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New features of the

# National Environmental Methods Index

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# Mission:

*“To allow rapid communication and comparison of critical parameters of methods for use with methods selection and/or methods modifications and data comparability”*



# What is NEMI?

- Online clearinghouse of environmental methods <http://www.nemi.gov>
- Methods for water, air, soils/sediment, and tissue
- Chemical, microbiological, population/community, toxicity tests, and more
- Searchable

# What's in NEMI?

- Almost 1,100 environmental monitoring methods:
  - Chemical, radiochemical, and biological methods
  - Methods for analysis, sample collection and preparation, and toxicity testing
    - Performance data - detection levels, accuracy & precision
    - QA/QC requirements
    - Relative cost
    - EPA Regulatory Status
  - Methods from 22 sources, including Federal agencies, states, and private organizations

# Who is NEMI?

- Created by the Methods and Data Comparability Board
- Support from EPA and USGS
- Many entities enter their own methods using online data-entry tools
- CRADA



# Why do we need NEMI?

- Significant resources are expended annually to collect water quality data
  - Water quality data is collected by numerous agencies and by varying methodologies
  - Need to compare and recommend methods that facilitate collaboration and yield comparable data and assessment results
  - Full method texts range up to 100+ pages in length -- Difficult to compare advantages and disadvantages of one method with another using full method texts
- Save time and money

# New Features in NEMI

- “Greenness Profiles”
- NEMI-CBR – extension of NEMI for homeland security (Chemical, Biological, and Radiological methods)
- Field protocols for biological sampling, physical habitat (beta)
- Toxicity testing
- Sample-collection

# Greenness Profiles



- Developed in cooperation with the Green Chemistry Institute of the ACS
- Grant from the ACS Petroleum Research Fund



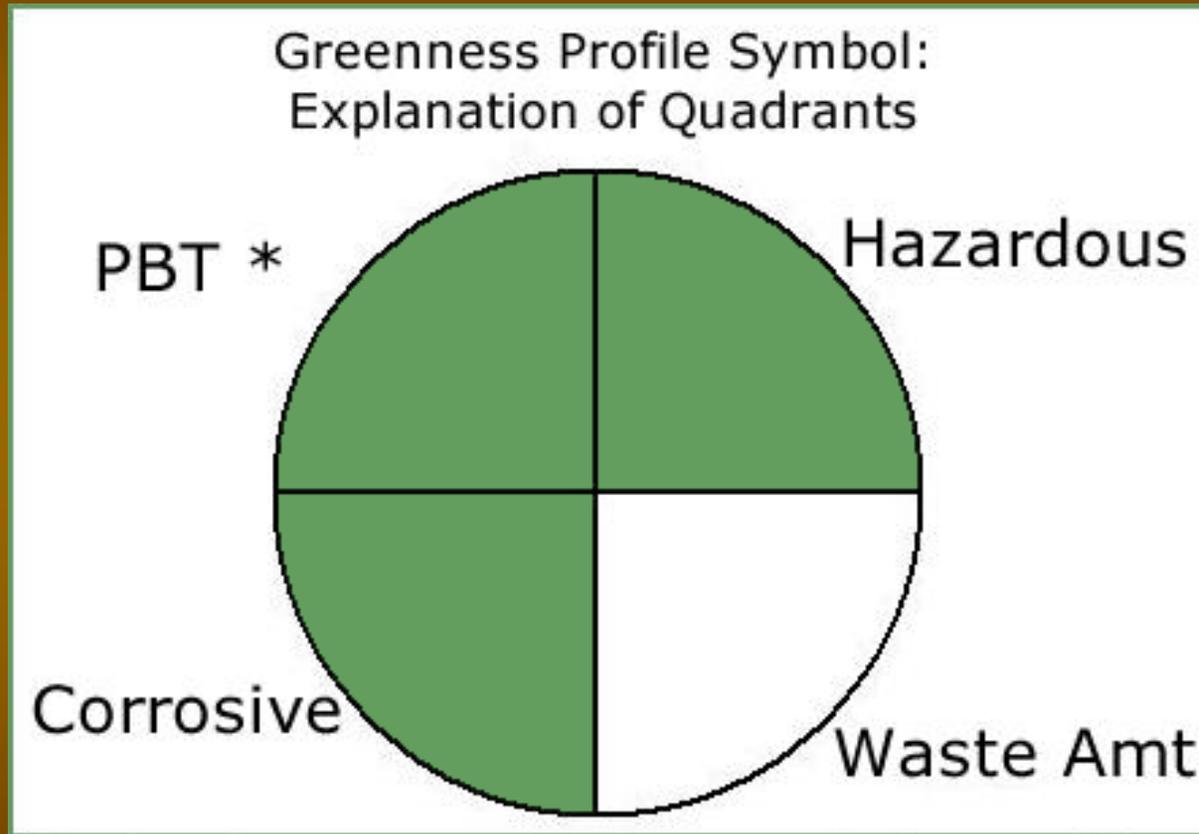
# Why Greenness Profiles?

