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# LNG Modeling Efforts Continue at ASA

As more natural gas reserves are found in increasingly remote areas, a problem facing the gas industry is how to transport the gas to its end users. Historically, the most common mode of transportation has been through pipelines. However, with large transit distances involved, transport by ship to LNG terminals is the only cost effective alternative. In order to assess the potential consequences of LNG operations on the environment and human safety, ASA has focused on several LNG-related modeling efforts. These include the determination of spread and thermal radiation zones in the event of an LNG spill on water, and the potential effects on marine biota from both the construction and operation of offshore LNG facilities.

## THE INSIDE STORY

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## Consequence Analysis of LNG Spills

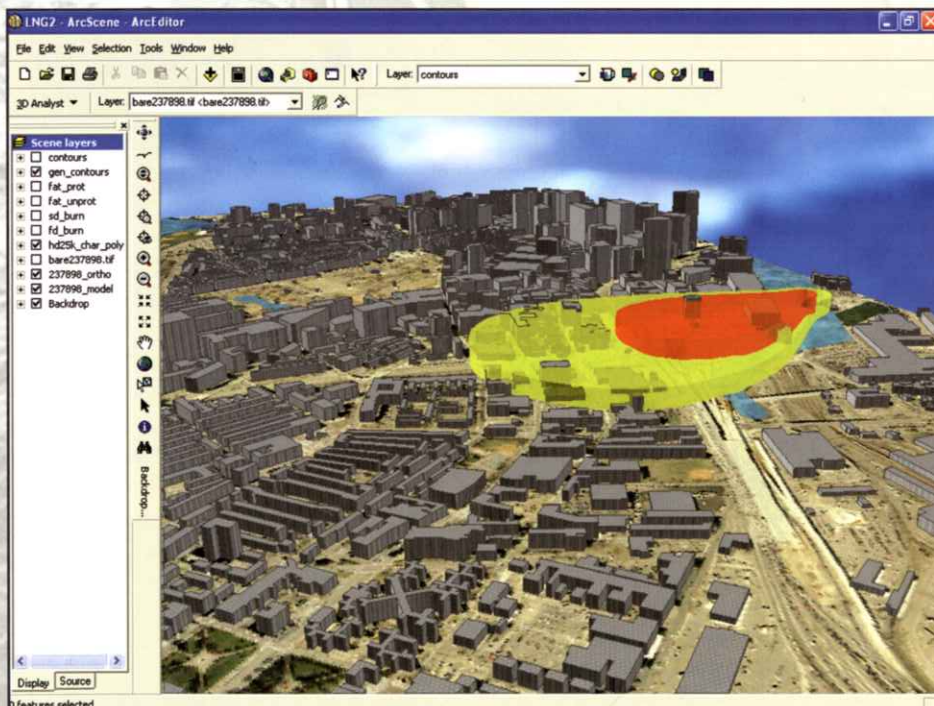
ASA is now completing the alpha phase of LNGMAP, an LNG model to determine fate and transport of LNG on the water surface and in the atmosphere, as well as the extent of thermal radiation in the event of a fire. This tool can be used to perform consequence analysis of LNG spills from offshore LNG facilities, LNG tankers and pipelines.

## Entrainment and Impingement of Marine Biota

A major operational issue for offshore LNG terminals is the technology used for regasification. Open Rack Vaporization (ORV), the preferred method to heat the LNG, uses the heat from seawater. When the cooled seawater is discharged, it can sink to the bottom, potentially affecting benthic species. Of more concern, however, is the entrainment and impingement of marine biota in the seawater moving through the heating system. Since large volumes of water are used, the loss of fish, as well as eggs and larvae, can have an impact on population levels. ASA has been working with the developers of proposed offshore LNG facilities to determine the potential entrainment and impingement effects for specific species.

