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Operational Requirements and the Current State of the Science - GMU PANEL 1

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EPA United States Environmental Protection Agency

COMPUTER-AIDED MANAGEMENT OF EMERGENCY OPERATIONS cameo

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

Agency Requirements for ATD Modeling

- Under the National Contingency Plan, NOAA (OR&R) provides scientific support to the Federal On-Scene Coordinator for spills of oil or other hazardous materials.
- Under ESF-10 of the Federal Response Plan NOAA is responsible for predicting pollutant movement, dispersion and characteristics (atmospheric or marine) over time
- Supporting joint EPA CAMEO program that provides tools for end users to meet regulatory needs of EPCRA and CAA-RMP

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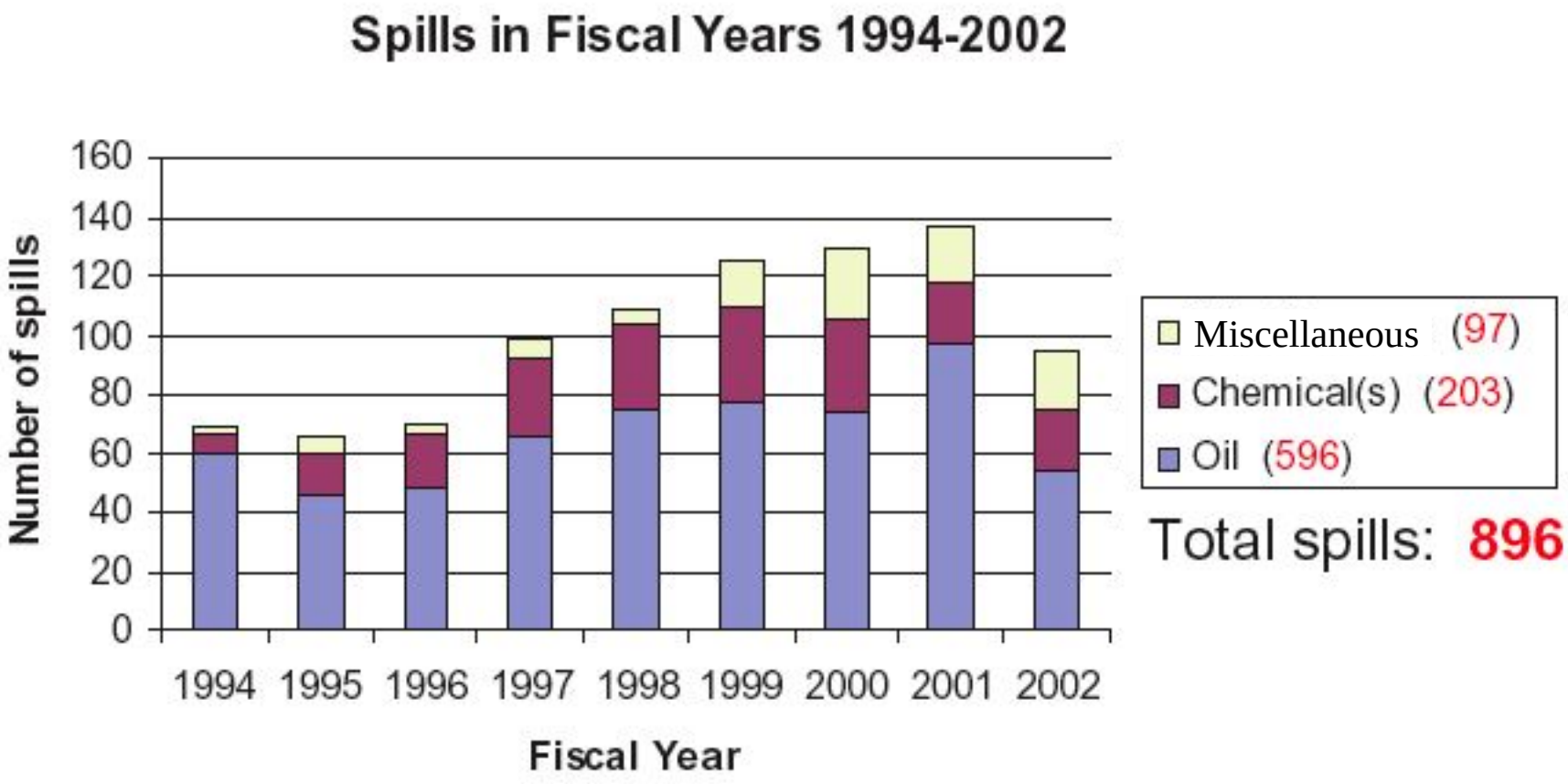
SSC/U.S. Coast Guard Districts


SANTA CLARA I


LNG


Spills in Fiscal Years 1994-2002
Number of spills
160
140
120
100
80
60
40
20
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
Fiscal Year
Miscellaneous (97)
Chemical(s) (203)
Oil (596)
Total spills: 896

