Surface Water Modeling System (SMS) Toolbox for Dredging Models and Data

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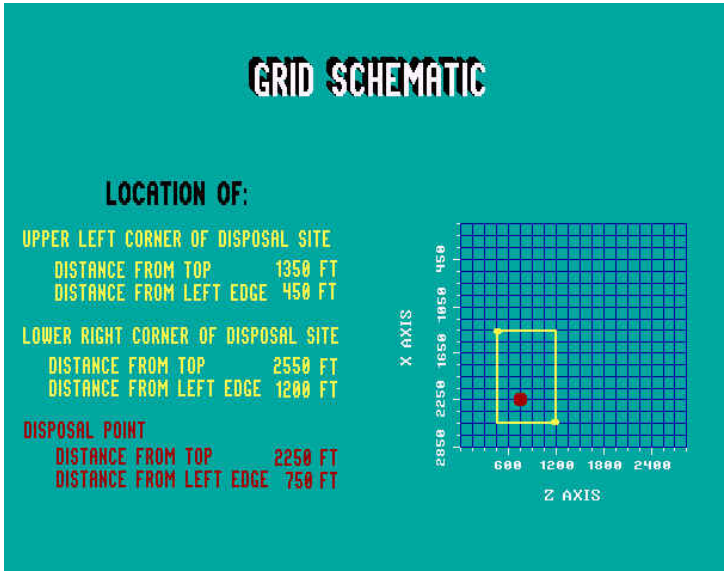
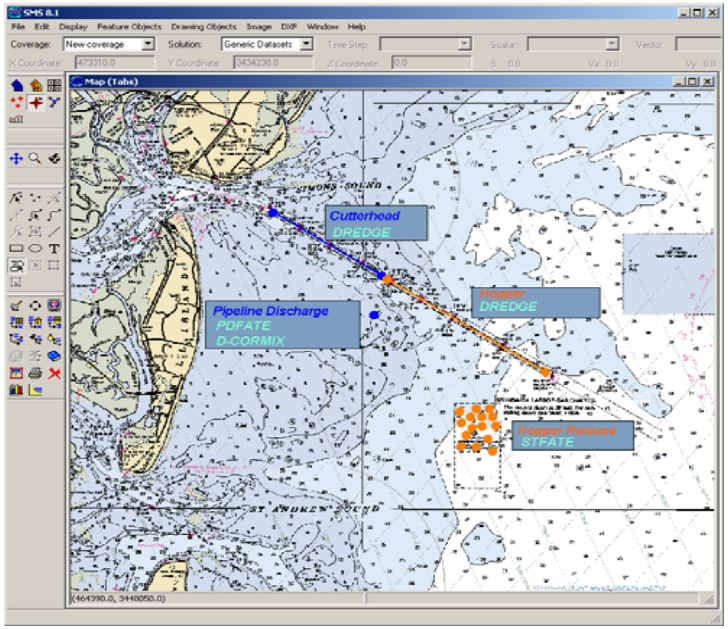
Motivation/Solution

MOTIVATION:

- Dredging models are stand alone
- Inefficient and time consuming to set up models, incorporate data sources, process output
- Powerful models under-utilized due to lack of interconnectivity