## Construction Effects

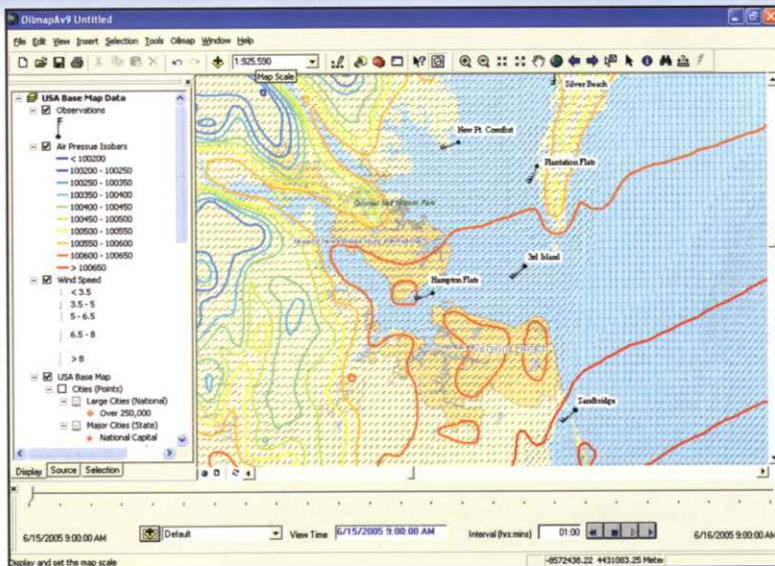
The construction of both LNG terminals and their connecting pipelines will impact the benthic communities in their vicinity. Benthos will be directly affected in the footprints of these facilities and indirectly in adjacent areas, particularly in the short term. ASA's analyses of both sediment concentrations in the water column and the deposition patterns generated by jet plows used to bury pipelines are providing quantitative estimates of these impacts.



Preliminary display of thermal radiation contours predicted by LNGMAP

# ASA and WeatherFlow Collaborate on GIS-Weather Tools

ASA has been working with WeatherFlow ([www.weatherflow.com](http://www.weatherflow.com)) to link to WeatherFlow's network of real-time weather stations and mesoscale wind models. These weather stations are installed at meteorologically strategic locations that fill gaps in the public data network throughout coastal locations of the United States, Canada, and most recently Mexico. The operational regional meteorological wind models use advanced data assimilation to provide high resolution forecasts for coastal regions. WeatherFlow observational and model data provide a unique source of wind and weather information for a variety of clients including the military, commercial maritime industry, recreational boating community and the National Weather Service. ASA's COASTMAP extension for ArcGIS 9.0 allows the WeatherFlow observation and model data to be integrated in its native formats (GRIB, NetCDF), for ArcGIS display, animation, analysis and linkage to other data products and forecast models.



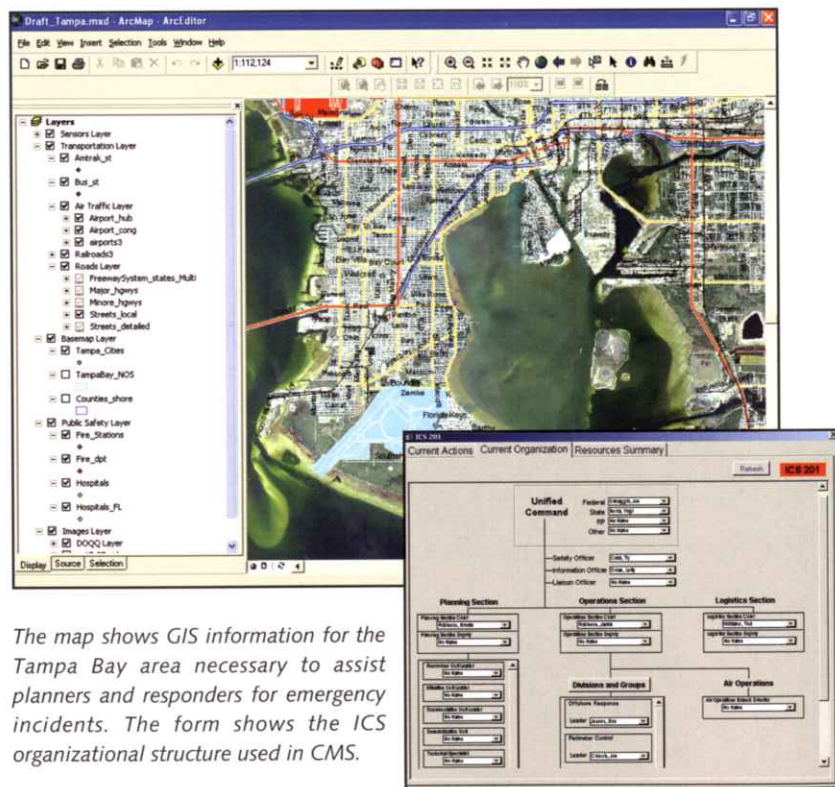
ArcGIS Coastmap extension used to display observation and model data for Chesapeake Bay.

