Progress on Dioxin Modeling Project

Anita Wong, Jianmin Ma and Yi-Fan Li
Environment Canada
June 9, 2010
Purpose of Study

- EC initiative to address a knowledge gap in dioxins/furans
- To help guide policy decision on Canada’s domestic activities and Canada’s participation in international initiatives related to dioxins/furans
- The study will:
  - extend our knowledge on the dioxins/furans global budget
  - examine pathways to the various compartments in the Canadian environment
  - enhance our understanding on the transboundary impact of dioxins/furans in Canada
THE GREAT LAKES BINATIONAL TOXICS STRATEGY

Scope of Study

Two parts:

- Emissions Inventory
  - Develop a comprehensive dioxin atmospheric emission inventory on a global scale

- Regional and Global Modeling
  - Upgrade Environment Canada’s atmospheric transport model for persistent organic pollutants: Canadian Model for Environmental Transport of Organochlorine Pesticides (CanMETOP) to predict the atmospheric level and global transport of dioxins/furans
  - Collect data for input into model eg. met. data
  - Perform scenario runs
Emissions Inventory

Preliminary results:

- In 2009-10 fiscal year, a comprehensive dioxin atmospheric emission inventories on a global scale has been completed.
- Given that most data was collected from 2000 through 2006, the year of 2004 was set as the reference year.
- Estimated world total release of dioxins/furans in the reference year of 2004 is 77,400 g TEQ in which 38,200 has been emitted into air.
- The global emissions data show that East Asia, India, and Central Europe are major source regions.
- The gridded emission inventory has been interpolated into regional-scale (horizontal resolution 24 km × 24 km) and global-scale (resolution 1° × 1° latitude/longitude) atmospheric transport model grids.
Global air emissions of dioxin in 2004
Scenario Modeling

Preliminary results:

- Multiple model scenario runs are set up to assess impact of dioxins/furans emissions from:
  - the United States, East Asia, India, Mexico, Europe and Russia on Canadian environment

- East Asian emissions contribute mostly to atmospheric level of dioxins/furans in Western Canada through trans-Pacific atmospheric transport

- India emissions appear to exert stronger influence on the west coast of the US than to Canada
Next Steps

- Multiple modeling scenario studies are still underway. Extensive modeling results are expected to be reported in early autumn of 2010.
- Modeling results will be used to evaluate and improve the emission inventory, and subsequently modeling results.
- Given considerable increase expected in dioxins/furans emission from China and India, another modeling scenario investigation will be undertaken to assess the impact of the increasing emission trend of dioxins/furans on Canada’s environment.
- Modeling impact of Canadian emissions on global environment.
- Assessment of effect of global dioxin/furan emissions on the Great Lakes will depend on extra funding. A proposal for climate change and global emission in local contamination over the Great Lakes has been submitted to the Great Lakes Restoration program but not endorsed.