- in many instances, the analytical methods used for water monitoring and testing are not very sustainable or “green”, often using:
  - hazardous solvents and reagents
  - generating large quantities of waste
  - using large amounts of energy

| Method Number<br>(Sort)    | Source<br>(Sort)                 | Method Descriptive Name<br>(Sort)  | Detection Level | Detection Level Type | Bias             | Precision      | Spiking Level | Instrumentation<br>(Sort) | Relative Cost<br>(Sort) | Greenness Profile<br> |
|----------------------------|----------------------------------|--|-----------------|----------------------|------------------|----------------|---------------|---------------------------|-------------------------|---|
| <a href="#">300.0</a>      | <a href="#">EPA-NERL</a>         | Inorganic Anions by Ion Chromatography                                       | .002 mg/L       | MDL                  | 103 % Rec (SL)   | 2 % RSD (SL)   | 10 mg/L       | IONCHR                    | \$\$                    |                      |
| <a href="#">300.1</a>      | <a href="#">EPA-OGWDW/TSC</a>    | Anions in Water by IC  | .008 mg/L       | MDL                  | 95 % Rec (SL)    | .14 % RSD (SL) | 10 mg/L       | IONCHR                    | \$\$                    |                      |
| <a href="#">352.1</a>      | <a href="#">EPA-NERL</a>         | Nitrate by Colorimetry   | .1 mg/L         | RNGE                 | 102 % Rec (ML)   | 14 % RSD (ML)  | .5 mg/L       | SPECTR                    | \$                      |                      |
| <a href="#">353.2</a>      | <a href="#">EPA-NERL</a>         | Nitrate-Nitrite Nitrogen by Colorimetry                                      | N/A             | RNGE                 | N/A              | N/A            |               | SPECTR_AUTO               | \$\$                    | Not enough information on the amount of sample and/or chemicals used for the analysis.                  |
| <a href="#">353.3</a>      | <a href="#">EPA-NERL</a>         | Nitrate-Nitrite by Cadmium Reduction and Colorimetry                         | N/A             | RNGE                 | N/A              | N/A            |               | SPECTR                    | \$                      |                      |
| <a href="#">353.4</a>      | <a href="#">EPA-NERL</a>         | Nitrate and Nitrite in Estuarine and Coastal Waters by Automated Colorimetry | .075 ug/L       | MDL                  | 106.4 % Rec (SL) | 1.5 % RSD (SL) | 139.94 ug/L   | SPECTR_AUTO               | \$                      |                      |
| <a href="#">4110B</a>      | <a href="#">Standard Methods</a> | Anions in Water by Ion Chromatography  | .0027 mg/L      | MDL                  | 106 % Rec (SL)   | 2.6 % RSD (SL) | 2.5 mg/L      | IONCHR                    | \$\$                    | Not enough information on the amount of sample and/or chemicals used for the analysis.                  |
| <a href="#">4110C</a>      | <a href="#">Standard Methods</a> | Anions in Water by Ion Chromatography  | 17 ug/L         | MDL                  | 103 % Rec (SL)   | N/A            | 8000 ug/L     | IONCHR                    | \$\$                    | Not enough information on the amount of sample and/or chemicals used for the analysis.                  |
| <a href="#">4500-NO3-E</a> | <a href="#">Standard Methods</a> | Nitrate in Water After Cadmium Reduction                                     | .01 mg/L        | RNGE                 | 99 % Rec (ML)    | 14 % RSD (ML)  | .5 mg/L       | SPECTR                    | \$                      |                    |



