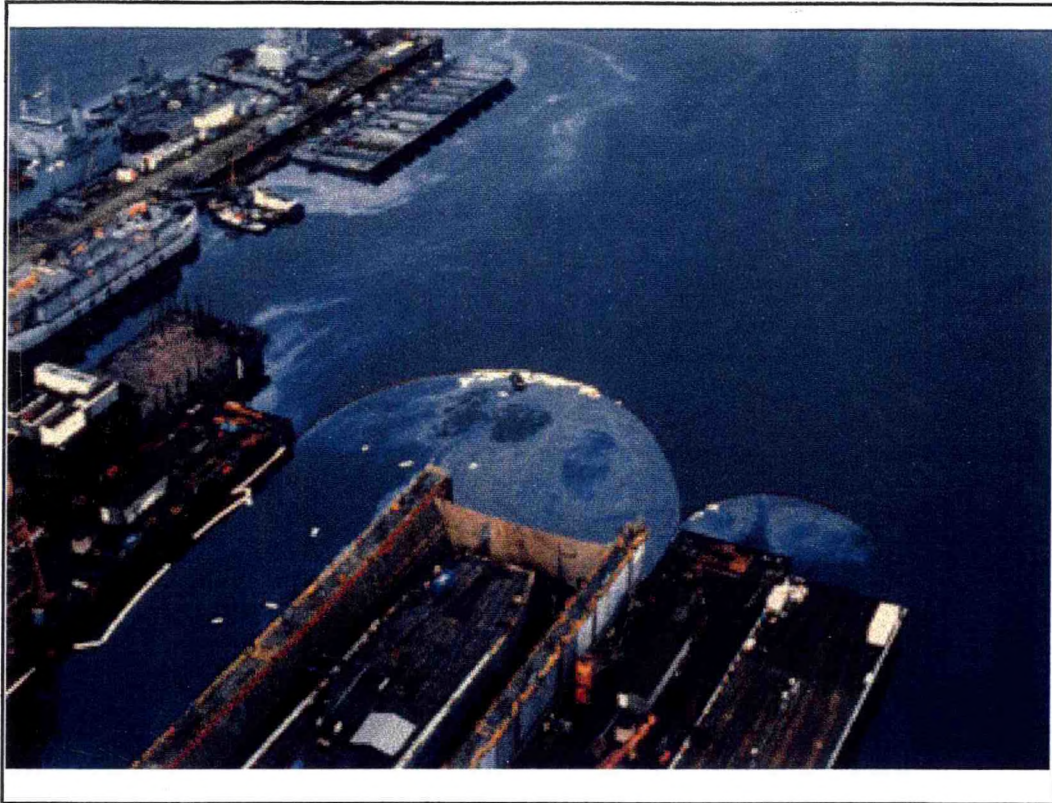


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HAZMAT MODELING PRODUCTS

for

Spill Response and Planning



NOAA • NOS • OR&R

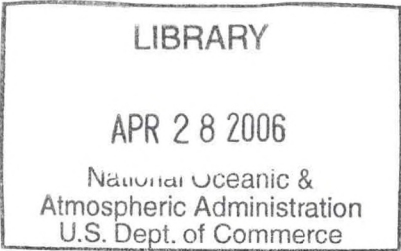
National Oceanic and Atmospheric Administration • National Ocean Service • Office of Response and Restoration

HAZMAT • Hazardous Materials Response Division

7600 Sand Point Way NE • Seattle, Washington 98115

Phone: 206-526-6317 • fax: 206-526-6329 • galt@hazmat.noaa.gov

March 2001



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1 Introduction

The Hazardous Materials Response Team (HAZMAT) of the National Oceanic and Atmospheric Administration (NOAA) has a mission to develop and use programs that provide scientific information to help the professional responders as well as the general public understand, plan for, and respond to oil and chemical spills. The organization is based in Seattle and consists of numerous teams that work on spill response and research. The purpose of this report is to show the products from one of these teams, the Modeling and Simulations Studies (MASS) Team. For more information see our website at <http://response.restoration.noaa.gov>

2 Initial Oil Spill Response Products (the first hour)

This information is usually conveyed initially verbally via a phone call, then followed up in the second hour with faxed and emailed products to all concerned parties.

Weather forecast

The HAZMAT modeling team is responsible for obtaining and sending out the forecast. This ensures that the forecast used for trajectories and field operations are consistent. Typically, twice-daily forecast is obtained from the National Weather Service office responsible for the spill area. The forecast is geared for trajectory information, field operations, and long term planning for the spill. The forecast will typically include information such as sunrise/sunset times, wind, waves, visibility, temperature extremes, river rise and fall information, and a long-range, extended forecast. See Figure 1 for an example.

Tide forecast

Forecast of tide heights and currents are generated from our in-house tide model, Shio, which is based on the NOS tide tables. Tide current information are important for transport analysis as well as for operational planning. Tide heights will often dictate whether beached oil will refloat or remain high and dry. See Figures 2 and 3 for tide prediction examples.

Oil fate information

Model predictions of the fate of the oil will come from our ADIOS 2 model. This is augmented by our estimates of the beach and water impacts one can expect from the type and amount of oil that has been spilled. This is based on published reports and decades of experience dealing with oil spills of varying sizes and types. See Figure 4 for example of ADIOS table output.

An initial trajectory report

After the above information is gathered, we will estimate the time scale and length scale of the problem. This will give us an idea of how long the oil will be a problem, how far we can expect it to move, and which areas are threatened downcurrent and downwind. This initial trajectory information is passed on verbally with a phone call and followed up with a written report. See Figure 5 for an example.

CHAMPION TRADER INCIDENT
1100 CST, Friday October 30 1998

Sunrise (10/30): 0600
Sunset (10/30): 1705

Sunrise (10/31): 0601
Sunset (10/31): 1704

36 HOUR FORECAST:

Winds:

Tonight, the winds are expected to be from the east at 5-10 knots. Saturday through Saturday night, east winds at 10 knots are predicted.

Waves:

Tonight, the seas are forecast to be 1 foot. Saturday through Saturday night, 2 foot seas are expected.

Precipitation:

Tonight through Saturday night, no precipitation is expected.

Ceiling/Visibility:

Tonight, patchy fog is predicted. Saturday, morning fog is forecast. Visibility is expected to be less than one mile lifting to be 5-7 miles by the afternoon hours.

Temperature:

The temperatures are predicted to range from highs in the 80's to lows in the 60's.

Extended Forecast:

Sunday, the winds are expected to be from the SE at 10-15 knots shifting to be from the south at 10-15 knots by the late afternoon hours. Seas 2-3 feet. Scattered showers and isolated thunderstorms are predicted. Monday, south winds at 10 knots are predicted to shift and be from the north at 10 knots by the late evening hours. Seas 2 feet. Showers and isolated thunderstorms are forecast.

Tropical Outlook:

Hurricane Mitch is not forecast to effect the spill region during the next five days. No major weather disturbance is predicted to effect the spill area during the next five days.

Weather Contact: Ph# (206) 526-6317

Figure 1. Example of a weather forecast.

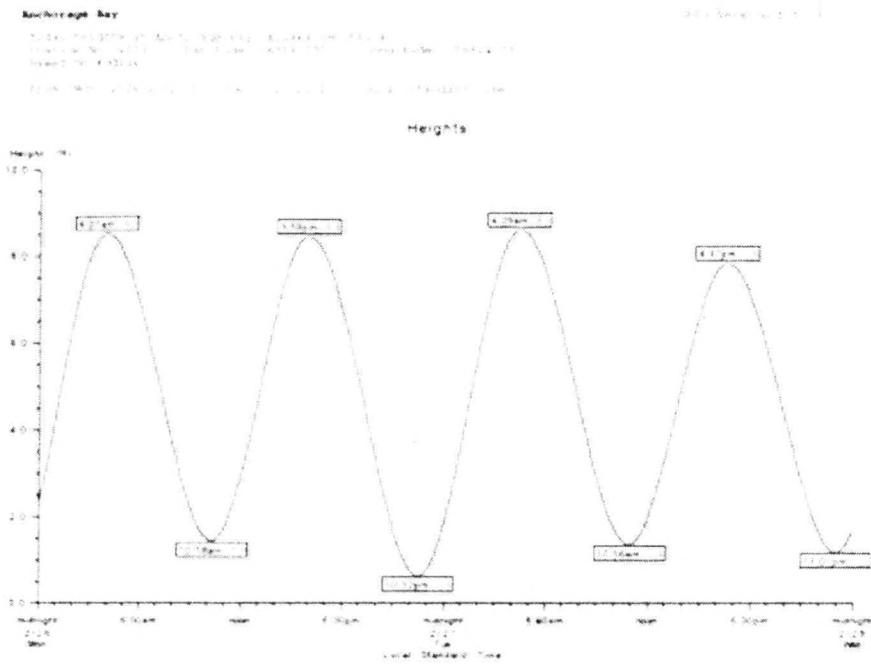


Figure 2. Tidal height prediction for Anchorage Alaska.

