



# Emergency Management Issues Special Interest Group Annual Meeting

## Enhancing Emergency Preparedness Analysis: The Chemical Mixture Methodology (CMM) Wizard

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# What is the CMM Wizard?

- An online version of the CMM Excel Workbook.
- Provides the same output as the Excel Workbook.
- Four sequential steps guides the user through the process of calculating a mixture's hazard indices (HI's).
- The Workbook's chemical data are stored in an Access database; the web-forms update dynamically based on user input.

# Benefits of the CMM Wizard being on the Web...

- Access from any computer with internet access.
- No need to download anything; no need to enable Macros.
- Chemical updates are immediately available to the end user; user's are getting the latest & greatest.

# Benefits of the CMM Wizard Application...

- Four simple steps = very little learning curve.
- Unlimited chemicals can be added to a mixture.
- Allows for a chemical to be *quickly* queried based on compound name, CAS registry number, or SAX number and added to a mixture.
- Integrity of the underlying chemical data can be better maintained because the data are stored in a database.

# A Demo Using the Workbook Sample Problem...

- Step 1: Select method of adding chemical to mixture.

The screenshot shows a web browser window titled "Chemical Mixture Methodology (CMM) Workbook - Windows Internet Explorer". The address bar displays the URL "http://nycmetdev.pnl.gov/cmm/cmm\_database.asp". The page content includes the title "Chemical Mixture Methodology (CMM) Online Wizard" and a sub-header "Step 1 of 4: Select Method for Adding Chemical Compounds to the Mixture". Two radio button options are presented: "Search the CMM Database by Compound, CAS, or SAX Number" (which is selected) and "Pick from a List of Compounds in the CMM Database". A "Next >" button is located at the bottom right of the form area.

# A Demo Using the Workbook Sample Problem...

- Step 2: Select the chemical compounds to add to the mixture.

Chemical Mixture Methodology (CMM) Online Wizard

Step 2 of 4: Select Chemical Compounds to Add to Mixture

Search Criteria: Value:  
Compound Name | carbon tetrachloride | Find

Search Results - Select Chemical(s) from List to Add to Mixture:  
Carbon tetrachloride | 56-23-5 | CBY000 | Add  
Carbon tetrachloride | 56-23-5 | CBY000

Chemicals Currently in Mixture:  
Carbon tetrachloride | 56-23-5 | CBY000  
Chloroform | 67-66-3 | CHJ500  
Hydrogen chloride; (Hydrochloric acid) | 7647-01-0 | HHL000  
Methyl chloride | 74-87-3 | MIF765  
Methylene chloride; (Dichloromethane) | 75-09-2 | MJP450 | Remove

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# A Demo Using the Workbook Sample Problem...

- Step 3: Input concentrations at the receptor point.

Chemical Mixture Methodology (CMM) Online Wizard

Step 3 of 4: Input Concentration at Receptor Point

Chemical Compound	CAS	Concentration at Receptor (mg/m <sup>3</sup> )
Carbon tetrachloride	56-23-5	50
Chloroform	67-66-3	100
Hydrogen chloride; (Hydrochloric acid)	7647-01-0	10
Methyl chloride	74-87-3	400
Methylene chloride; (Dichloromethane)	75-09-2	200

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# A Demo Using the Workbook Sample Problem...

- Step 4: Select protective action criteria as basis for calculating HI's.

Chemical Mixture Methodology (CMM) Workbook - Windows Internet Explorer

http://nycmetdev.pnl.gov/cmm/backup/cmm\_database.asp

Google

Chemical Mixture Methodology (CMM) Workbook

Page Tools

## Chemical Mixture Methodology (CMM) Online Wizard

Step 4 of 4: Select Concentration Limit to Analyze

TEEL-0 ▼

- TEEL-0
- PAC-1
- PAC-2**
- PAC-3

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# A Demo Using the Workbook Sample Problem...

- Examine results (HI Summary)...

Chemical Mixture Methodology (CMM) Online Wizard

Results: Primary HI Summary | [HIs By Mode](#) | [HIs by Target Organ](#)

Chemicals in Mixture	CAS	Individual Hazard Index (HI)
Carbon tetrachloride	56-23-5	0.042
Chloroform	67-66-3	0.321
Hydrogen chloride; (Hydrochloric acid)	7647-01-0	0.305
Methyl chloride	74-87-3	0.213
Methylene chloride; (Dichloromethane)	75-09-2	0.103
Sum of All HIs:		0.983

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# A Demo Using the Workbook Sample Problem...

- Examine results (HIs by Mode)...

The screenshot shows a web browser window titled "Chemical Mixture Methodology (CMM) Workbook - Windows Internet Explorer". The address bar shows the URL: [http://nycmetdev.pnl.gov/cmm/cmm\\_database.asp?output=mode](http://nycmetdev.pnl.gov/cmm/cmm_database.asp?output=mode). The page content includes a navigation menu with "Results: Primary HI Summary | HIs By Mode | HIs by Target Organ". The main content is a table with the following data:

HCN	Mode or Endpoint	HI Sum >= 0.25
14, 15, 16	Irritants	0.568
3	Chronic Systemic Toxins	0.358
4	Acute Systemic Toxins	0.838
5	Reproductive Toxins	0.450
7	Nervous System Toxins	0.636
8	Narcotics	0.321
11	Acute Respiratory Toxins	0.625

At the bottom right of the table area, there is a "< Back" button.

# A Demo Using the Workbook Sample Problem...

- Examine results (HIs by Target Organ)...

Chemical Mixture Methodology (CMM) Workbook - Windows Internet Explorer

http://nycmetdev.pnl.gov/cmm\_database.asp?output=organ

Chemical Mixture Methodology (CMM) Workbook

### Chemical Mixture Methodology (CMM) Online Wizard

Results: [Primary HI Summary](#) | [HIs By Mode](#) | [HIs by Target Organ](#)

HCN	Target Organ	HI Sum >= 0.25
4.03, 4.00	Bladder Toxin (A)	0.518
4.06, 4.00	Hematological System, Unspecified Effects (A)	0.838
4.13, 4.00	Bone Toxin (A)	0.518
4.04, 4.00	Bone Marrow Toxin (A)	0.518
4.05, 4.00	Brain Toxin (A)	0.518
4.01, 4.00	Eye Toxin (Acute, Other than Irritation) (A)	0.838
4.07, 4.00	Gastrointestinal Tract Toxin (A)	0.518
4.08, 4.00	Heart, Cardiovascular System Toxin (A)	0.838
4.09, 4.00	Kidney Toxin (A)	0.838
3.10, 3.00	Liver Toxin (C)	0.358
4.10, 4.00	Liver Toxin (A)	0.518
4.11, 4.00	Skin Toxin, Other than Irritation (A)	0.518
4.12, 4.00	Skin Perforation (A)	0.518
4.02, 4.00	Nose Toxin, Other than Irritation (A)	0.838
5.00, 4.00	Reproductive System Toxin (A)	0.663
7.00, 7.01, 8.00, 6.00, 4.00	Nervous System, Including CNS, Narcosis and Cholinesteras	0.941
11.00, 11.01, 4.00	Respiratory System Toxin, Including Severe and Moderate	0.838

# CMM Wizard Future Refinements...

## Short Term...

- General interface improvements.
- Provide the ability to save and open previously defined mixtures.
- Provide the ability to add multiple receptor distances for calculating HIs.
- Provide ability for additional entry of assumptions used in analysis (e.g., wind speed, stability class).

## Longer Term...

- Directly link to dispersion model (e.g., EPICode) to automatically calculate concentrations at defined receptor locations.