# Greenness Profiles





## National Environmental Methods Index



Greenness Profile information developed in cooperation with the Green Chemistry Institute

|                                   |   |
|-----------------------------------|---|
| <b>Method Number</b>              | 300.0   |
| <b>PBT</b>                        | Green   |
| <b>Corrosive</b>                  | Green   |
| <b>Hazardous</b>                  | Green   |
| <b>Waste Amt</b>                  | Green   |
| <b>Analytical Sample Amt (mL)</b> | 3   |
| <b>Analytical Sample Amt (g)</b>  | 3   |
| <b>pH of Analytical Sample</b>    | N.S.  |
| <b>Calculated Waste Amt (g)</b>   | 3.0   |
| <b>Assumptions/Comments</b>       | 1. sample is free from residual chlorine-dioxide 2. eda is used for the preservation. |

Done

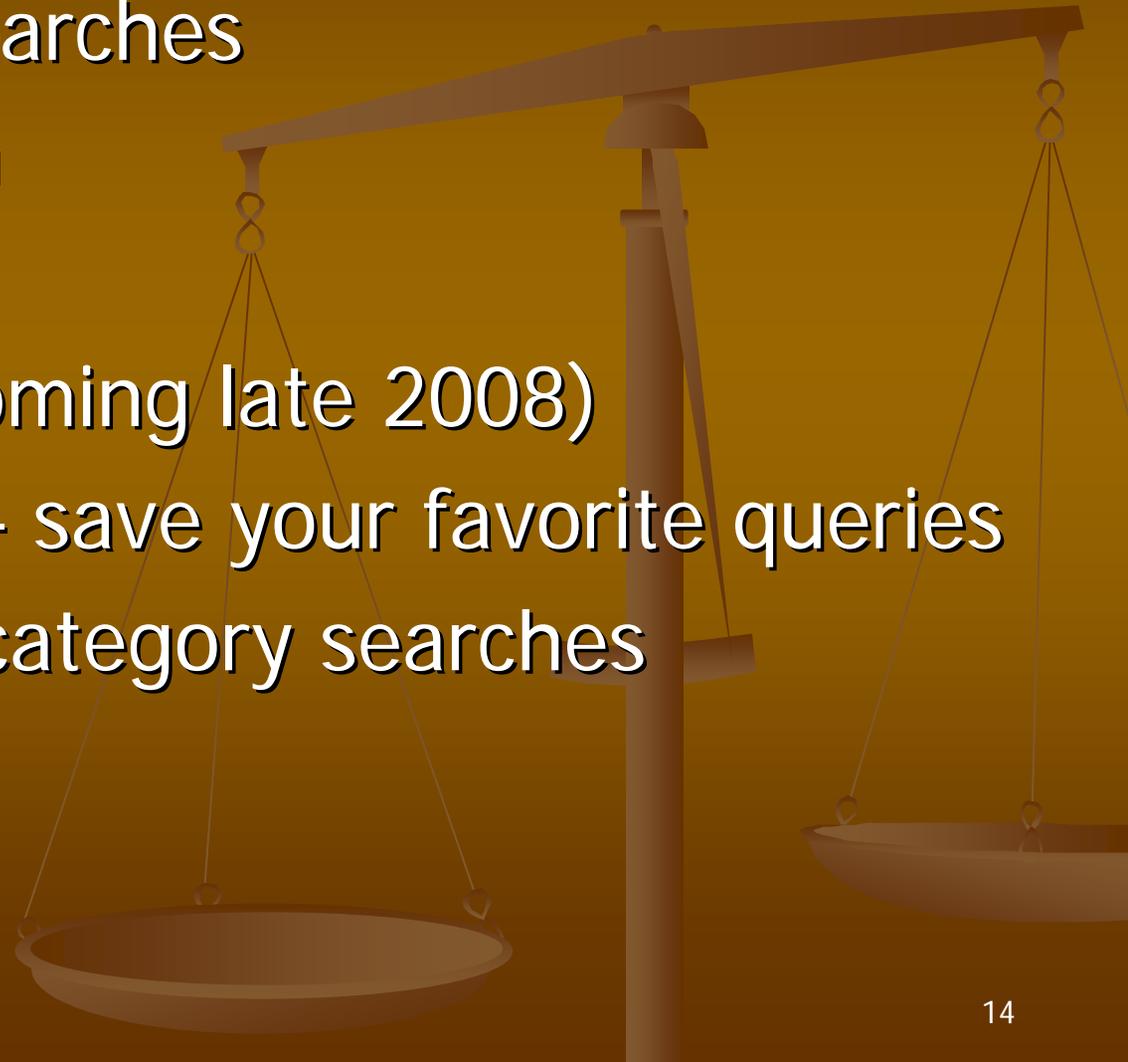


# Field protocols

- Biological Population/community
  - Benthic macroinvertebrates
  - Later 2008: algae and fish
- Water collection
  - Surface & ground water
- Physical measurements
  - Methods for temp, SC, DO, etc.
  - Turbidity, sediment (coming soon)
  - Habitat (draft)

# New functionality features

- Multi-analyte searches
- Keyword search
- NEMI v. 3.0 (Coming late 2008)
- “My methods” – save your favorite queries
- Easier method category searches



# NEMI-CBR

- Extension of NEMI for water security use
- Limited-access database
  - Water utilities
- Contains information on method rapidity, screening and confirmatory methods
- 229 methods

| Method Number    | Method Descriptive Name   | Flag | Media | Source         | Rapidity            | Screening | Confirmatory | Instrumentation |
|------------------|---|------|-------|----------------|---------------------|-----------|--------------|-----------------|
| ☞1624            | Volatile Organic Compounds by GC/MS   |      | WATER | ☞EPA-EAD       | Moderate (1-3 hrs.) | No        | Yes          | GC-MS           |
| ☞502.2 (by ELCD) | VOCs in Water by GC/PID/ELCD  |      | WATER | ☞EPA-NERL      | Moderate (1-3 hrs.) | No        | Yes          | GC-ELCD         |
| ☞524.2           | VOCs in Water Using GCMS  |      | WATER | ☞EPA-NERL      | Moderate (1-3 hrs.) | Possibly  | Yes          | GC-MS           |
| ☞551.1           | Chlorinated Compounds in Water Using GC-ECD   |      | WATER | ☞EPA-OGWDW/TSC | Moderate (1-3 hrs.) | No        | Possibly     | GC-ECD          |