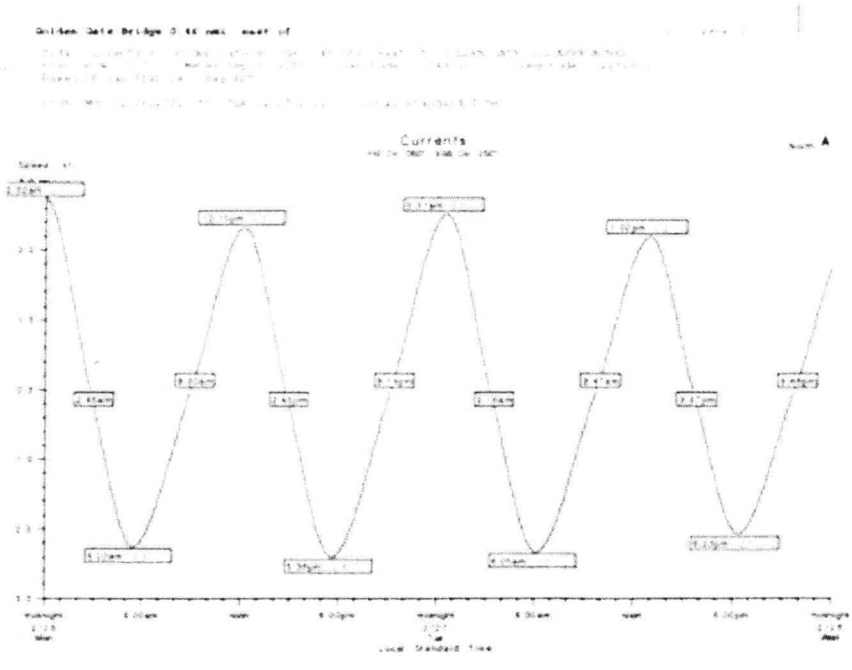


Figure 3. Tidal current prediction for Golden Gate, San Francisco, California.

Oil Name = DIESEL/HEATING OIL NO.2, CHEVRON

API = 33.5

Pour Point = 5 deg F

Wind Speed = constant at 15 mph
from winds

Wave Height = computed

Water Temperature = 65 deg F

Time of Initial Release = February 26, 0900 hours

Total Amount of Oil Released = 5,000 bbl

| Hours Into Spill | Released bbl | | Evaporated percent | | Dispersed percent | | Remaining percent |
|---------------------|-----------------|---|-----------------------|---|----------------------|---|----------------------|
| 1 | 5,000 | - | 0 | - | 0 | - | 100 |
| 2 | 5,000 | | 0 | | 1 | | 99 |
| 4 | 5,000 | - | 1 | - | 3 | - | 97 |
| 6 | 5,000 | | 2 | | 7 | | 91 |
| 8 | 5,000 | - | 4 | - | 15 | - | 81 |
| 10 | 5,000 | | 5 | | 25 | | 69 |
| 12 | 5,000 | - | 7 | - | 36 | - | 57 |
| 18 | 5,000 | | 11 | | 63 | | 25 |

Figure 4. Example of ADIOS 2 oil fate table.

Date: June 21, 1998, 2115 PDT
To: NOAA SSC Brad Benggio

FROM: NOAA/Hazardous Materials Response Division
Modeling and Simulation Studies
Seattle, WA 98115

SUBJECT: M/T *Kapitan Egora* 6502

FOR ADDITIONAL INFORMATION, PLEASE CONTACT Jerry Galt,
MODELING AND SIMULATION STUDIES, NOAA, SEATTLE, WA 98115.
PHONE (206) 526-6317.

Per your request, we have looked at trajectory implications of a potential release of Fuel Oil #6. These notes are based on the following information:

On June 21, 1998 we received notification that the vessel M/T *Kapitan Egora* was aground off of Bahia De Guayanilla at 17-57.7N 66-45.96W in the vicinity of buoy #1. On board was 298,000 gal. of #6. At this time, the vessel is not leaking product. If any of this initial information is incorrect or if more information becomes available, please let us know ASAP as it would affect any trajectory implications.

1) WEATHER

Present winds in the vicinity of the grounding are reported to be from the east at 25 to 30 knots. Seas may be to 8 feet with the dominant swell moving from east to west. There are also reports of scattered showers and thundershowers. Forecasts are for weather to return to the dominate trade wind pattern with 10-20 knot winds from the E-ESE.

2) TRAJECTORY ANALYSIS

If a significant amount of product is lost the reef front to the northwest of the grounding site will be threatened as well as the Punta Verraco area. On the flood tide oil could be carried into the western arm of Bahia De Guayanilla and threaten the mangrove area in the back reaches of the bay. Beyond the immediate vicinity of the grounding the dominant strong easterly winds and forecasted persistent trades will tend to move any spilled oil west along the coast where it could cause scattered or patchy shoreline impacts along the entire southwest coast of Puerto Rico.

Heavy refined products, such as Fuel Oil #6, tend to weather very slowly. This type of oil may not spread into a very thin film and often simply breaks up into smaller patches and eventually tar balls. Because this type of oil may not form a sheen, the resulting tar ball field may be difficult to observe using visual and remote sensing techniques. This, combined with the persistence of the tar balls, makes these types of spills quite likely to result in long-range and, occasionally, unexpected beach impacts.

3) OIL WEATHERING

Given the forecast winds, we would expect that less than ten percent of the oil will evaporate or disperse into the water column during the first twenty-four hours. There may be some scavenging of the slick from suspended sediment, particularly in the nearshore or surf areas. We do not expect emulsification to occur.

Figure 5. Verbal trajectory analysis.

3 Computer Modeling Products for Spills (hours 2 –4)

If the initial trajectory report described above indicates that the oil will be a threat to resources over a time span of 24 hours or more, then a computer trajectory model is set up and run. For most coastal U.S. areas, this will take about 2 to 3 hours from start to finish. For areas that we have not worked before it may take 4 to 6 hours before a model run is complete.

Model output consists of a set of maps with a series of contours showing heavy, medium, and light distributions of oil bounded by an uncertainty line. At the bottom of the page is a scale bar with pictures indicating what heavy and light contours represent. The maps are generated daily and typically forecast 24 – 48 hours into the future. A set of maps will consist of 2 to 4 maps showing the distribution of oil for the next morning and late the next afternoon. These times are usually selected to coincide with overflight times.

The contours represent our best guess as to where the oil would be at the indicated times. The uncertainty lines represent the uncertainty in the inputs to the model run. These include uncertainty in the weather predictions, water current estimates, and details of the spill scenario.

The maps are usually faxed to the command post, and sent out via email as bitmap or JPEG images. They can also be saved as a set of files in a MOSS file format for import into a geographic information system. A separate manual (*Digital Distribution Standard of NOAA Trajectory Analysis Information*) documents the MOSS format. Translators are available for the asking.

See Figure 6 for an example of what is sent out.



Mystery Spill off S.F. MASS Trajectory Analysis

Estimate for: 1700, 9/29/98

Prepared: 1251, 9/29/98

NOAA/HAZMAT/MASS (206) 526-6317



These estimates are based on the latest available information. Please refer to the trajectory analysis briefing and your Scientific Support Coordinator (SSC) for more complete information. This output shows estimated distributions of heavy, light, and medium concentrations as well as an outer confidence line. The confidence line is based on potential errors in the pollutant transport processes.

