

Chemical Discharge Model System

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

- Impact Assessment
- 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

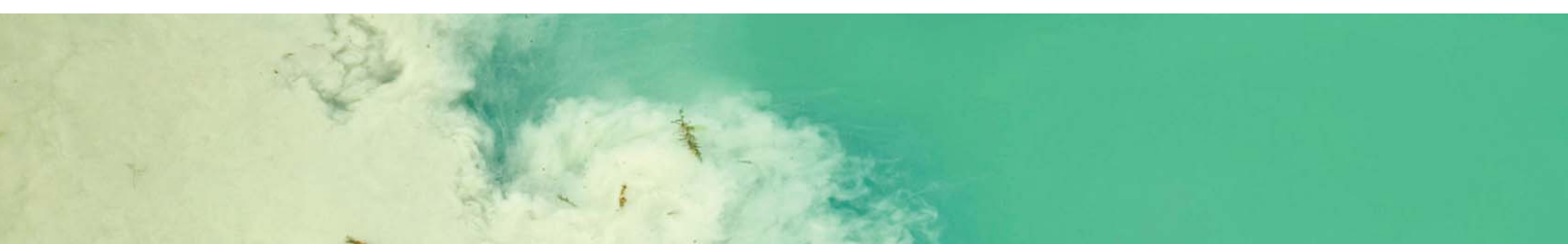
Features

- 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



CHEMMAP Highlights

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



Model Modules

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 and dispersant effectiveness

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 U.S. EPA ecological risk assessment terminology)
- Dose (sum of concentration times time of exposure) aquatic biota are exposed to and the expected percent mortality from acute toxic effects
- Direct-contact impacts to birds, mammals, and other wildlife

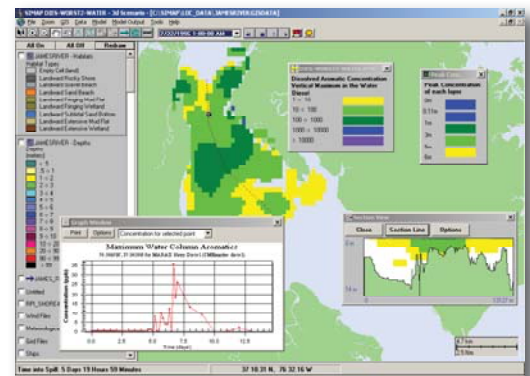
Stochastic Model

The stochastic model predicts:

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

CHEMMAP 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.



Environmental, Chemical and Biological Databases

- **Environmental database** - includes coastline, bathymetry, shoreline type, ecological habitat type, and temporally varying ice coverage, temperature, and salinity
- **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 U.S., ASA has developed a biological database containing seasonal or monthly mean abundance by species and habitat type for each biogeographic region of the U.S.

ASA has built a wide range of computer modeling applications to solve various environmental problems. ASA's family of environmental modeling tools are available for licensed use and customization and include: AIRMAP, CHEMMAP, COASTMAP, HYDROMAP, OILMAP, SARMAP, SIMAP, MUDMAP and WQMAP. For more information visit our website at www.asascience.com.