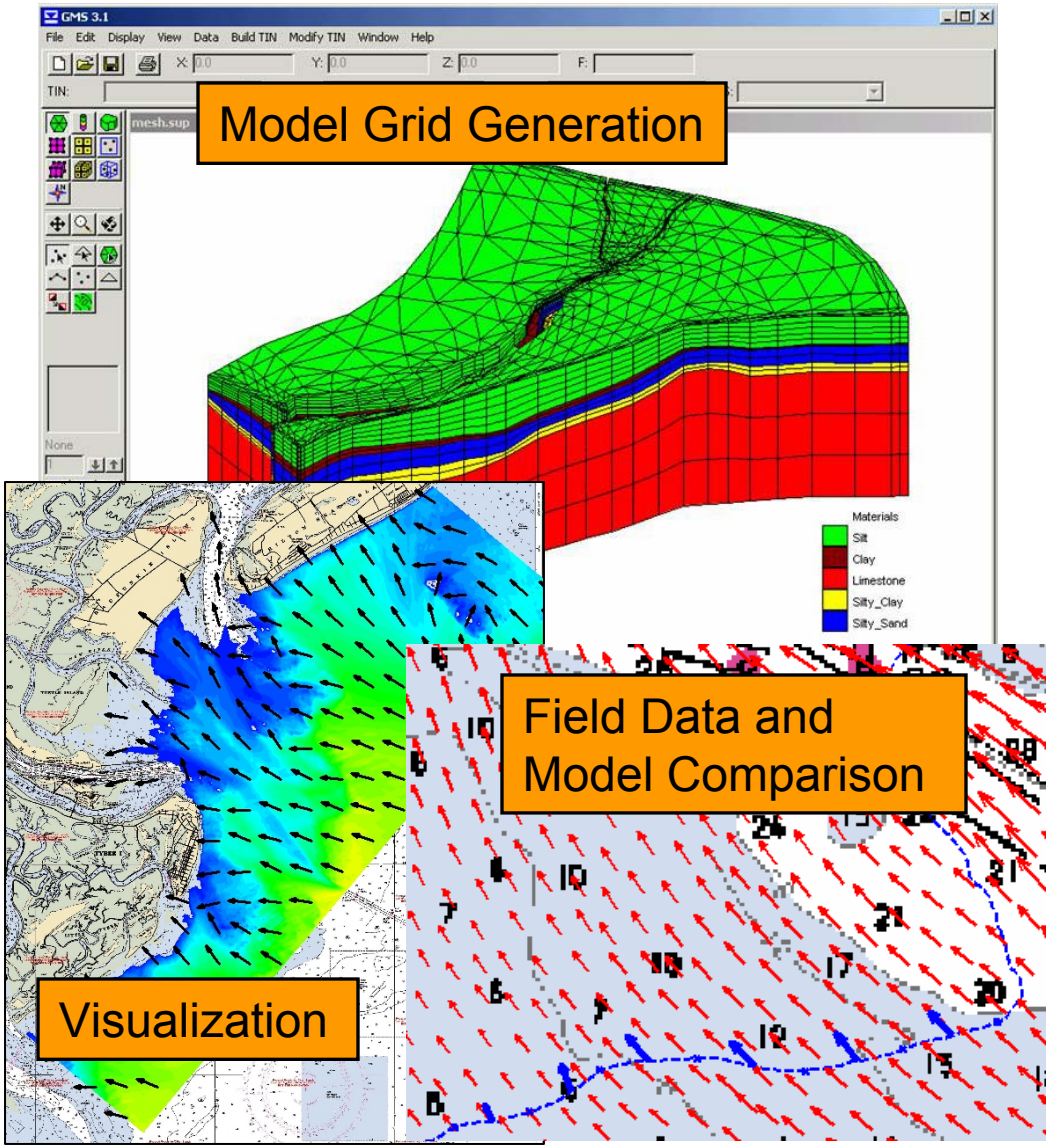




SOLUTION:

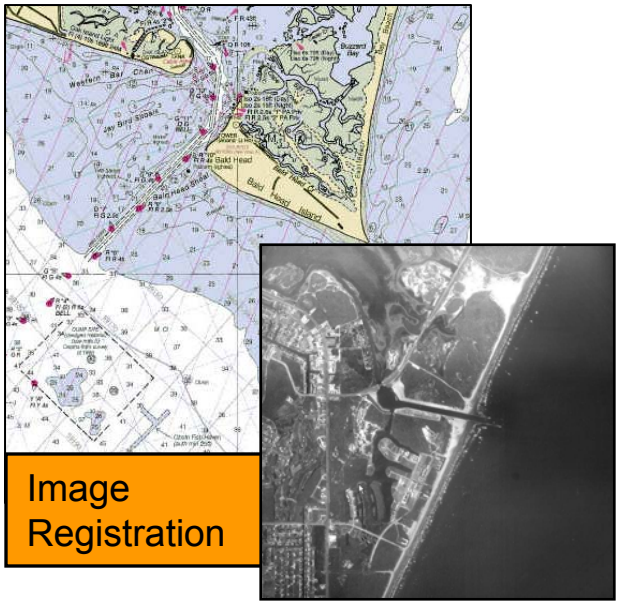
- Incorporate dredging models and data sources into Corps-supported data/model mgmt system (SMS)
- Interconnect dredging and other Corps models/tools/databases
- Develop system for rapid dredge data integration, analysis, visualization