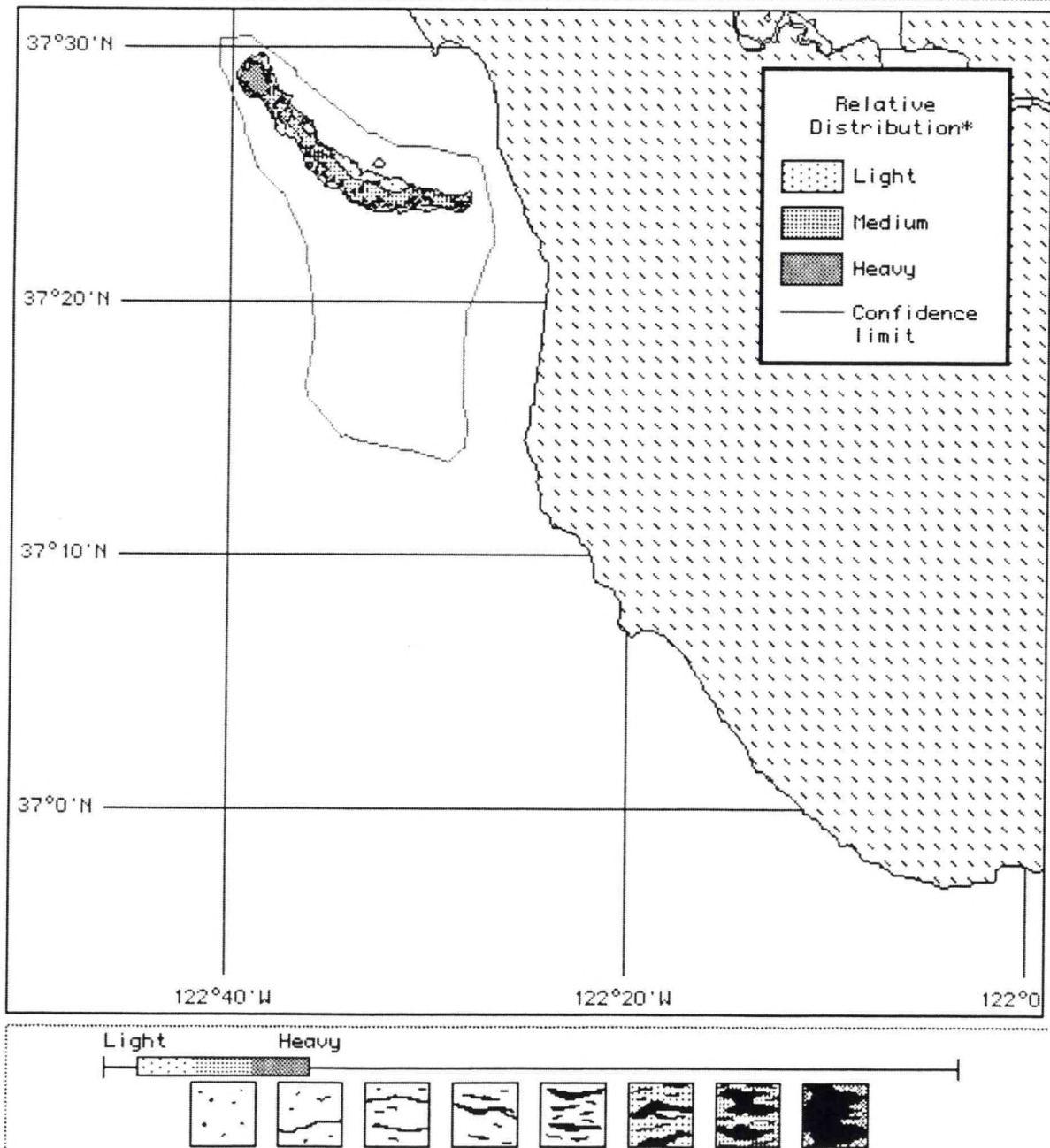


Figure 6. Trajectory analysis.

4 *On-scene Oil Spill Tracking (day 2 to end of spill)*

If a spill warrants it, an Away Team goes on-scene to provide vital observational data for modeling calibration and response operations and to help interpret MASS trajectory analysis for response personnel. Typical duties for Away Team personnel include flying reconnaissance over the spill area and mapping the pollutant's distribution, locating important oceanographic features that may affect the trajectory, deploying instruments to measure winds and currents, deploying satellite-tracked drifters, and assisting with the interpretation of remote sensing data. Away Team members also serve as on-site experts for spill trajectory and behavior that can be queried by the spill incident commanders.

The overflight maps are distributed on-scene at the command post and to other interested parties via fax or email from HAZMAT central in Seattle.

The interaction between the on-scene Away Team and the Home Team back in Seattle doing the model predictions are key to the success of the trajectory predictions. With daily reports from the Away Team guiding the calibration of the model parameters, the accuracy of the model will typically increase from about 50% to 70% initially to about 80% to 90% after a few days.

See Figure 7 for an example of a NOAA/HAZMAT-generated overflight map.

Barge BUFFALO 292 Incident

Overflight Map (Composite)
prepared by NOAA

Date/Time: 28 MAR 96
Platform: Helicopters (2 flights)
Observers: Payton (NOAA) 1102-1330, 1410-1600
Floen (MRS) 1430-1530

USE ONLY AS A GENERAL REFERENCE

Graphic does not indicate exact locations or amounts of oil.

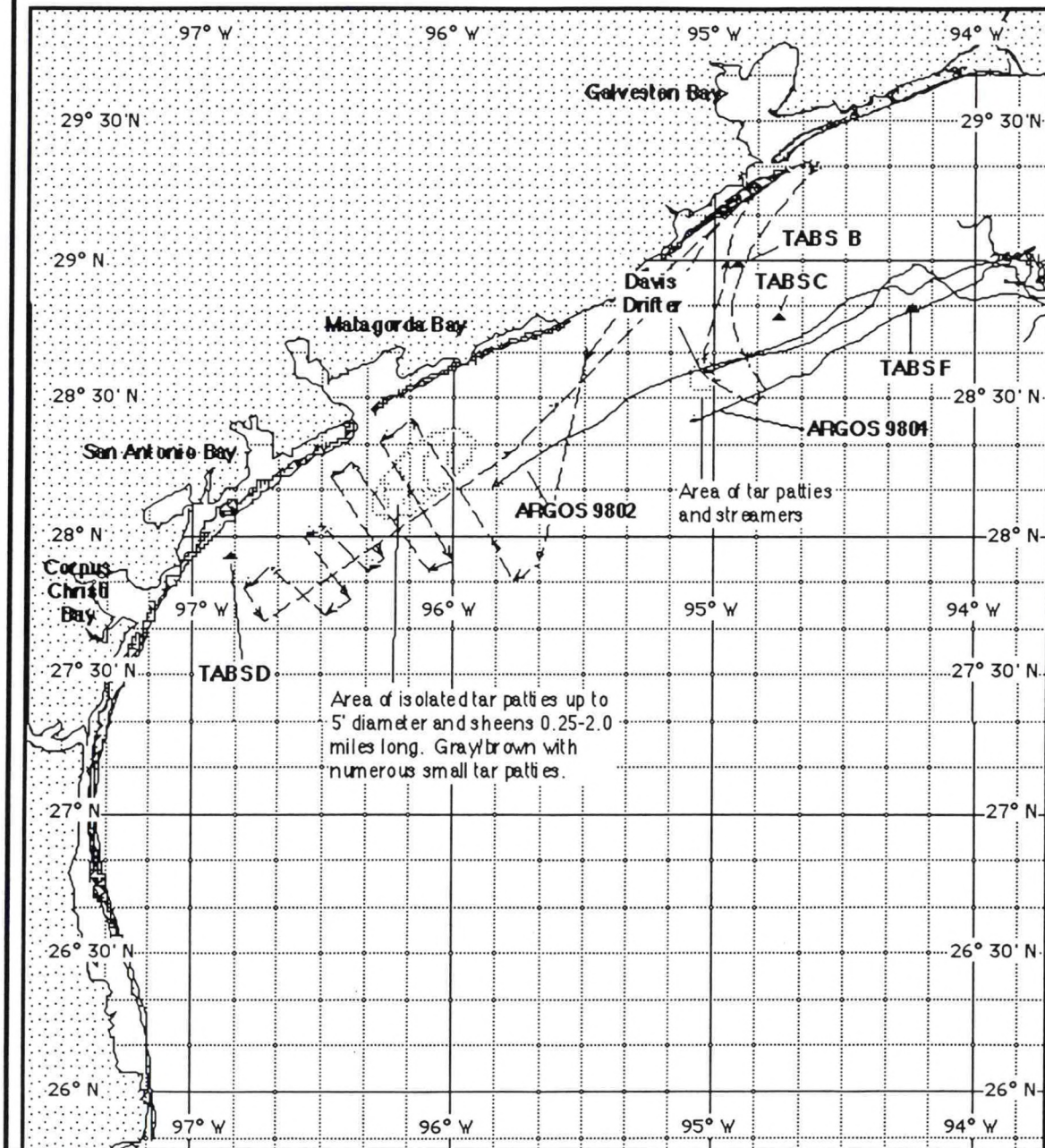


Figure 7. Overflight map.

5 SAR and Other Trajectory Modeling Products

The HAZMAT modeling team has been involved with modeling more than oil spills over the years. Search and rescue (SAR) cases have involved searches for missing people, missing boats, and flotsam from several highly publicized plane crashes. We have also been involved with locating the source of mystery tarballs, garbage and, on rare occasions, bodies that have come ashore.

Our modeling tools can be run in both forward and backward modes. The forward runs will predict where things will end up, and the backward mode will predict where things came from. The typical output will be a map that with a 90 or 95% probability contour that indicates where things can go to or come from.

See Figures 8 and 9 for examples of SAR and mystery slick source runs.



TWA flight 800

Estimate for: 1200, 7/22/96
Prepared: 1455, 7/21/96

HAZMAT Trajectory Analysis

NOAA/HAZMAT/MASS (206) 526-6317



These estimates are based on statistical analysis of transport processes. Probabilities reflect likelihood of floatsam being within a 1 km square of any specific location. Please refer to your Scientific Support Coordinator (SSC) for more complete information.

