EPA Community-Focused Exposure and Risk Screening Tool: C-FERST

NIEHS PEPH Program Meeting
April 27, 2010
What Is C-FERST?
Community-Focused Exposure and Risk Screening Tool

- One-stop shop web tool for conducting community-level assessments

- GIS display and analysis

- Access to available resources

- [www.epa.gov/heasd/c-ferst](http://www.epa.gov/heasd/c-ferst)

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Innovative, high quality science

User-friendly interface and readouts

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Cumulative Impacts of Multiple Stressors

- Prioritize environmental issues
- Identify communities at risk
- Assess impact of actions (accountability)
Background

1. Development of Communities & Cumulative Risk Research Program (Zartarian and Schultz, 2008)
2. Review of publicly available EPA tools (Barzyk et al., 2008)
3. Overview of measurement methods (Medina-Vera et al., 2008)
4. Development of C-FERST (2008-present)
5. Further development of methods and resources (2008-present)
6. Subsequent Annual Performance Measures (i.e., Agency milestones)
   - Development and application of C-FERST (2010)
   - Application and assessment of tools in communities (2011)
Needs & Impacts

Needs
• Understand environmental issues in context of risk
• Develop EPA tools using best available information
• EJ communities could have higher risks and limited access to resources

Impacts
• Enhance access to information and methods to reduce reliance on risk perception
• Empower regions and communities with a localized exposure assessment tool based on sound science to make informed cost-effective decisions and take action
• Improve public health by facilitating informed decisions about “at risk” or “hot spot” communities
• Provide information to develop solutions
Goal of Case Studies

How

• Apply tools
• Assess tools

Where

• In specific geographic areas for specific populations
• In a cumulative exposure framework

Why

• To support regional community efforts, such as
• CARE, Environmental Justice, Enforcement Targeting
• Local-scale community efforts, Identifying communities at risk
• To develop state-of-the-science tools like C-FERST
Current Projected Timeline

- C-FERST Intranet version 1 (June 2010)
  - Internal EPA testing and use
  - Guidance, web links, fact sheets, interactive maps for air toxics (NATA)

- C-FERST Extranet version 1 (December 2010?)
  - Beta testing by communities, academia, other Federal Agencies
  - Internet with password protection for limited public access
  - Inclusion of additional issues (e.g., radon) and data layers

- C-FERST Internet version 1 and beyond for public use (2011→)
  - Maps for additional issues (e.g., drinking water, lead, fish consumption)
  - Links to tools, incorporation of cumulative risk research (e.g., non-chemical stressors)
  - Ability to upload or link to locally collected data
  - Applications for community case studies
  - Blog/Wiki to facilitate sharing results
### Environmental Issues in C-FERST (FY10-12)

<table>
<thead>
<tr>
<th>Issues with fact sheets and science for exposure/risk maps</th>
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<tbody>
<tr>
<td>• air toxics</td>
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<tr>
<td>• arsenic in food, drinking water, soil</td>
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<td>• diesel PM</td>
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<td>• environmental tobacco smoke (ETS)</td>
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<td>• fine particulates</td>
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<td>• lead (multimedia)</td>
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<td>• mercury in fish</td>
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<td>• near roadway</td>
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<td>• ozone</td>
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<td>• radon</td>
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<td>• residential pesticides</td>
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<td>• ultraviolet radiation</td>
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<th>Issues with fact sheets only</th>
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<tr>
<td>• autobody shops</td>
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<td>• brownfields</td>
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<td>• E. Coli at beaches</td>
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<tr>
<td>• hazardous waste/pharmaceuticals</td>
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<tr>
<td>• healthy homes</td>
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<td>• methamphetamine labs</td>
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<td>• microbials in drinking water</td>
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<tr>
<td>• land use/smart growth</td>
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<tr>
<td>• lead in drinking water</td>
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<tr>
<td>• mold</td>
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<tr>
<td>• recreational water quality</td>
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<td>• runoff</td>
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<tr>
<td>• schools</td>
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<td>• solid waste disposal/recycling</td>
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A's Cumulative Risk Guidance Document with C-FERST

1. **Initiating Factor**: Determine whether your assessment is driven by an end point or increases in illnesses in the population, b) chemical concentrations in humans or the environment, or c) pollutant sources within the community.