SMS Model & Data Mgmt

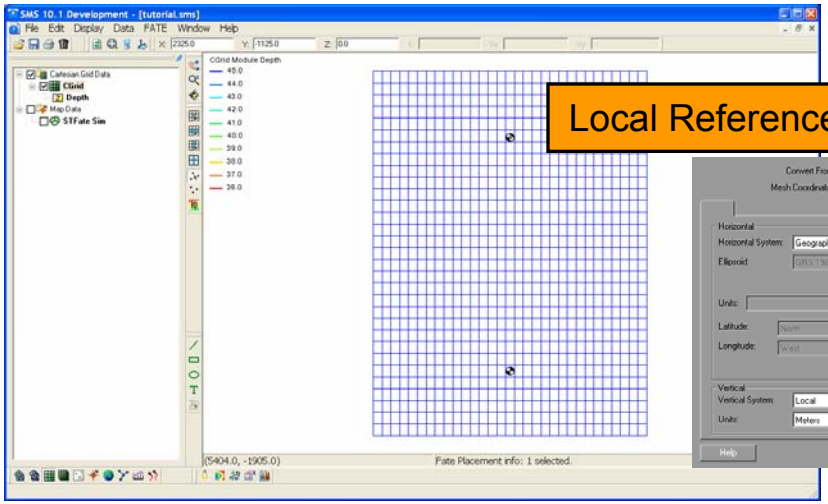


- Includes Corps hydro, wave, WQ, watershed, water resource, and groundwater models
- Used for: grid generation, model setup, visualization, post-processing,
- Interaction between models
- Incorporate data from multiple sources: GIS, time series, etc.
- Interconnectivity to web-based data sources
- Data analysis and interpolation tools
- Common data input include
  - Bathymetry and boundaries
  - Structures
  - Hydrodynamic and wave data
  - Sediment
  - Water Chemistry
  - Resources
  - Dredge data/schedule
  - Time series

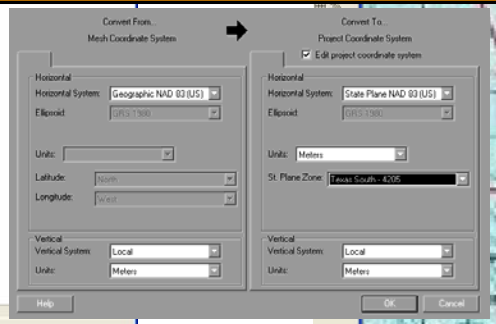
SMS Georeferencing

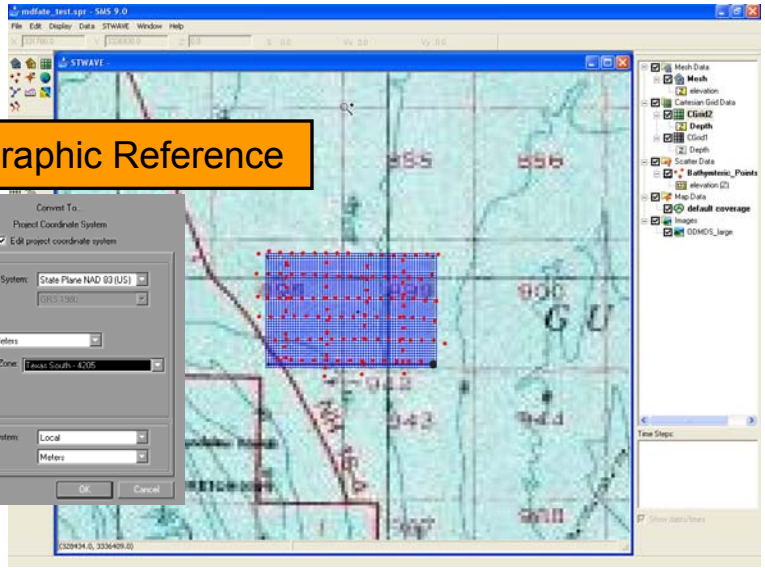


- Data sources are diverse and no standard coordinate system exists
- SMS tool: Georeference data sources and model output
- Coordinate conversion
- GIS shape files
  - Import
  - Create
- Image registration
  - NOAA maps
  - Google Earth Images
  - Other Aerial Photography and maps