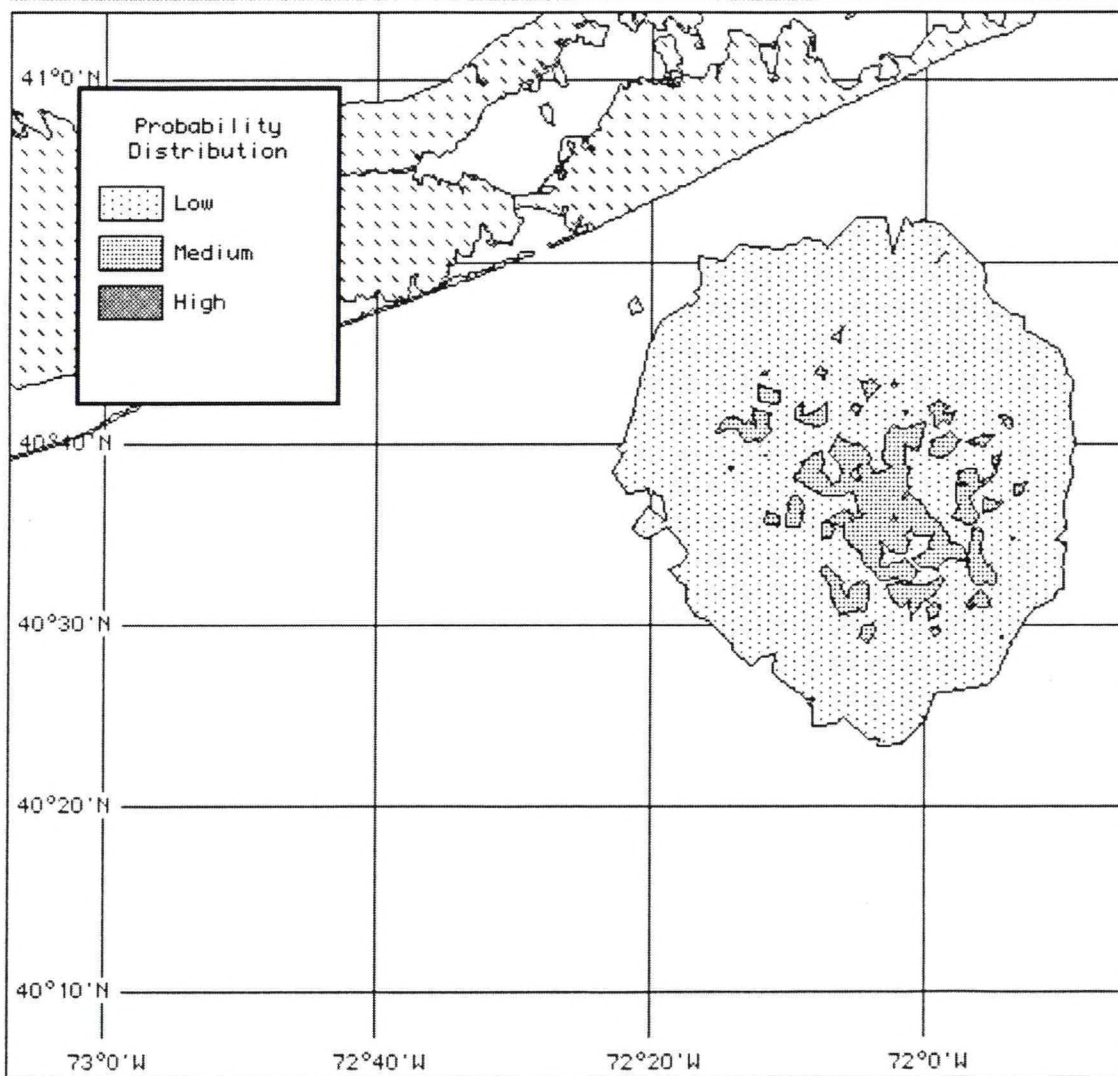


Figure 8. Example of TWA 800 SAR map.



Mystery slick

Estimate for:

Prepared: 1212, 1/23/98

MASS Trajectory Analysis

NOAA/HAZMAT/MASS (206) 526-6317



Analysis based on winds from buoy 46026 and average winter currents.
It is assumed the oil was at the receptor site on Nov. 21, 1997, 06:00 PST.

Note: This analysis should replace analysis done on 12/11/97.

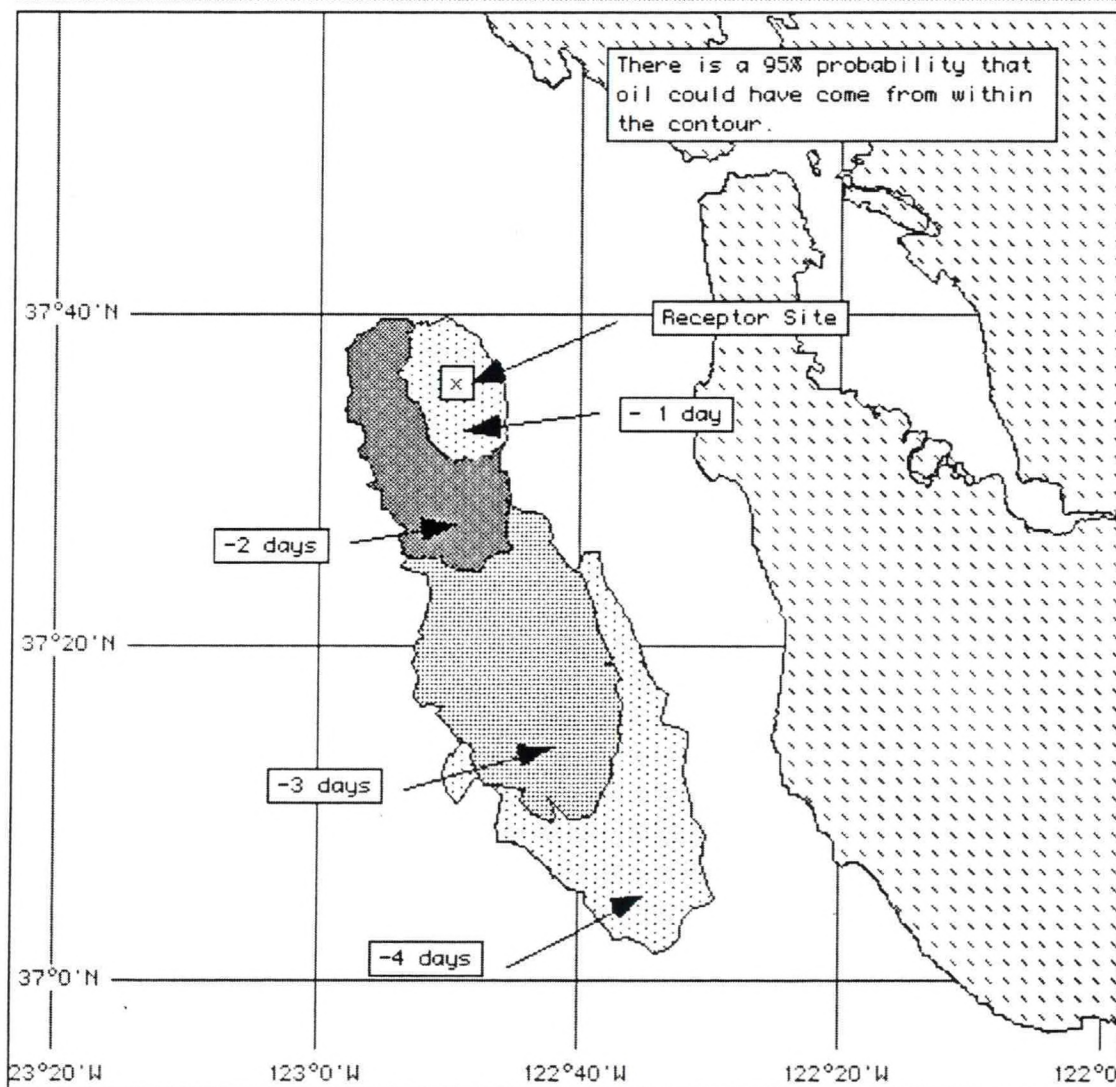


Figure 9. Example of receptor mode run for mystery slick.

6 Oil Spill Drill Products

The modeling team has been providing free oil spill drill products for about 20 to 30 drills each year for government agencies and private companies. The materials generated for a drill are identical to what would be generated for a real spill. This helps the local spill community become familiar with the HAZMAT products that they would see during an actual spill. We also prepare a few additional products to help plan a drill scenario and direct the activities on drill day.

Products used to plan a drill

We often set up the model for a given area and help run several scenarios with different wind conditions and start times to help drill planners pick a scenario that will meet their goals. We recommend that you work with your local HAZMAT Scientific Support Coordinator when seeking help with developing a scenario. They are experienced in running our General NOAA Oil Modeling Environment (GNOME) spill model in drill mode to help select a scenario.

Products used to control a drill

Once the spill scenario and environmental conditions are selected for a drill, we will produce a QuickTime movie showing the movement of the oil. The movie frames will allow drill control personnel to run the drill in detail. This is a drill control product only. During actual spills we do not send out movies.

Products for drill players to use

All of the actual spill products mentioned above are available for drill players to use. These include the initial spill response products, trajectory model output products, and onscene overflight maps. The goal in making these products available is to familiarize local responders to the HAZMAT modeling products they would see during an actual oil spill event.

How to request drill products

We recommend that you work with the Scientific Support Coordinator responsible for your area. You will be asked to fill in a HAZMAT drill request form that will make our lives easier. The completed drill form should get back to us at least two weeks in advance of when you need our products. Occasionally, we are asked to participate in a

real-time drill, often unannounced. When this happens we will not generate a full set of products. With the 20 to 30 drills and over 100 spill calls a year, we are often unable to drop what we are doing to respond to an unannounced drill.

See Appendix I for a copy of the drill request form.

7 Oil-Spill Planning

To model a spill that could occur in the future requires a different type of analysis, because neither the environmental parameters and the scenario for a spill in the future are known. The inputs have to be dealt with statistically, and the outputs have to be presented as probabilities. We have been doing statistical planning using discrete particles that represent one spill scenario apiece for the last 20 years. Over the last five years we have embarked on a new approach to computing and displaying statistical probabilities of where oil could go. This new tool and method is call the Trajectory Analysis Planner (TAP). The first two methods described below are what is available now. TAP is a work in progress but a few locations have been analyzed and are available for the asking.

Planning for a fixed source

When developing a risk analysis from a specific source site, such as refinery, or pipeline lightering site, the model is run in a forward mode using either statistical wind tables, or long term (10 – 20 years) hourly wind records. The model is run with several thousand particles and each particle is released under a different wind and tide condition. The output will consist of contours that will indicate where 90% – 95% of the oil would be found at specific times after the spill. You will not be able to predict where any particular spill would go but you have an ideal of how far 90 %– 95% of the spill would go. See Figure 10 for an example.