## THE INCIDENT COMMAND SYSTEM

The concept of the Incident Command System (ICS) was developed more than thirty years ago after wildfires burned over one-half million acres of Southern California, killing 16 people and destroying 700 buildings. Criticism of the response to the 1970 fires focused on the failure to provide leadership in solving cooperation, command and control, communications and training issues for responders. An inter-agency group was formed to address the problems and ICS was born. Now when a natural event or terrorist attack occurs in the U.S., the response and recovery are most often managed using the Incident Command System because it provides the command structure necessary to quickly assemble an effective response organization in a potentially chaotic emergency situation. The ICS organizes personnel into a hierarchical structure so that everyone knows his or her responsibilities as well as their place in the organization. The ICS also facilitates the deployment and tracking of response resources such as vessels, aircraft and rescue vehicles to multiple locations in the response, and provides mechanisms for the management of these resources through a cycle of work periods lasting days and sometimes weeks. ICS contains the organizing principles, organizational structure, operating and communications protocols and common terminology around which emergency preparedness planning, response and recovery operations are based.

In February 2003, the U.S. Homeland Security Presidential Directive 5 directed the Secretary of the Department of Homeland Security to develop and administer a nationwide system, called the National Incident Management System (NIMS), which provides a consistent approach for federal, state and local governments to prepare for, respond to and recover from all domestic incidents. ICS forms the backbone of the NIMS, providing standards for management, terminology, span of control and communications during all phases of incident management. HSPD-5 also requires all Federal departments and agencies to adopt and use the NIMS in their incident management and emergency preparedness, response and recovery activities.

Government agencies at all levels use the ICS for a range of applications. The Federal Emergency Management Agency (FEMA) uses ICS for managing the response and recovery from naturally occurring events such as hurricanes, tornadoes and floods. The Forest Service and the National Park Service have built their wildfire response and recovery



The map shows GIS information for the Tampa Bay area necessary to assist planners and responders for emergency incidents. The form shows the ICS organizational structure used in CMS.

operations around ICS. The U.S. Coast Guard has been a leader in the adoption and use of ICS, applying it to hazardous materials spill response and recovery, and to search and rescue operations. ASA has implemented the Incident Command System in software systems used for crisis management by the U.S. Coast Guard and international government agencies. Currently ASA is under contract to supply an ICS-based software system to the Transportation Security Administration (TSA) for use in an ongoing port security exercise program at major port areas around the U.S. As emergency preparedness, response and recovery become more important to organizations in the U.S., ICS will become more widely used and accepted for incident management practices.

# PERSONNEL

During the first week of April, **Kelly Knee** delivered and conducted training for the OILMAP, CHEMMAP, and SARMAP ESRI ArcGIS extensions to the Rijkswaterstaat North Sea Directorate (RNSD) in Rijswijk, The Hague. RNSD is part of the Netherlands' Ministry of Transport, Public Works and Water Management, and has, among others, a national responsibility (under the auspices of the Dutch Coast Guard) to coordinate all response activities in the event of a hazardous spill incident in or around the Dutch Continental Shelf. The extensions delivered integrate the capabilities of the ArcMap system with an interactive ability to generate and visualize time-varying environmental data and numerical model results.

**Eoin Howlett** provided an upgrade and training for SARMAP and OILMAP to the Isle of Man Coastguard. Eoin worked with Chief Coastguard Captain Colin Finney and the IT staff to integrate SARMAP with the Coastguard's new IT infrastructure.

**Craig Swanson, Deborah French McCay** and **Jill Rowe** attended the Providence River Dredging Project Research Wrap-up Workshop held at the US EPA offices in Narragansett, RI on 25 April. The purpose of the workshop was to present results of monitoring done during the recently completed Providence River dredging project, as well as additional monitoring at the Rhode Island Dump Site where the clean material from the dredging project was disposed. The findings showed that environmental impacts were within estimates made before the project started.

**Craig Swanson** represented ASA at the Rhode Island Port Safety & Security Committee Meeting held in Providence, RI on 27 April. The meeting, hosted by the Marine Safety Office of the U.S. Coast Guard, focused on updating state and federal agency representatives as well as the private sector on safety and security issues for Rhode Island waters.

**Eoin Howlett** was an invited speaker at the 47<sup>th</sup> IASST International Meeting and Safety Conference at the National Maritime College of Ireland (NMCI) in Cork. Eoin presented information on the latest computer technologies being used for marine search and rescue. Eoin also sampled some excellent Irish Whisky at the local distillery.



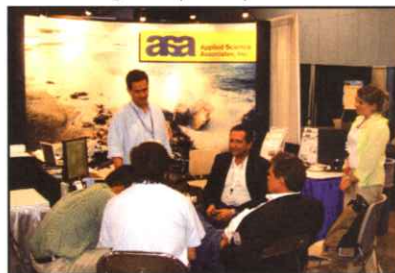
**Roddy Thomas** and **Eoin Howlett** attended an EROCIPS (Emergency Response to coastal Oil, Chemical and Inert Pollution from Shipping) planning workshop in Dorchester at the Dorset County Council offices. The Dorset emergency planning officer, Mr. Alan Hutchings, led the meeting which included representatives from Pembrokeshire, Devon and Northern Ireland.