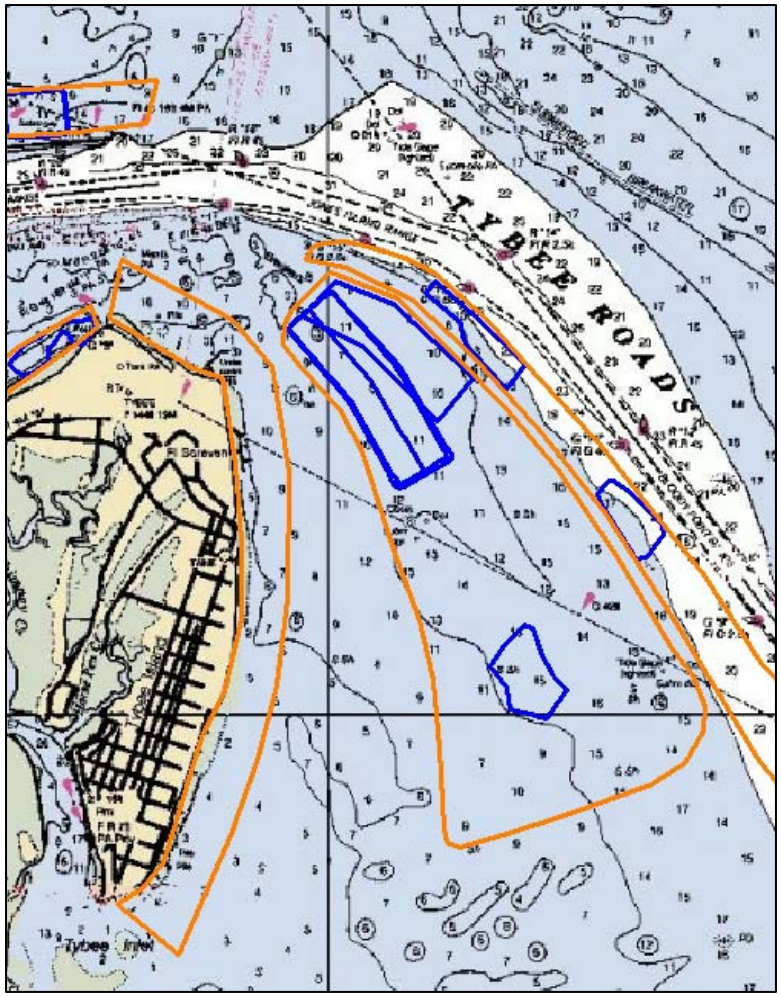


Local Reference → Geographic Reference





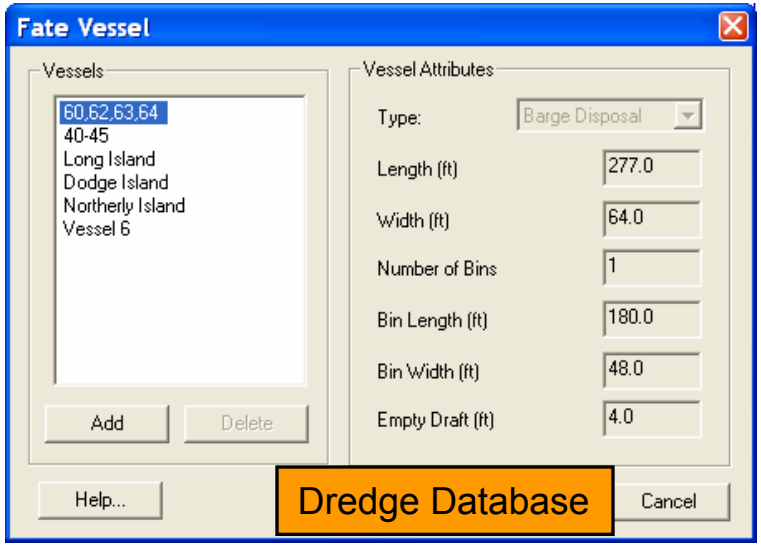
Dredging Toolbox in SMS

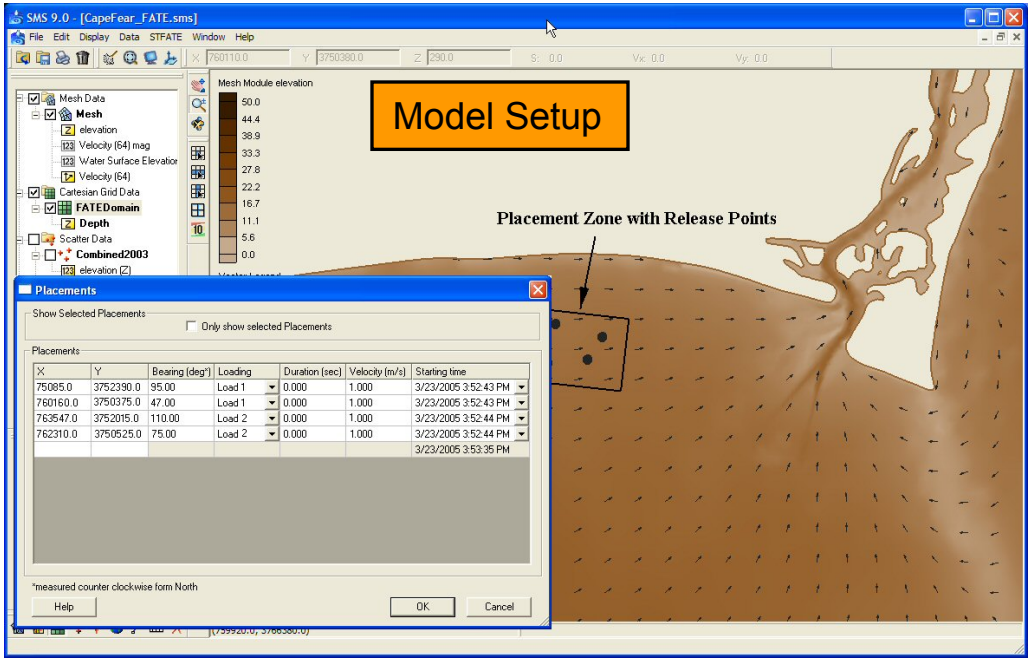


Approach: Provide Dredging Project Staff with:

- Comprehensive management system for models and data
- Interconnectivity with other Corps models (hydro, waves, etc)
- Efficient connectivity to external data sources
- Dredge-specific databases
- Interconnectivity between dredging models
- Efficient model setup
- Visualization and analysis tools