Planning for a specific receptor site

When planning for a specific stretch of beach such as Waikiki to Diamond Head, the model is run backwards from the beach. Once again, the model is run with statistical wind tables or long term hourly wind records. Several thousand particles are release with their own unique wind and current history and the results are contours at specific times. The results tell you where oil could be spilled and impact your stretch of beach. You also get an idea of how long it would take the oil to impact the receptor beach. This type of information is typically used to plan for locating shipping lanes and lightering areas. See Figure 11 for an example.

TAP ... Trajectory Analysis for Planning

The TAP project is designed to analyze the following issues for an entire port:

- potential threats from oil spills during different seasons of the year;
- the probability of spilled oil reaching a receptor site
- how long it would take oil to reach a receptor site
- how much oil could impact a receptor site
- the cost of having an oil spill in terms of dollars or other assets

TAP runs off a set of data cubes developed for a particular port. Each cube represents the distribution of oil from a particular source site and a particular season. The cubes are generated by running the oil spill model thousands of time from each source site and accumulating statistics from each run. The runs start at a different time within a 10- to 20-year record of winds, tides, and river runoff.

Unlike the first two methods, TAP will generate actual probability ranges and adjust for oil types.

The TAP runs have been time- and labor-intensive efforts. As of the winter of 2001, only a handful of locations have been done: San Francisco Bay; San Diego Bay; Kaneohe Bay, Hawaii; northern Puget Sound, Washington; Inchon Harbor, Korea; and the Arabian Gulf. These are available on CD by request.

Development continues on the project. It is hoped that future versions will be able to allow for on-water intervention techniques such as skimming, dispersant application, and burning. Check our website (<http://response.restoration.noaa.gov>) or email to tap@hazmat.noaa.gov to find out what's available.

See Figure 12 for an example of TAP output.

Winter Analysis

Estimate for: Winter
Prepared: 0954, 2/9/01

HAZMAT Trajectory Analysis

NOAA/HAZMAT (206) 526-6317



These estimates are based on NOS tide tables for January and 20 years of hourly January winds from Newport News Airport. Contours show the 90% probability of where spilled oil from the reserve fleet would be at the times shown.

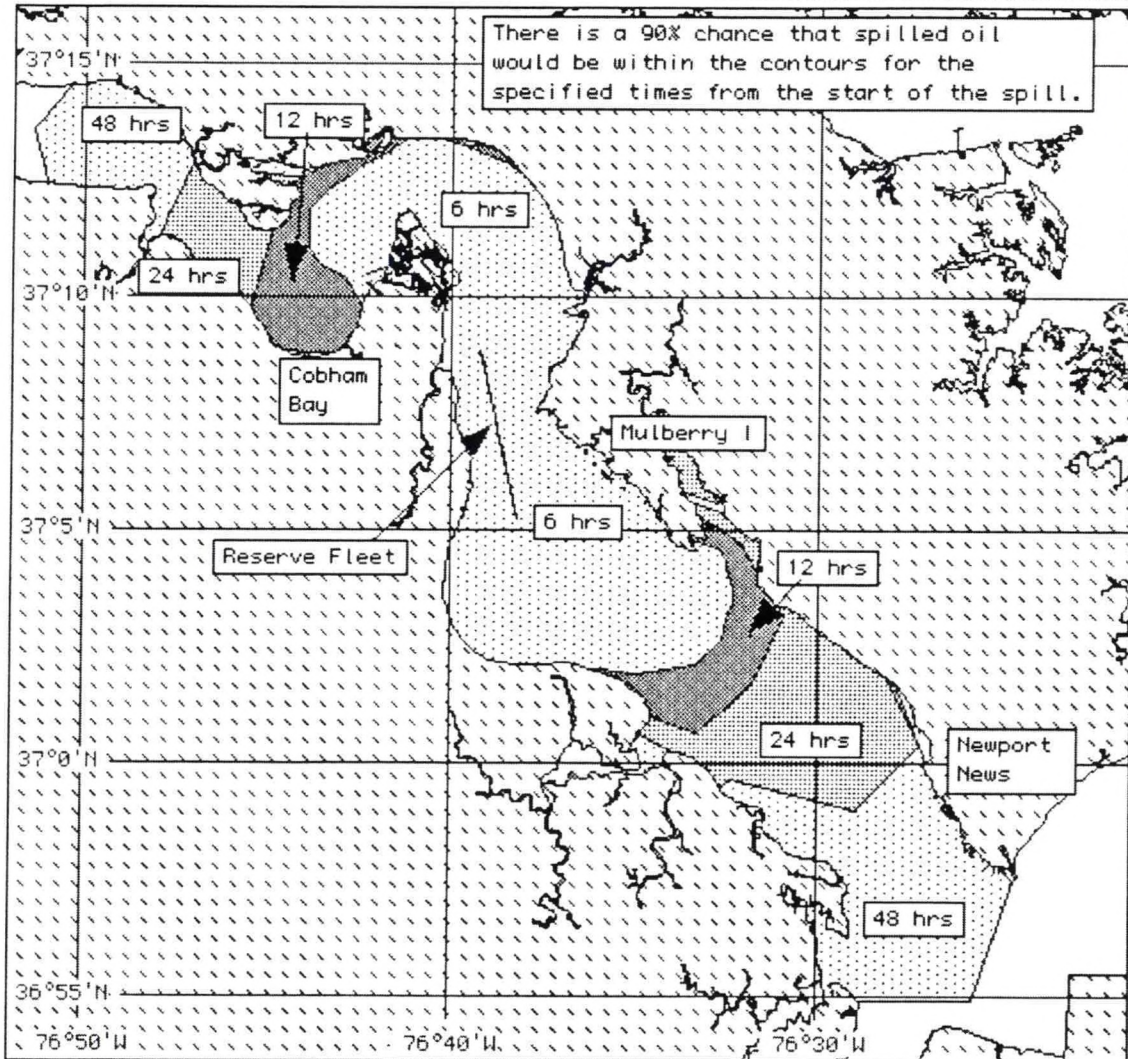


Figure 10. Example of area planning run for spill originating from James River Reserve Fleet.



Waikiki, Oahu, HI

MASS Statistical Analysis

Estimate for: Hour 12, 24 & 48

Prepared: 0952, 8/7/98

NOAA/HAZMAT/MASS (206) 526-6317

Season: Winter (DEC - FEB)
Reverse Trajectory

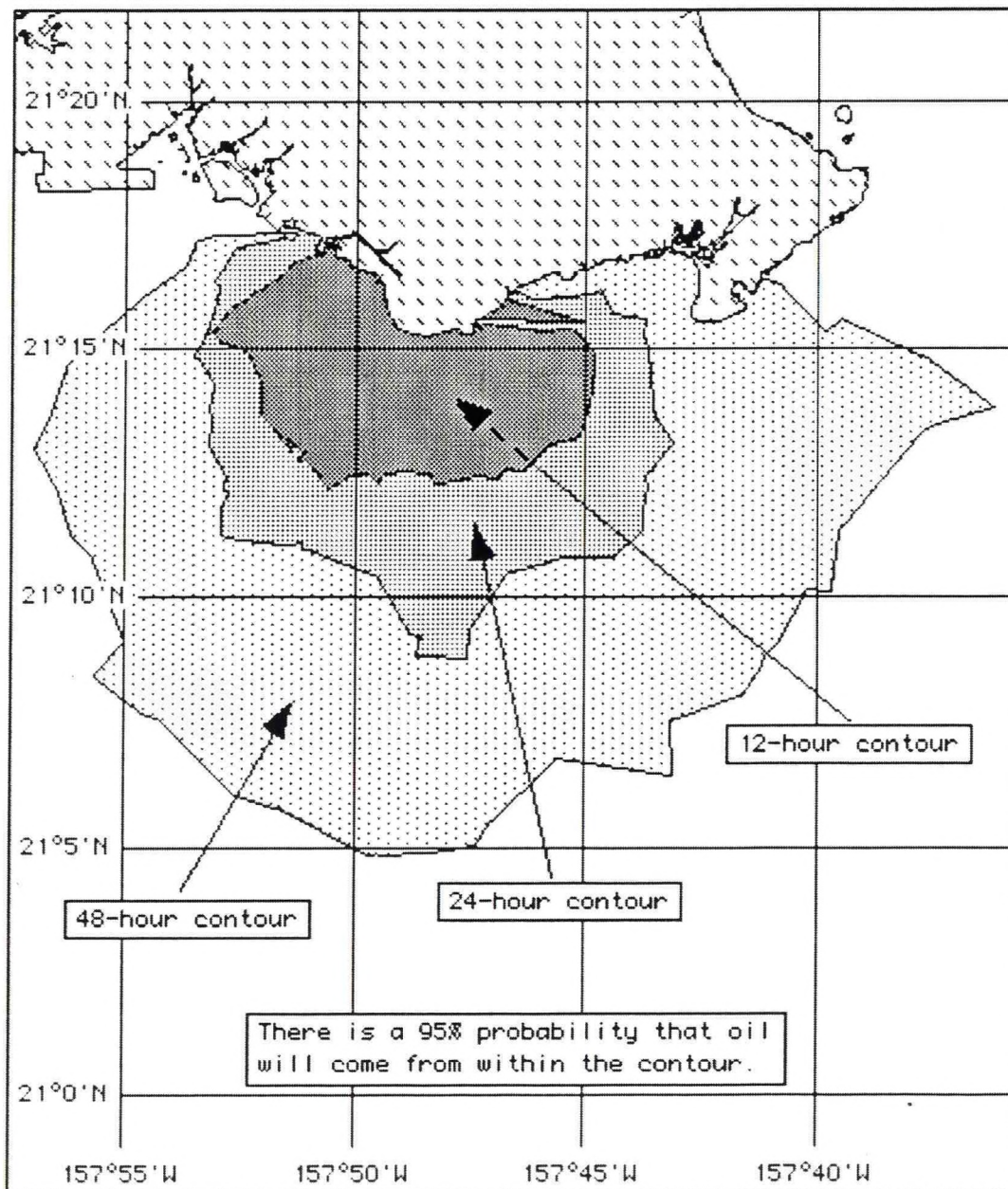


Figure 11. Receptor mode contours for Waikiki beach planning.