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History of ALOHA

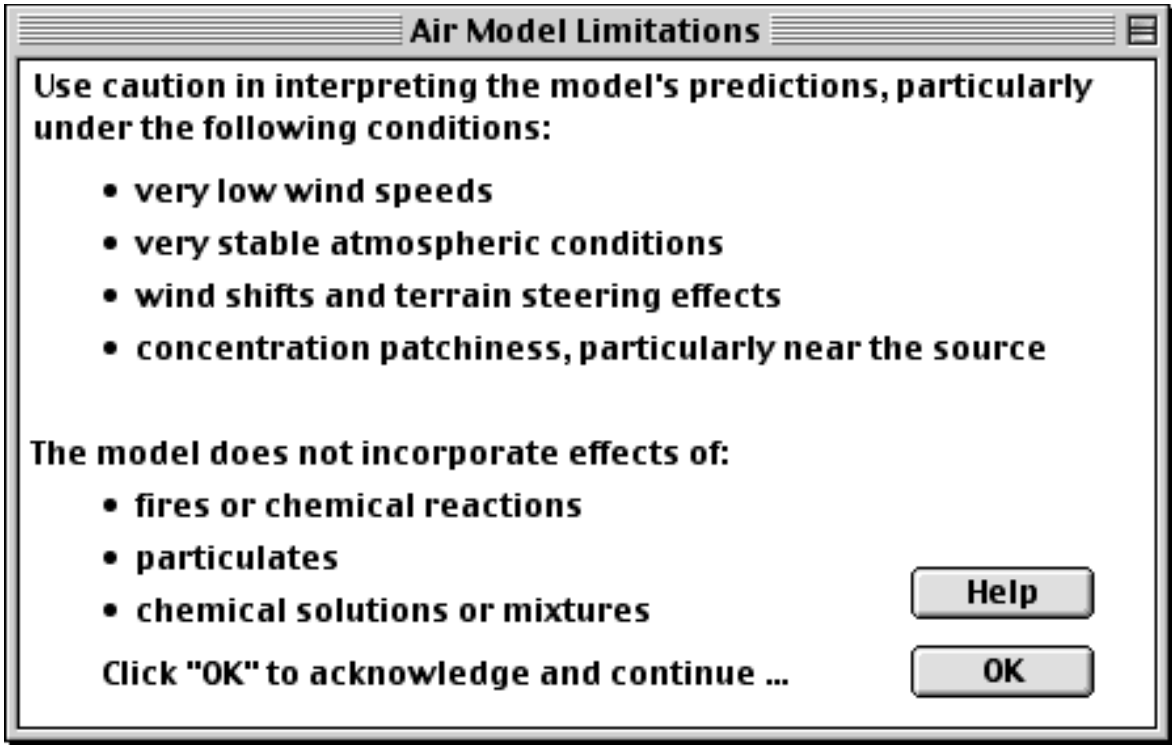
- 1984 4.x and earlier versions
- 1986 4.x for outside distribution
- 1990 5.0 - Heavy Gas and S(t)
- 1992 5.1 - Windows version released
- 1995 5.2 - improvements in dispersion & source
- 1999 5.2.2 - Chemlib changes, pipe changes
- 2002 5.2.3 - plotting changes, upgraded chemicals
- 2003 5.3.?- aqueous solutions, smart LOCs, computation

Present Design Criteria

- Quick to set up and run in the field
  - Cues for infrequent users
  - Ask ?s that can reasonably be answered
  - Minimize inputs/reasonable defaults
  - Variable I/O units
- Easily Interpreted Output
  - Graphical/text
  - Variety of output options

Design Challenges

- Data sparse environment
- Limited knowledge of uncertainty(ies)
- Guiding users to credible science



Stop !

HEXYLTRICHLOROSILANE reacts with any water it contacts to produce hydrochloric acid and heat. ALOHA does not model chemically reactive substances and cannot accurately predict the air hazard from the release of this substance if it comes in contact with water.

Do you wish to continue and model this chemical as if it were a non-reactive chemical?

Cancel **Yes** **Help**

Note !

This chemical may flash boil and/or result in two phas flow.

OK **Help**

NOTES and WARNINGS

Warning !

Override the stability class table ONLY if you are sure that special circumstances exist. Otherwise, click Cancel.

OK **Cancel** **Help**

Footprint Window

```
Dispersion Module: Gaussian
User-specified LOC: 100 ppm
Max Threat Zone for LOC:  14 yards
Note: Footprint was not drawn because
   effects of near-field patchiness make dispersion
   predictions unreliable for short distances.
```

Guidance

HELP!!

INSTRUCTIONS

You may know that tank temperature is near the boiling point, but not be sure whether it is above or below the boiling point. If this is the case, try running your scenario twice - first with tank temperature set to just below boiling, and again with temperature set above boiling. Compare the two sets of results produced by ALOHA to find the range of release rates possible for your scenario. Running a liquid release scenario at a temperature ABOVE BOILING will give you the HIGHEST release rate and LARGEST footprint.