Dredging Toolbox in SMS

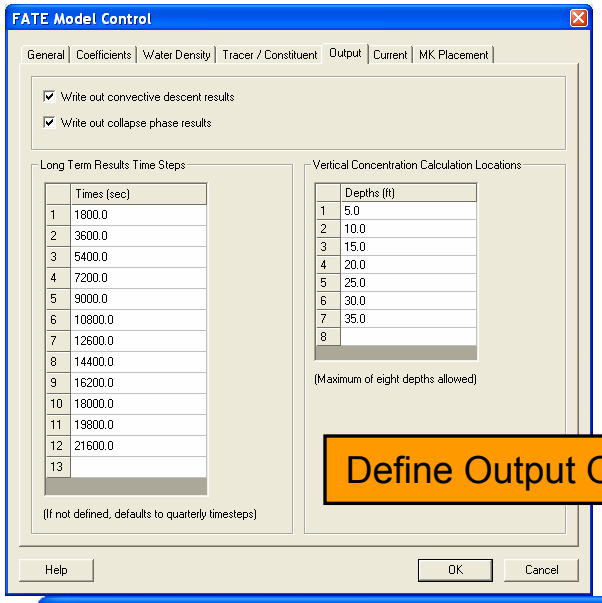




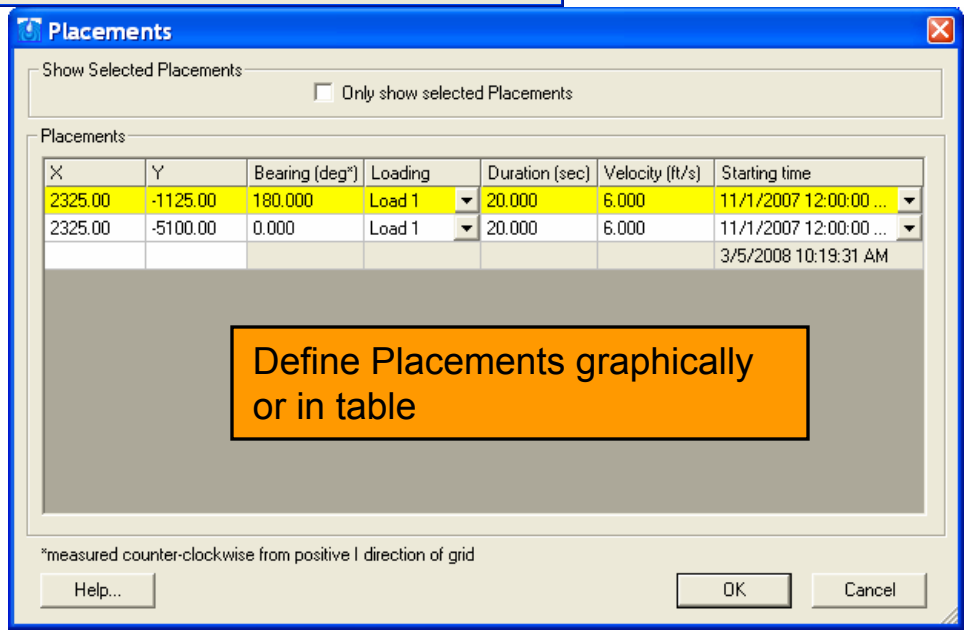
- Tools currently in SMS
  - STFATE
  - Dredge Database
  - PTM
  - Dredging Source Models
  - Analysis tools
- Tools presently being incorporated (FY08)
  - MPFATE
  - LTFATE
- Beyond 2008
  - Additional databases
  - Additional analysis tools
  - PTM-WQ

STFATE in SMS

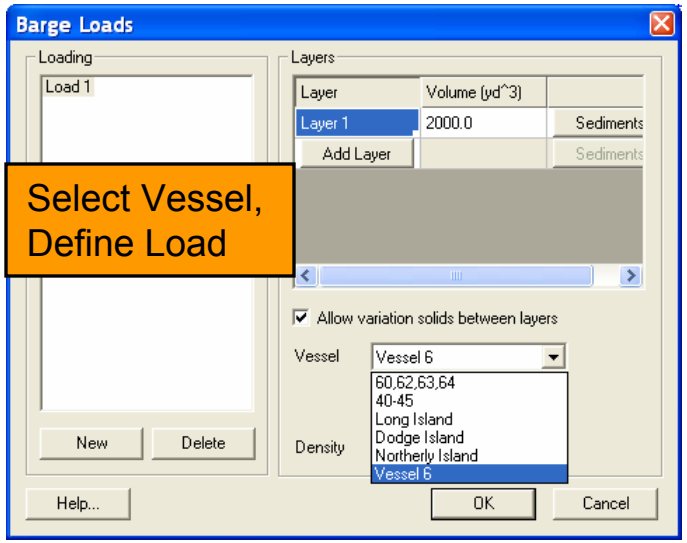
- GUI for Model Setup
  - Lead user through model input windows
  - Provide/indicate data sources for model input
  - Execute model
  - Display model output
  - Provide data reports