TAP II™ - Trajectory Analysis Planner

Mode: Shoreline Impact Analysis
Season: Mar - Aug
Time: 1 day

Oil Type: Fuel Oil #6
Amount Released: 1000 bbl
Level of Concern: 1 bbl

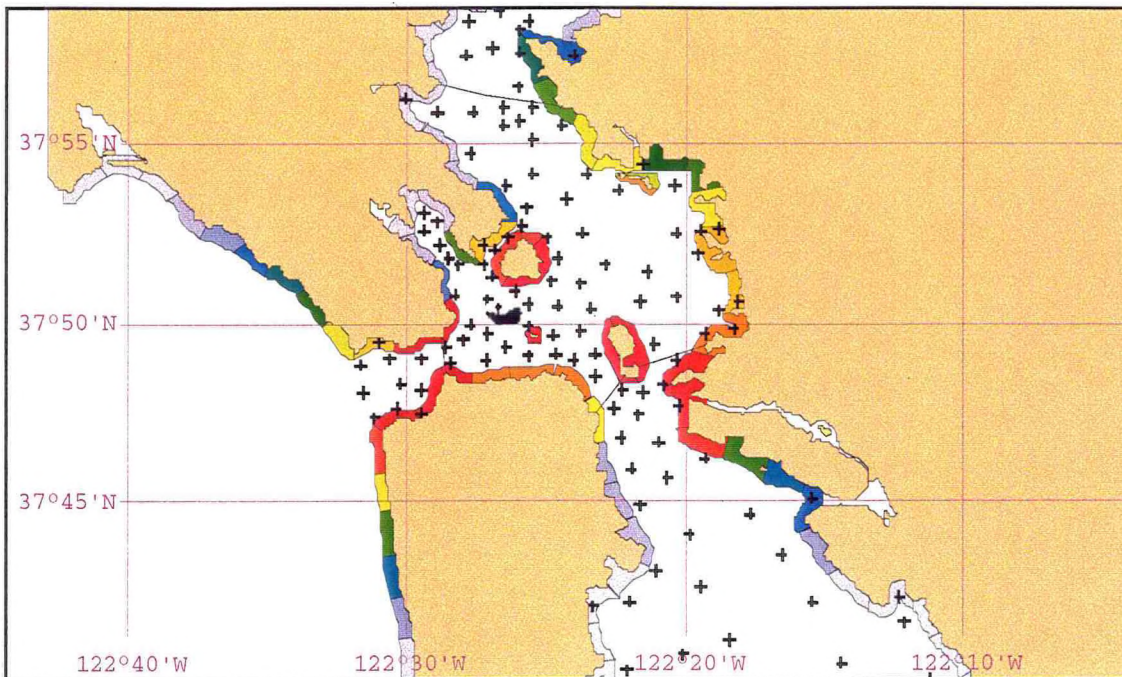
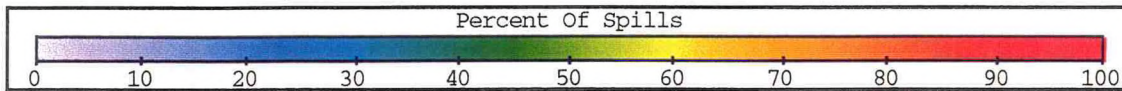


Figure 12. Example of TAP output for San Francisco Bay showing where spills can go.

8 GNOME (General NOAA Oil Modeling Environment) Files

General NOAA Oil Modeling Environment (GNOME) is an object-oriented application that simulates oil movement due to wind, currents, tides and associated mixing. It is a new, publicly available, oil-spill trajectory model. GNOME plots the predicted evolution of spill positions from relevant oceanographic, atmospheric, and spill information. HAZMAT uses this model during spill response to calculate our best guess of the spill's trajectory and the associated uncertainty in that trajectory considering the imprecision of input information.

Regional "location files" are also available for different regions of the United States that contain distilled information regarding local oceanography for use with GNOME. These location files ask you simple questions about the conditions you would like to simulate, and set up the GNOME model accordingly. Location files also contain references and Internet data sites to help you find more detailed information and observations. These location files are not complete enough for use in spill response but are an excellent tool for creating scenarios and building intuition regarding oil-spill trajectories at a particular location. The number of areas with location files is increasing.

Get GNOME at response.restoration.noaa.gov/software/gnome/gnomeinfo.html in Macintosh and IBM compatible formats. Training is periodically available from HAZMAT. See Figure 13 for an example of a GNOME output screen.

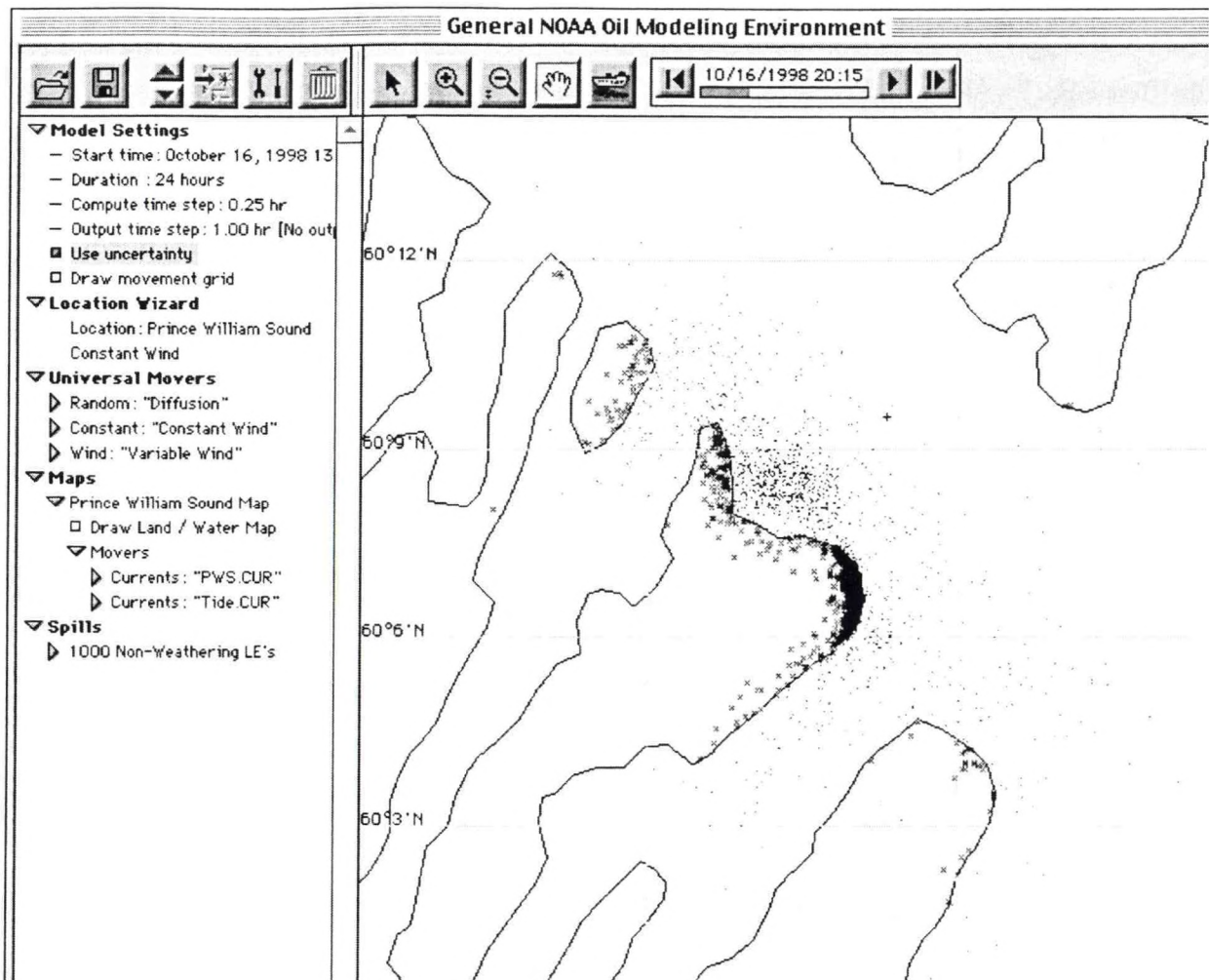


Figure 13. GNOME output window.

