

CHEMMAP is a chemical discharge model designed to predict the trajectory, fate, impacts and biological effects of a wide variety of chemical substances three-dimensionally as an ArcView® extension.

APPLICATIONS FOR CHEMMAP INCLUDE:

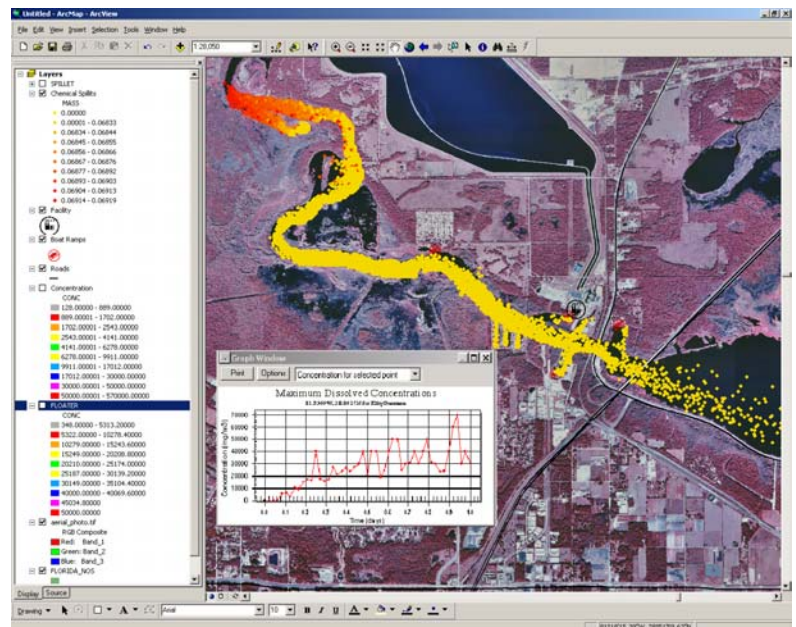
- Hindcast/forecast of spill response.
- Natural resource damage assessment.
- Contingency planning - including worst-case scenario.
- Evaluation of point source discharges.
- Cost-benefit analysis.
- Drills and education.

CHEMMAP HIGHLIGHTS

- ▶ Chemical Fates Model
- ▶ Biological Exposure and Effects Model
- ▶ Stochastic Model
- ▶ Hazard Quotient Calculations
- ▶ Environmental, Chemical & Biological Databases
- ▶ Fully integrated with ArcView®

FEATURES

- Enter data, run the model, and generate graphics within ArcView®
- Can be applied to any fresh or salt aquatic environment in the world.
- 3D Viewer capabilities.
- Easily interpreted visual displays of concentrations over time.
- Can utilize a variety of 1, 2, 3-D hydrodynamic data file formats and can create 2-D vertically averaged current files where modeled currents are unavailable.
- Optional biological exposure model to predict exposed fish and wildlife impacts.
- MSDS database linked to the physical-chemical database.
- Extensive chemical database providing physical-chemical data.



CHEMICAL FATES MODEL

CHEMMAP simulates the following processes:

- Initial plume dynamics.
- Slick spreading, transport, and entrainment of floating materials.
- Evaporation and volatilization (to atmosphere).
- Transport and dispersion of dissolved and particulate materials in the water column and in the atmosphere.
- Dissolution and adsorption to suspended sediments.
- Sedimentation and resuspension.
- Natural degradation.
- Shoreline entrainment.
- Boom effectiveness.

HAZARD QUOTIENT

For all CHEMMAP model options the Hazard Quotients also known as Predicted Effects Concentrations divided by Predicted No Effects Concentration (PEC/PNEC) can be readily calculated.

BIOLOGICAL EXPOSURE AND EFFECTS MODEL

The biological exposure model evaluates:

- Area or water volume exposed above a selected threshold (i.e. a toxicological endpoint in US EPA ecological risk assessment terminology).
- Dose (sum of concentration times time of exposure) the biota are exposed to and the expected percent mortality from acute toxic effects.

STOCHASTIC MODEL

The stochastic model predicts:

- Range of expected concentrations and the probability of exceeding thresholds of concern from a chemical discharge.
- Frequency distribution of model results, for which statistics are calculated and plotted.



ENVIRONMENTAL, CHEMICAL AND BIOLOGICAL DATABASES

- *Environmental database* - includes coastline, bathymetry, shoreline type, ecological habitat type, and temporally varying ice coverage and temperature.
- *Chemical database* - includes physical-chemical parameters that allow the user to add new chemicals, duplicate chemicals already in the database and make changes to chemical data while preserving the original values. There is a link to ChemWatch Chemical Management System's comprehensive Health and Safety information.
- *Biological databases* - can be set up for any area of the world. For the US, ASA has developed a biological database containing seasonal or monthly mean abundance by species and habitat type for each biogeographic region of the US.



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