2. **Characterize Population based on Initiating Factor**: Provide a physical description of the study area and a demographic description of the population in that study area. These descriptions may be further refined as the investigation progresses.

3. **Generate Chemical List**: Develop a list of relevant chemicals by evaluating information on chemical releases, biomonitoring data, public health information, and environmental concentrations. This initial list of relevant chemicals is likely to be closely tied to the initiating factor.

4. **Identify Links between Chemicals and Subpopulations**: Identify the population groups which, because of either higher exposure or increased vulnerability, are particularly sensitive to the chemicals of interest. Occupational, dietary, or other exposure sources to toxicologically similar chemicals may exist for some population subgroups. Community involvement is important for the identification of such factors. A conceptual map may be useful for this step and would include the sources, chemicals, exposure pathways, exposure routes, subpopulations and health endpoints to be analyzed.

5. **Quantify Exposure for General Population & Subpopulations**: Using the previously defined population and study area, identify all existing and future completed pathways. Exposure modeling may be helpful here; useful tools for this step include monitoring data for chemical concentrations and information from epidemiologic studies or public health databases. It will be useful to identify relevant exposure factors, including those unique factors which cause differential exposures for sensitive subpopulations.

6. **Form Initial Exposure Groups**: Simplify the gathered information by grouping the chemicals according to a) timing of exposure (both duration and intermittency), and b) either medium or pathway.

7. **Quantify Dose-Response for Initial Toxicity-based Chemical Groups**: Using the initial exposure groups formed in 5, evaluate the groups in terms of toxicological timing factors, toxicokinetic overlaps, internal dose, interactions, toxicodynamic interactions, and persistence of effects. Keep in mind that both simultaneous and sequential exposures may exhibit joint toxicity. Any issues that cannot be quantified may be described qualitatively.

8. **Integrate Exposure & Dose-Response, Refine Exposure and Toxicity Assessments**: Determine whether any of the toxicity overlaps (i.e., interactions) match up with the exposure overlaps. If so, exposure information for these chemicals may need to be improved. The products of this step are refined exposure and toxicity characteristics and the resulting risk estimates.

9. **Conduct Risk Characterization**: Perform a technical integrative analysis to produce risk estimates. Using the results of this analysis, state recommendations and uncertainties in a risk characterization summary.
View Environmental Issue Profiles

To generate a report, set the local area (if desired), select one or more issues using the checkboxes below, and click the Generate Report button below.

Set Local Area

The reports contain information about the following:

- **General Information** (links to fact sheets)
- **Health outcomes** (links to other e.g., CDC) tools
- **Exposure and risk reductions** (links to fact sheets)
- **Population affected** (relevant information e.g., maps, statistics of vulnerable sub-populations)
- **Sources** (links to fact sheets and relevant information e.g., databases, other tools, and maps when available)
- **Environmental Concentrations** (links to available databases, information for collecting local measurements, maps)
- **Human Exposures** (summary of contributing behaviors, other exposure factors, maps)
- **Health risks** (ranges within a community, comparisons to national averages, key factors/vulnerabilities/risk modifying factors, links to fact sheets, maps when available)
- **Other Communities Focusing on this Issue** (links to community reports and promising practices documents)
- **Solutions Implemented by Other Communities** (links to community reports and promising practices documents)
Potential Overlap with NIEHS PEPH Program

- Assess applicability of C-FERST across the wide range of community projects
- Identify utility of exposure assessments within context of community goals
- Determine strengths and weaknesses of the tool – information or methodological gaps e.g.
- Cross-check levels of information required to make decisions
Acknowledgments

- C-FERST Development Team in ORD NERL
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- C-FERST Collaborators in ORD, CARE (e.g., R1, R5, R7, R9), and Region 1 (e.g., GIS team)
Disclaimer

Although this work was reviewed by EPA and approved for presentation, it may not necessarily reflect official Agency policy.