9 Chemical Spill Response

Accidents involving large amounts of chemicals in ship containers, trains, and storage tanks at large fixed facilities in or near marine resources have required HAZMAT to design and implement several scientific tools that can help responders and planners answer many of the questions that arise during a chemical spill. When the call comes in, many of the questions concern chemistry issues such as, *What chemical are we dealing with? If it is released in large quantity how will it behave?*, and *Does the material react with water or air?* Once the chemical is known, what are the intrinsic hazards associated with it? *What are the health and safety issues that we need to be concerned with for the workers at the site and the general community?* Knowledge of the chemical's behavior and resources at risk help to define response options.

HAZMAT's most widely used computer tool for chemical spill response and planning is the Computer-Aided Management of Emergency Operations (CAMEO®) system. CAMEO includes a chemical information module with a database; federal regulatory information on hazardous chemicals; Mapping Application for Response, Planning, and Local Operational Tasks (MARPLOT®, a microcomputer-based, rapid mapping program), a map display application that allows quick and flexible manipulation of U.S. Bureau of the Census TIGER/Line digital map files; an air plume model, Areal Locations of Hazardous Atmospheres (ALOHA®), for modeling the behavior of releases of chemicals to the atmosphere; and The Chemical Reactivity Worksheet Program, which predicts potential hazardous chemical reactions. All modules work interactively to quickly display critical information.

The Chemical Database module, which contains response information for approximately 4,000 chemicals, includes 60,000 chemical synonyms and identification numbers that help the emergency responder identify unknown substances during an incident. Once a chemical is identified, fire fighting, physical property, health hazards, first aid guidance, and spill recommendations are provided (Figure 14). The Reactivity database includes all the chemicals in CAMEO, and gives specific information about chemical reactivity behavior with common materials and mixtures of chemicals, along with case history and anecdotal information. Much of the above information is used to

assess and prioritize the hazards associated with particular chemical constituents in a given scenario.

The ALOHA® atmospheric dispersion module predicts the downwind dispersion of a chemical cloud (Figure 15). Graphical outputs include estimates of the plume footprint, source strength, and chemical concentration curves. The output from ALOHA can then be sent to MARPLOT™, the mapping module, to display the footprint on a digitized map of the local area (Figure 16). The map can be enhanced with information concerning the locations of other facilities storing hazardous materials and special concern populations such as hospitals, daycare centers, and schools. Specific information about these locations can be extracted from CAMEO information modules to help determine the degree of hazard posed by the incident.

Health and safety issues are addressed by identifying the chemicals involved. The hazards associated with the specific chemicals are prioritized. For example, if a large amount of a chemical is spilled and if that chemical is both volatile and toxic, ALOHA may be needed to determine the risk to the community. Staff chemists answer questions about sampling and analysis. If sampling and analysis is necessary, the Louisiana State University Institute of Environmental Studies can place state-of-the-art monitoring equipment at the spill site. This type of support allows responders a more real-time decision-making ability.

Anticipating chemical behavior of materials spilled in water is another important part of NOAA's response efforts during chemical spills. The event in which a large amount of acid is spilled into a waterway may be significant as the pH drops and organisms in the water sensitive to pH may be affected. The release of toxic gases from a mixture of spilled chemicals may be pH-dependent, and may again determine response options that should be adopted during the spill. Many of these questions are addressed by NOAA chemists and staff scientists when the initial call is received.

CAMEO™ Response Information Data Sheet

CHEMTREC (800) 424-9300 or (202) 483-7616

Chemical Name: ACENAPHTHENE

CAS Number: 83329

NFPA Degrees of Hazard:

Health:

Flammability:

Reactivity:

Special:

General Description:

Acenaphthene appears as white needles. It is soluble in hot alcohol. It is heavier than and insoluble in water. It is derived from coal tar and is used to make dyes, pharmaceuticals, insecticides, fungicides, and plastics. It is irritating to skin and mucous membranes. When heated to decomposition, it emits acrid smoke and irritating fumes. (© AAR, 1991)

Physical Properties:

Specific Gravity, Liquid: >1 (© AAR, 1991)

Fire Hazard:

Health Hazards:

Fire Fighting:

Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty). (© AAR, 1991)

Non-Fire Response:

Keep material out of water sources and sewers. Build dikes to contain flow as necessary. (© AAR, 1991)

First Aid:

In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. (© AAR, 1991)

Figure 14. Response Information Data Sheets (RIDS)

Footprint Window

ALOHA™ 5.2



Time: October 19, 1996 & 1140 hours PDT (Using computer's clock)
Chemical Name: CHLORINE
Wind: 10 mph from N at 3 meters
FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: equals IDLH (10 ppm)
Max Threat Zone for LOC: 1.2 miles