Ensuring expected Results

- Sensitivity analysis
- Algorithm checking
- Usability testing
- Model to model comparisons
- Comparisons to field data

Usability Testing

- *No model can reasonably be evaluated independent of the context in which it is to be used*

ALOHA Strengths

- Link to CAMEO (80K synonyms, 6K chems, 15K identification numbers, 10K organizations)
- Link to simple mapping capability (MARPLOT)
- Training tool/intuition builder
- Usability, accessibility, fitness to purpose
- Transportability
- Responsive technical support

ALOHA weaknesses

- Length/Time scale (10 km/60 minute)
- Pure chemicals only (no rad, no bio)
- Liquids in pipes as a source/dual end ruptures
- No flammables (jet/pool fires)
- No explosives (UCVE, BLEVE)
- No multiple met data input capability
- Elevated dense-gas releases
- Time dependent meteorology
- Releases on or over water
- No Complex topography

Shortcomings in supporting Agency Requirements

- Better dispersion model education/coordination
- Connections between the front/middle/end of the problem
- Understanding/Conveying Uncertainties
- Understanding of Model Sensitivities
- Flammables/Explosives

Continued Development

Goal: Keep Focus on First Responder

- Multiple LOCs at a time
- Aqueous Solutions
- F & E as either calculators or part of ALOHA?
- Water reactive calculations for byproduct source strengths (calculator?)
- Enhance network/web capabilities

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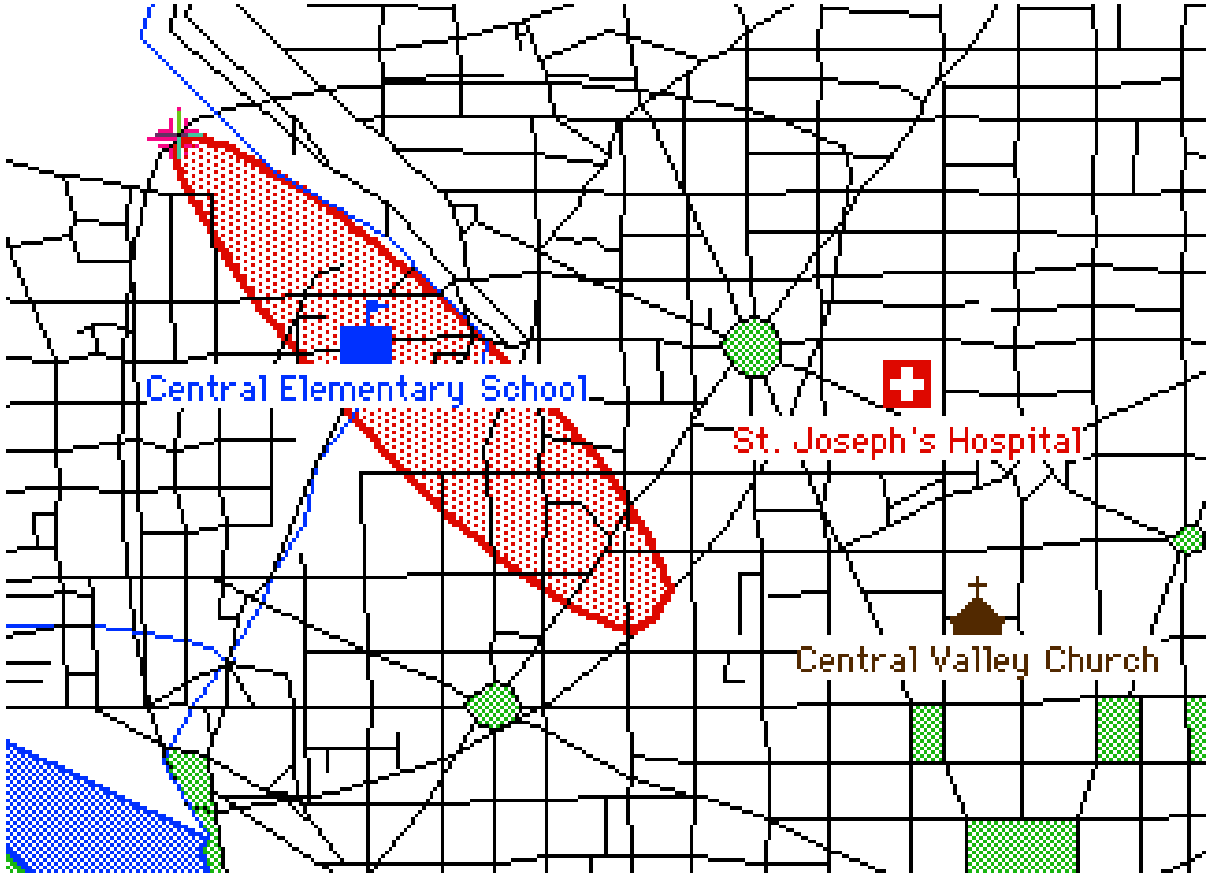
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