are substances that meet these criteria which are already listed
SAB approach

• Initially, TURI created a list of 136 chemicals meeting the chemical structure criteria for inclusion in the group.
• Approximately half of these chemicals were already on the TURA list, making it possible to compare toxic effects.
Collect Standard EHS info on substances

- Physical properties (FP, VP, etc)
- Acute toxicity
- Reproductive/developmental toxicity
- Liver toxicity/Target organs
- Carcinogenicity
- Neurotoxicity
- PBT
### Standard EHS Info

<table>
<thead>
<tr>
<th>TSCA Inventory No</th>
<th>TURA List?</th>
<th>CAS/Chemical Number</th>
<th>Chemical Name</th>
<th>Chemical formula</th>
<th>Molecular wt. (mainly from ChemID Plus)</th>
<th>Physical State at Room Temperature</th>
<th>Vapor Pressure (mm Hg at ~20°C)</th>
<th>PBT</th>
<th>DURC (Read to Action from MS work)</th>
<th>ReproEXPERT</th>
<th>Target Organ (HAZMAP)</th>
<th>Flash point (RTECS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-535-5</td>
<td>Y</td>
<td>75-00-2</td>
<td>Carbon tetrachloride</td>
<td>CCl₄ 153.82</td>
<td>Liquid 91.3 549 188 34 6.2</td>
<td>25 TSCA(highlighted) Developmental, Endocrine, Reproductive, Neurotoxic</td>
<td>3.5 S</td>
<td>Y Y Y</td>
<td>2B S</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>No MSDS</td>
<td></td>
</tr>
<tr>
<td>26-536-0</td>
<td>Y</td>
<td>75-00-3</td>
<td>Carbon tetrachloride</td>
<td>CF₄ 88.0043</td>
<td>Gas n/f</td>
<td>n/f</td>
<td>n/f</td>
<td>n/f</td>
<td>Y Y Y</td>
<td>n/f</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Not flammable</td>
</tr>
<tr>
<td>507-62-5</td>
<td>Y</td>
<td>507-62-5</td>
<td>Methane, tetraiodo-</td>
<td>CI₄ 519.6286</td>
<td>Solid No MSDS</td>
<td>Y Y</td>
<td>38 75 549 158 3.3 24</td>
<td>2B S</td>
<td>Y Y Y</td>
<td>n/f</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Not considered fire hazard.</td>
</tr>
<tr>
<td>507-63-5</td>
<td>N</td>
<td>507-63-5</td>
<td>Chloroform</td>
<td>CHCl₃ 119.38</td>
<td>Liquid</td>
<td>160 @ 20°C 197 mm Hg at 25 deg C</td>
<td>60 120 549 188 410 0.24</td>
<td>2B S</td>
<td>Y Y Y</td>
<td>2B S</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Practically not flammable</td>
</tr>
<tr>
<td>507-64-7</td>
<td>Y</td>
<td>507-64-7</td>
<td>Methane, trifluoro-</td>
<td>CHF₃ 70.0138</td>
<td>Gas (Liquified Gas)</td>
<td>3.53X10⁴ mm Hg at 25 deg C /from experimentally-derived coefficients/</td>
<td>Y Y</td>
<td>3 S</td>
<td>n/f Y</td>
<td>Simple Asphyxiant</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>None</td>
</tr>
<tr>
<td>507-65-5</td>
<td>N</td>
<td>507-65-5</td>
<td>Methane, triiodo-</td>
<td>CHI₃ 393.7321</td>
<td>Solid No information found</td>
<td>15 30 140 1200 3.2 47</td>
<td>2S S</td>
<td>Y Y Y</td>
<td>Simple Asphyxiant</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Practically not flammable</td>
<td></td>
</tr>
<tr>
<td>507-66-7</td>
<td>Y</td>
<td>507-66-7</td>
<td>Bromomethane</td>
<td>CH₃Br 94.94</td>
<td>Gas</td>
<td>1620 mm Hg @ 25 deg C</td>
<td>15 30 140 420 2.8 0.12</td>
<td>3 S</td>
<td>Y Y Y</td>
<td>3 S</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Not considered fire hazard.</td>
</tr>
<tr>
<td>507-67-3</td>
<td>N</td>
<td>507-67-3</td>
<td>Methyl fluoride</td>
<td>CH₃F 34.0329</td>
<td>Solid No information found</td>
<td>32 75 549 54 47 4.2</td>
<td>2B S</td>
<td>Y Y Y</td>
<td>3 S</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>507-68-4</td>
<td>Y</td>
<td>507-68-4</td>
<td>Methyl iodide</td>
<td>CH₃I 141.939</td>
<td>Liquid</td>
<td>4.05X10² mm Hg @ 25 deg C; 400 @ 25C (77°F)</td>
<td>15 30 140 220 4.6 25</td>
<td>3 S</td>
<td>Y Y Y</td>
<td>Simple Asphyxiant</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Practically not flammable</td>
</tr>
<tr>
<td>507-69-5</td>
<td>Y</td>
<td>507-69-5</td>
<td>Chloromethane</td>
<td>CH₃Cl 50.49</td>
<td>Gas (Compresses to Liquid)</td>
<td>Vapour pressure, kPa at 21°C: 506</td>
<td>15 30 140 420 2.8 0.12</td>
<td>3 S</td>
<td>Y Y Y</td>
<td>3 S</td>
<td>Cardiovascular/Blood, Developmental, Endocrine, Gastrointestinal or Liver, Kidney, Reproductive, Respiratory, Male or Female in Gen.</td>
<td>Flammable Gas</td>
</tr>
</tbody>
</table>