| ☞601             | Purgeable Halocarbons via GC with Electrolytic conductivity (ELCD) or microcoulometric detector |      | WATER | ☞EPA-EAD       | Moderate (1-3 hrs.) | No        | Yes          | GC-ELCD         |

# CBR Advisor

- Expert system companion to NEMI-CBR
- Obtain advice to:
  - Select appropriate methods for any given situation
  - Classify threat warnings
  - Threat evaluation and immediate response
  - Site characterization, evaluation, and entry
  - When and why screening methods are used
  - How to collect, package, and ship samples
- Based on EPA's Response Protocol Toolbox



## CBR Methods Advisor

EPA's Water Security Division Expert System for NEMI-CBR

### Select Chemical Contaminants for Confirmatory Analysis

Chemical contaminants are grouped into four major types, each of which has special requirements for their methods such as instrumentation and sample preparation and/or sample preservation. Select the types of chemical agents that you wish to find methods for (you may select more than one).

- Biotoxins.**
- Chemical warfare agents.**
- Inorganic compounds and/or elements.**
- Organic compounds including pesticides and drugs.**

OK

Restart

Back

Exsys CORVID

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## Explanation

### Major Types of Chemical Agents

The expert system considers four different "types" of chemical agents that could be introduced into water: **biotoxins, chemical warfare agents, inorganic compounds and/or elements, and organic compounds.** The methods for sampling and analyzing for each of these agents are very different from each other and even within these three major types of chemical agents there are further sub-groupings which are based on sampling and analytical considerations that directly affect method selection. Although Biotoxins are organic compounds, they differ from the other analytes listed under "Organic compounds" in that they are larger, less volatile, polar compounds that require different methods for analysis.

- [Click Here for Biotoxin Agent Methods](#)
- [Click Here for Chemical Warfare Agent Methods](#)

Note that there is not an option to select "I don't know - I need help." This is because when searching for a method to confirm an analyte or organism (or to monitor for it) you must know what you are analyzing for.



Questions? Comments?



# Contact NEMI

- Send email to "nemi@usgs.gov"