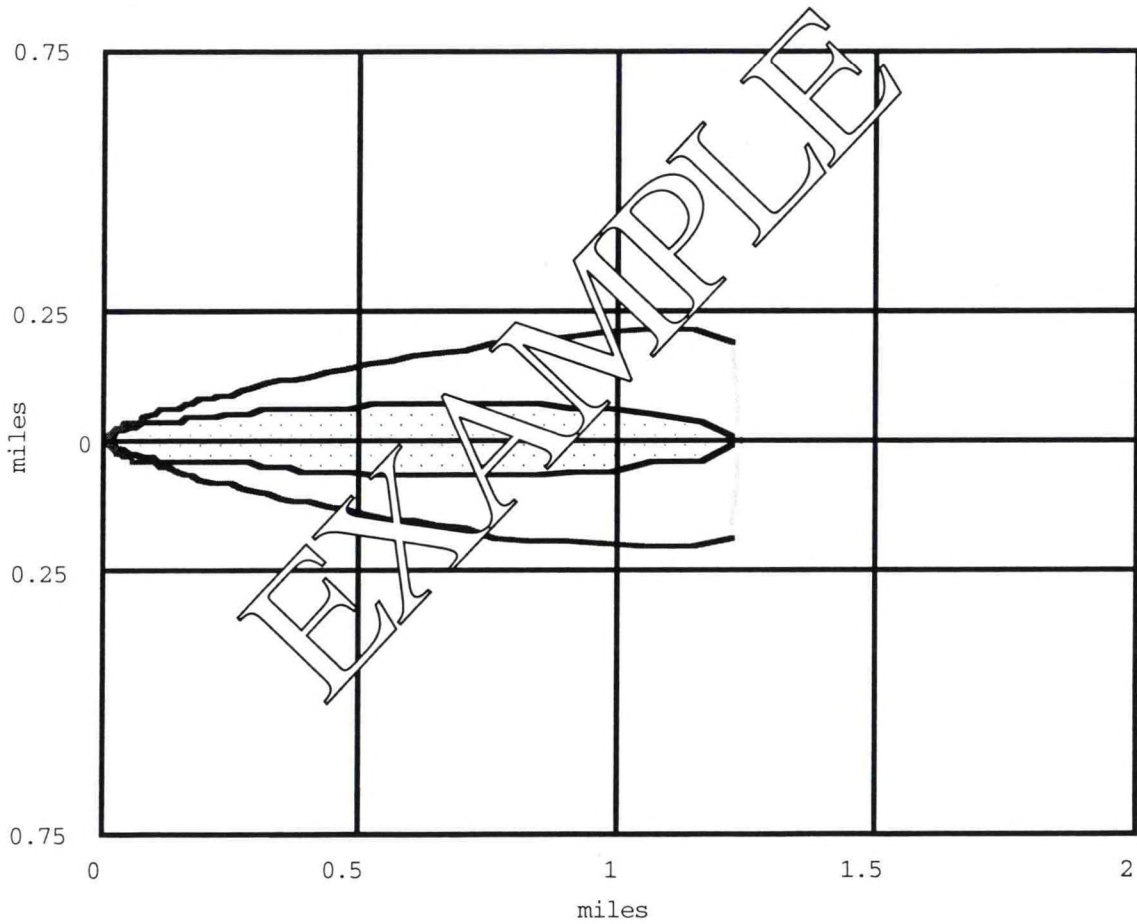


Figure 15. ALOHA footprint

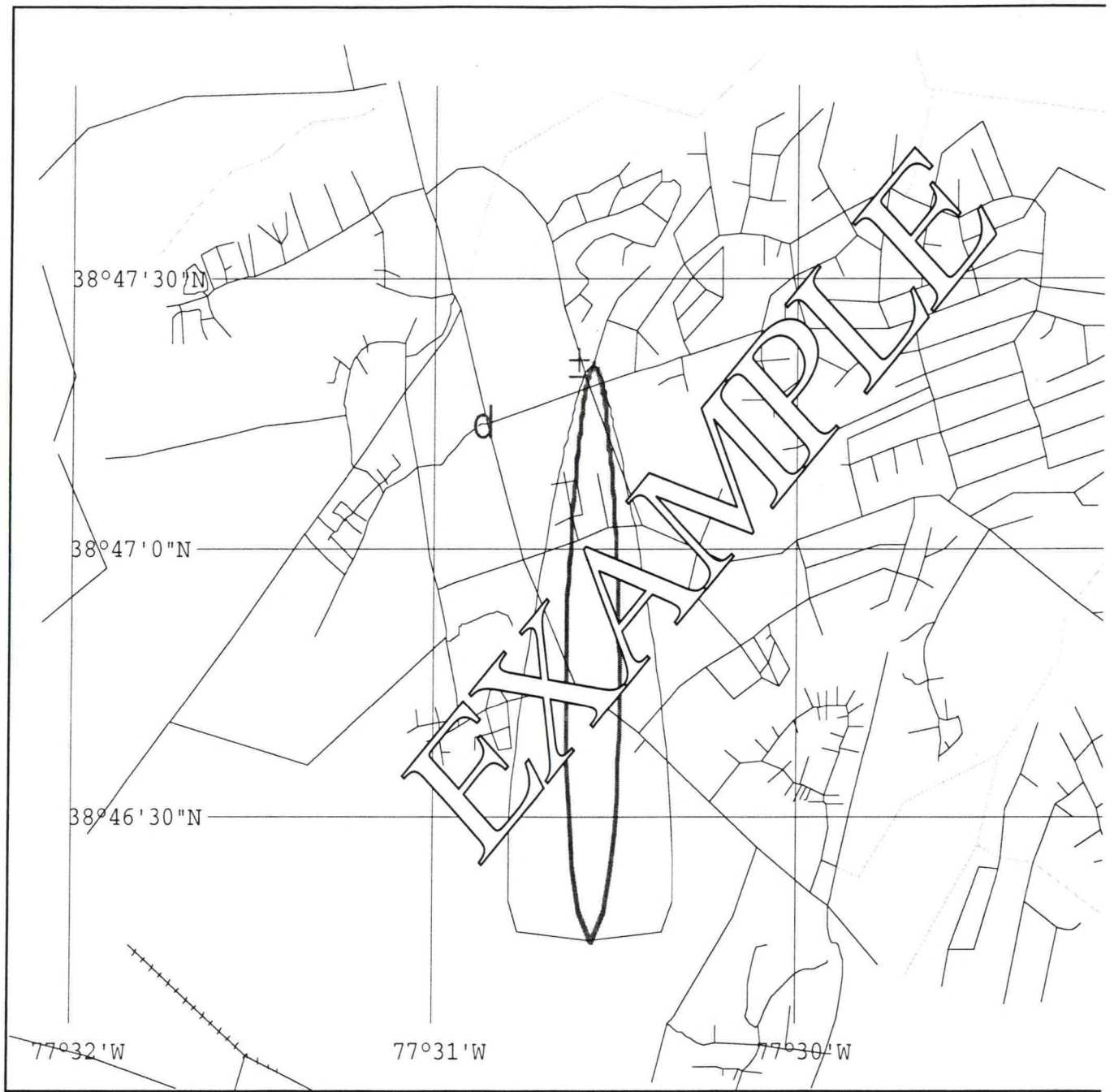


Figure 16. ALOHA footprint on MARPLOT map.

10 Availability of NOAA/HAZMAT Software

The programs that we use to generate our products have all been written and developed in-house and come in two flavors. The first set is developed to be distributed publicly. These are well documented and usually come with example problems and training materials. The second set is developed as in-house tools and come with very little or no documentation.

All the software is available for free. Those developed for public distribution can be downloaded from our website for both Windows and Macintosh systems. These include the CAMEO programs, GNOME, and ADIOS2. The programs developed for in-house use are available for the asking with very little or no documentation, and are usually Macintosh only applications. These include SHIO (our in-house tide program), OSSM (our old industrial strength oil spill model), CATS (our hydrodynamic program), GNOME Analyst (our display program that generates the trajectory graphics), and a host of other smaller utility programs. TAP is available for planning for the specific areas mentioned above. It comes packaged with a manual and a CD with all the data.

About once every other year, we hold an oil spill modeling workshop. The course runs an entire week and we discuss and distribute all our modeling tools, including the in-house versions. If you are interested in attending the class, you can email us at gnomewizard@hazmat.noaa.gov to get on the list.

In general, we don't distribute the source code for the applications. There is no documentation for any of our code and there is no system setup for helping with computer code questions.

DRILL REQUEST FORM

(To be filled out by NOAA SSC)

Drill request rules:

A completed drill request form is needed for each drill request submitted. The form should be filled in or reviewed by an SSC before being submitted to MASS. The SSC is responsible for making sure the request is reasonable and for explaining the output options to the requesting party.

Drill requests are put into the queue when received. They will usually be assigned in the order they are received. When they get done will depend upon how complicated the request is and how busy we are. If time is an issue, we may move Coast Guard requests to the top of the queue and move industry requests to the bottom.

A minimum of two weeks' advance notice is required.

We usually run the requested scenario through the model, and send the SSC the preliminary results to get confirmation that the trajectory will satisfy the goals of the drill. We will not generate any of the requested output until we get confirmation that the trajectory is OK.

GENERAL INFORMATION

Name: _____

Organization: _____

Address: _____

Phone Number: _____
Fax Number: _____

By when do you want the information?
(2-week minimum lead-time)

What are the goals of the drill?
Does it matter where the oil goes
and when it gets there, or do you
want to specify winds and let the
oil go where the winds and
current take it? *

Is this a tabletop drill?:

Will equipment be deployed?:

Will anything be put into the water to
simulate the oil?

Are other trajectory models being
used?

***Note:**

If you specify winds and the oil does not go where you want it to go, your request for a new drill scenario may go to the bottom of the queue. If you choose where and when the oil will beach, we will try to adjust the winds and currents so that the model makes this happen. This may require unrealistic winds and currents.

DRILL REQUEST FORM

Accident Location

Latitude: _____ Longitude: _____

Geographic Description:

SPILL SCENARIO

Start date and time of spill: _____

Duration of spill
(instantaneous or continuing
over hours or days): _____

Is source stationary or moving
(provide course and speed if
moving)? _____

THE OIL

Amount of oil spilled (provide
leak rate if continuous spill): _____

If you select an ADIOS oil, just provide the name. Otherwise, fill in all of the requested information below.

Name of oil: _____

API of oil: _____

Pour point of oil (supply units): _____

Viscosity at ref. temp. (supply
units for visc. and temp) _____

DRILL REQUEST FORM

ENVIRONMENTAL PARAMETERS

Provide winds for entire duration of model run, or specify that you want us to make the winds up. If we generate winds, we need oil destination and arrival time.

Provide tidal currents and heights for duration of model run or specify that we use actual tides for the drill dates.

OUTPUT PARAMETERS

Number of days to run model:
(remember to supply winds)

Products for drill control (check items you want)

Movies (hourly frames)

Products for drill players. These are what we normally provide during a spill

| | | | |
|----------------------------|-------|--------------------------|-------|
| Initial written trajectory | _____ | GENWEST overflight maps* | _____ |
| Daily trajectory forecast | _____ | ADIOS tables | _____ |
| Weather reports | _____ | | _____ |
| Tide data | _____ | | _____ |

* To request overflight maps you need to specify the following information
When the overflight was done (for example, 0730 - 0930 Sept. 25th, 1997)
Who did the overflight (for example, NOAA SSC / Ed Levine)
What the platform was (for example, USCG - HH65A)
The flight path sketched out

AREA PLANNING REQUEST FORM
(To be filled out by NOAA SSC)

Planning request rules:

A completed planning request form is needed for each request submitted. The form should be filled in or reviewed by an SSC before being submitted to MASS. The SSC is responsible for making sure the request is reasonable and explaining the output options to the requesting party.

Planning requests are put into the queue when received. They will usually be assigned in the order they are received. When they get done, will depend upon how complicated the request is and how busy we are. Typical request will be processed within a month.

We suggest that you provide long-term (10 years' worth) of wind data for us to use or have us obtain archived hourly wind data for 10 years to use. If you specify that we obtain the long wind records necessary for the analysis, it may take 2 to 3 weeks for the data to arrive from the National Climatic Data Center and another 2 to 3 weeks to process the data and do the model runs.

GENERAL INFORMATION

Name: _____

Organization: _____

Address: _____

Phone Number: _____

Fax Number: _____

By when do you want the information?
4 week minimum lead-time

What are the goals of the study?

How are the results being used?

PLANNING REQUEST FORM

What type of analysis do you want done?

Statistical Run _____ Deterministic Run _____
Forward Run _____ Backwards Run _____

Accident Locations(forward run) or Receptor sites(backwards run)

| | | | |
|----------|-------|-----------|-------|
| Latitude | _____ | Longitude | _____ |
| Latitude | _____ | Longitude | _____ |
| Latitude | _____ | Longitude | _____ |
| Latitude | _____ | Longitude | _____ |
| Latitude | _____ | Longitude | _____ |

When do you want model run for?

Start date and time for deterministic runs _____
OR _____
Season or months to evaluate for
statistical runs _____

WHAT ARE WE MODELLING?

If Oil :
Specify oil type _____
Amount spilled _____
Duration of spill _____

If not oil explain:

How long do you want model run for?
Specify days or hours _____

PLANNING REQUEST FORM

ENVIRONMENTAL PARAMETERS

Provide winds OR we will obtain 10 yr. wind records from archived data. If not available, we will use statistical wind tables. It may take **three weeks** to get archived wind data and process it.

Provide currents or specify that we use tidal currents from table and seasonal coastal currents.

OUTPUT OPTIONS

Macintosh movies
(We don't do
Windows movies) _____

95% Probability Contour

Specify months you want output for, or tell us to determine seasonality from wind data and do analysis for appropriate wind determined seasons.