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Effects of highest concern

- Neurotoxicity
- Persistence
- Reproductive/Developmental
- Carcinogenicity
- Ozone depletion/ or greenhouse gases
TURI Review

• More comprehensive list of refrigerants

• TURI checked neurotoxicity data & verified that nearly all have evidence of neurotoxicity, consistent with the findings of the substances reviewed by SAB.
Uses

- solvents
- propellants
- refrigerants
- blowing agents
- fire extinguishing agents,
- chemical intermediates,
- and a variety of other uses, including mixed use
## Tier II Data

### Table 1: 2015 Tier II data

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Tier II reports</th>
<th>Expected number of TURA filers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1-Trifluoroethane [HFC-143a]</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane [R134a]*</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>1,1-difluoroethane [HFC-152a]</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Fluoroform [HFC-23]</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Pentafluoroethane</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Refrigerant (NOS**)</td>
<td>35</td>
<td>3</td>
</tr>
<tr>
<td>R-410</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Solvent (NOS**)</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Tetrafluoromethane [PFC-14]</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

This table shows Tier II reports for chemicals that meet the chemical structure criteria for the C1-C4 NOL category and are not already reportable individually under TURA. To develop an expected number of TURA filers, TURI limited the Tier II data set based on TURA reportable SIC codes, employee numbers, and quantity of chemical reported.

* Banned in the EU for use in specified automotive air conditioning systems.

** Not otherwise specified.
Tier II

- 76 records, majority of these records are for refrigerants, and fewer refer to solvents.
- Narrow based on employee count, amount, SIC
- There could be facilities that would be subject to TURA reporting requirements that may not appear under Tier II, either due to reporting errors or due to threshold considerations
Process

• SAB reviews science & recommends
• TURI develops policy analysis
• Advisory committee reviews
• Administrative council makes decision
• Regulatory process
Guidance

• For the 2019 Reporting Year, C1-C4 Halogenated Hydrocarbons/Halocarbons, NOL category will be reportable under TURA.

• This category is defined as chemicals with 4 or fewer carbons, at least one halogen, and only hydrogen as the other constituent, that are not already individually listed on the TURA chemical list.
Guidance, continued

- This includes fully halogenated chemicals that contain no hydrogen. Halogens are further defined as fluorine, chlorine, bromine, and iodine.
- Chemicals that meet the definition of this category, but were already listed, remain individually reportable.