

**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.

### APPLICATIONS FOR CHEMMAP INCLUDE:

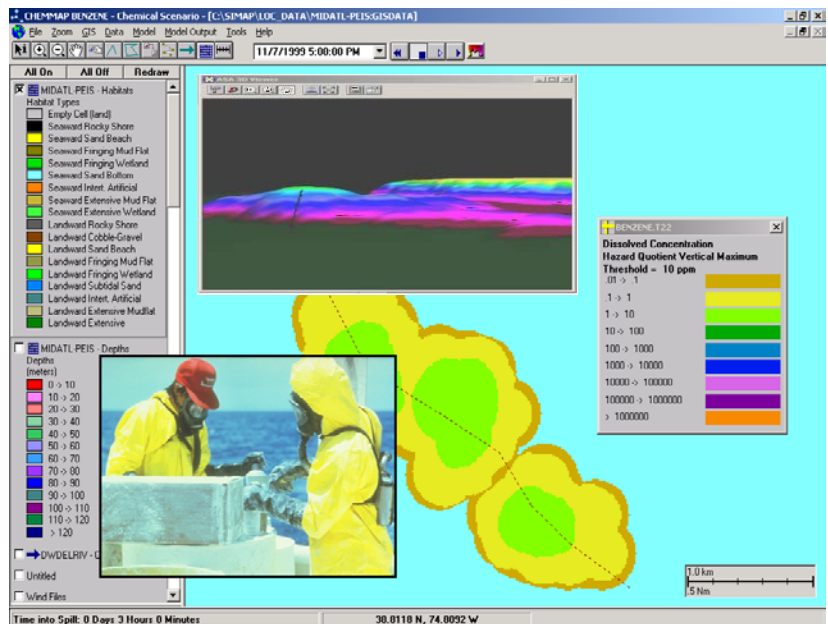
- Hindcast/forecast of spill response.
- Natural resource damage assessment.
- Contingency planning - including worst-case scenario.
- Evaluation of point source discharges.
- Cost-benefit analysis.
- Drills and education.

### CHEMMAP HIGHLIGHTS

- ▶ Chemical Fates Model
- ▶ Biological Exposure and Effects Model
- ▶ Stochastic Model
- ▶ Hazard Quotient Calculations
- ▶ Environmental, Chemical & Biological Databases

### FEATURES

- Contains ASA's own GIS or can be used in other GIS software such as ArcView®.
- Location specific environmental/biological data applied to any fresh or salt aquatic environment in the world.
- Can utilize a variety of hydrodynamic file formats.
- Easily interpreted visual displays of concentrations over time.
- 3D Viewer capabilities.
- 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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