Define Output Options

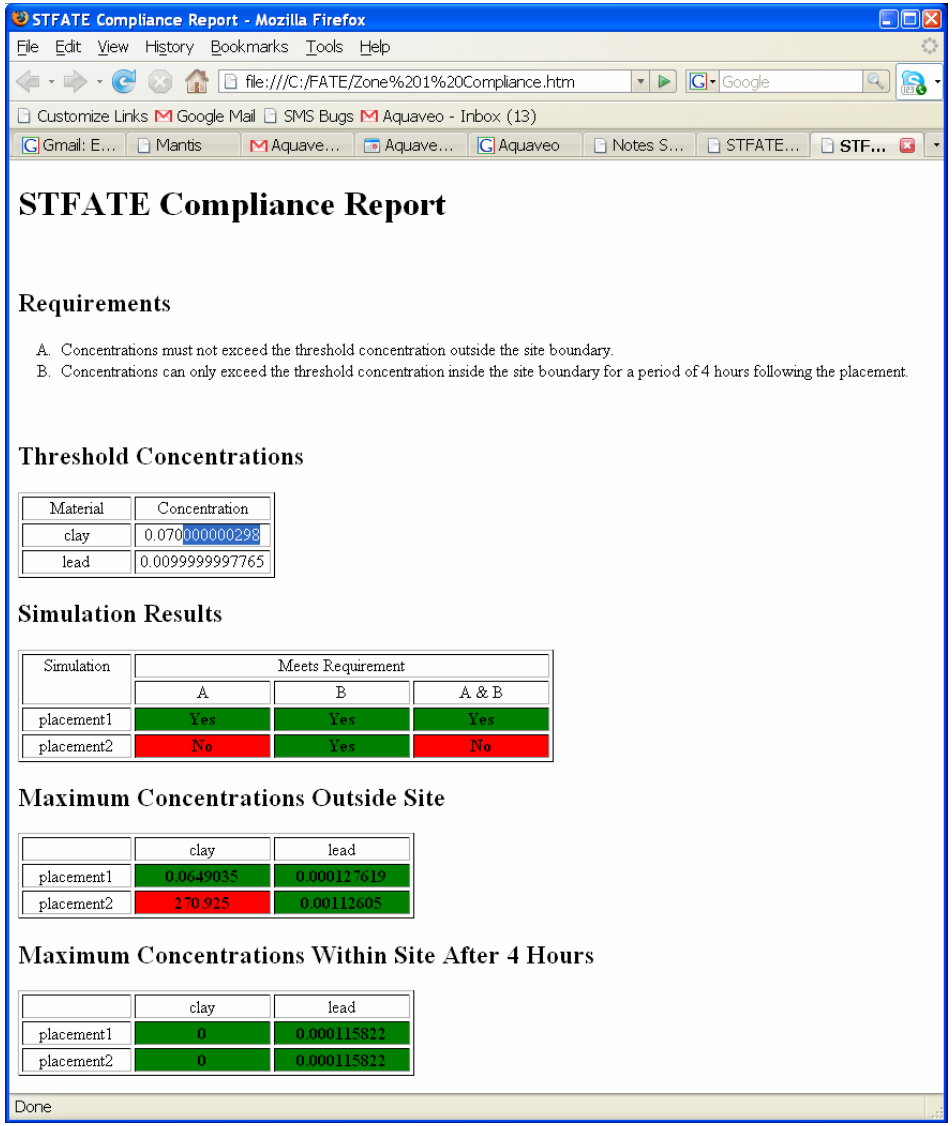


Define Placements graphically or in table



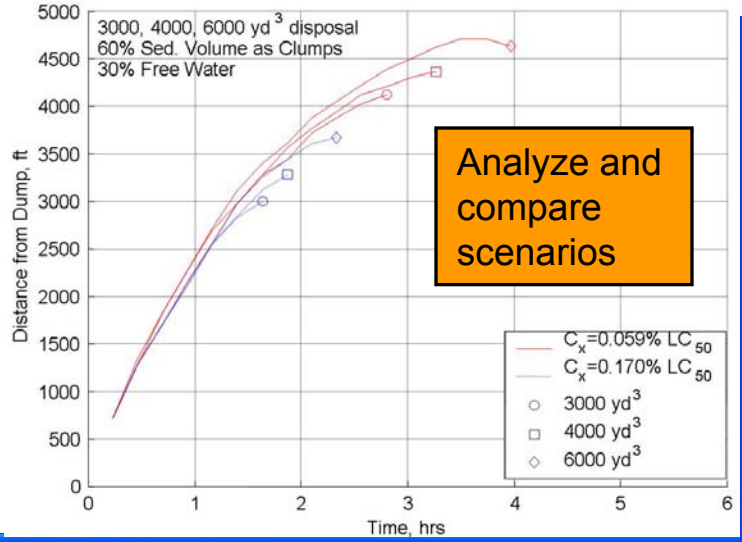
Select Vessel, Define Load

STFATE in SMS

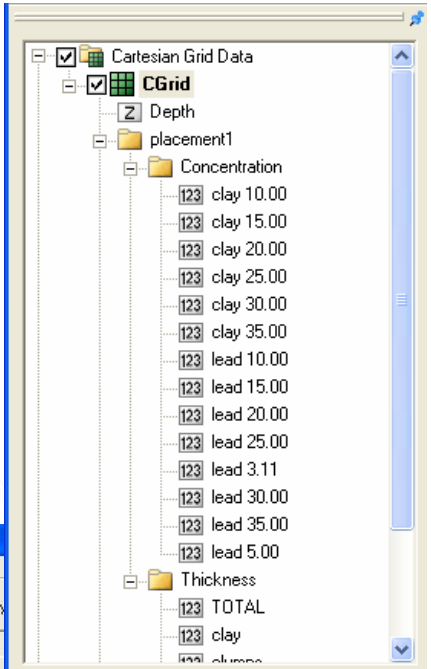


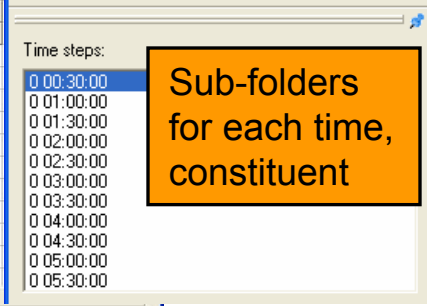
- Data Reports and stored data
  - Html data report
  - Color coded for compliance
  - Automatically replaced, if desired when new simulation performed
  - Save model input for easy modification of scenario
  - All output saved for further analysis
  - Output formatted for input to far-field transport models

STFATE in SMS

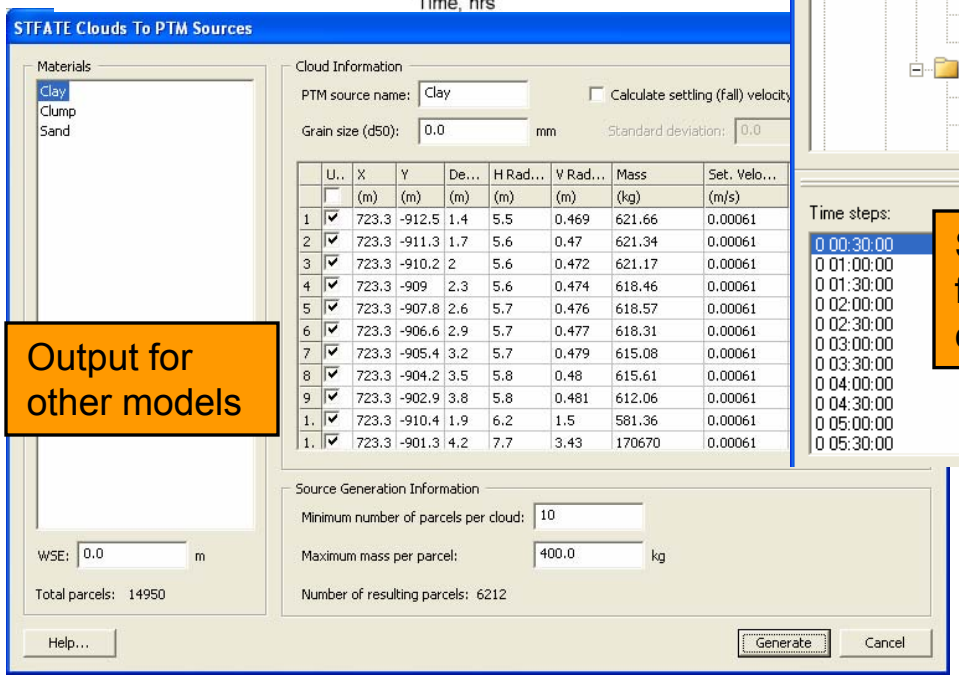


Analyze and compare scenarios





Sub-folders for each time, constituent



Output for other models

- Data analysis tools
- Scenario comparison tools
- Create input files for far-field models
- Save at each timestep
- Sub-folders for each cloud at each timestep
- Sub-folders for deposition

PTM in SMS

- Lagrangian Particle Tracking model for predicting fate of sediment and constituent from multiple sources
- Sources often derived from other dredging models (STFATE, MPFATE, LTFATE, Dredging Source)
- Computationally efficient for multiple scenarios
- Widely applied for dredging operations
- Subject of next presentation

Benefits to User

- Connectivity to most digital data, including maps and photographs
- Connectivity to other models
- Decreased time needed for CSM and model scenario development
- Increased time efficiency and product quality for model applications
- Increased performance of model-derived lines of evidence through improved input, calibration and validation
- Powerful array of data analysis and interpolation tools
- Improved communication of results (data analysis conclusions) through improved visualization and analysis tools