**Chris Galagan** attended the US Coast Guard Innovation Expo 2-5 May in Santa Clara, CA. The Expo is an opportunity to see and discuss the latest technologies being developed within the Coast Guard and by private high-tech companies servicing the industry. A major theme of the conference this year was Domain Awareness, and Chris demonstrated ASA's search and rescue software system currently being developed for the Coast Guard.

**Eoin Howlett** attended the Second Annual IOOS Implementation Conference hosted by Ocean.US in Washington D.C. on 3-4 May. The meeting focused on "Setting National Priorities for the Integrated Ocean Observing System" with sessions on:

- Forecasting of Natural Hazards
- Mitigating and Managing the Effects of Natural Hazards
- Data Management and Communications
- Using IOOS Data and Information for Education, Capacity Building, and Outreach

**Deborah French McCay, Nicole Whittier, Eric Anderson, Eduardo Yassuda,** and **Scott Langtry** attended the 2005 International Oil Spill Conference (IOSC), 15-19 May at the Miami Beach Convention Center in Miami Beach, FL. Debbie presented two papers and Nicole gave a poster presentation.



*Eduardo demonstrates OILMAP to IOSC attendees.*

On 23 May, **Eduardo Yassuda** was an invited speaker at the III SEMANES, state of Espirito Santo Environmental Workshop. The title of his presentation was "Geoprocessing Tools in Coastal Management Projects".

**Eoin Howlett, Chris Galagan,** and **Guy DeWardener** attended the 6<sup>th</sup> in-progress review (IPR) meeting for the US Coast Guard SAROPS project. The meeting was held at the National SAR School in Yorktown, VA on 24-25 May.

On 26 May, **Sasha Zigic** traveled to Melbourne to present the findings of a novel pilot dispersant modelling study to the stakeholders for Western Port Victoria. At the forum a number of agencies were represented along with ESSO Australia and community group leaders. The pilot study is to assist in decision making concerning the use of dispersant in the event of a spill.

**Deborah French McCay** attended the 2005 Arctic and Marine Oilspill Program (AMOP) in Calgary, Alberta, Canada 7-9 June. Debbie was scheduled to present "Use of Probabilistic Trajectory and Impact Modeling to Assess Consequences of Oil Spills with Various Response Strategies", but her flight was delayed, taking 32 hours to get to Calgary! Thankfully Dagmar Etkin from Environmental Research Consulting was able to step in and present for Debbie!

On 6-9 June, visiting University of Rhode Island Senior Researcher **Eric Comerma**, of Spain, attended the 4<sup>th</sup> EuroGOOS meeting in Brest on behalf of ASA. He presented "The Integration of Global Ocean Observation System (GOOS) and Other Related Data in Support of a Range of Emergency Response Model Prediction Applications". Activities in Brazil, Australia and the US were summarized.

**Matthew Hanna** attended an ESRI training course in Denver, Colorado on 8-11 June. The course covered installing, administering, and programming for the ArcGIS Server 9.1.

On 10 June, ASA South America held its "I Professional Retreat", where the whole team went out on the white waters of the Jucitaba River, Brazil. After the morning rafting cruise, they discussed team and individual issues. **Ronaldo Palmeira** directed the barbecue project, with bartender **Jose Edson**.



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## Personnel continued

In mid June, **Eric Anderson** traveled to Atyrau, Kazakhstan to conduct OILMAP training and further develop environmental data inputs with AGIP KCO personnel. ASA has been supporting this oil development project in the North Caspian since 1998, when Shell Oil was in charge of the project. Later a new oil company called OKIOC was formed, and more recently the project lead has moved to AGIP.



**Malcolm Spaulding** attended the LAPCOD conference in Lercis, Italy, 15-17 June. The conference focused on the application of Lagrangian techniques to study ocean and coastal systems. He presented a paper entitled "Application of a random flight model in a search and rescue model system", co-authored by **Tatsu Isaji, Eoin Howlett, and Paul Hall** from ASA and Art Allen, U.S. Coast Guard Search and Rescue Center.



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## Upcoming Conferences

**Craig Swanson** will be presenting a paper, "Southport Harbor Hydrodynamic and Pollutant Transport Modeling Study", at the 2005 TMDL conference of the Water Environment Federation, 26-29 June in Philadelphia. The paper will be presented in the session on Bacteria TMDL Modeling and Source Tracking, at 0830 on 28 June, and focuses on the use of backward tracking models to estimate source locations.

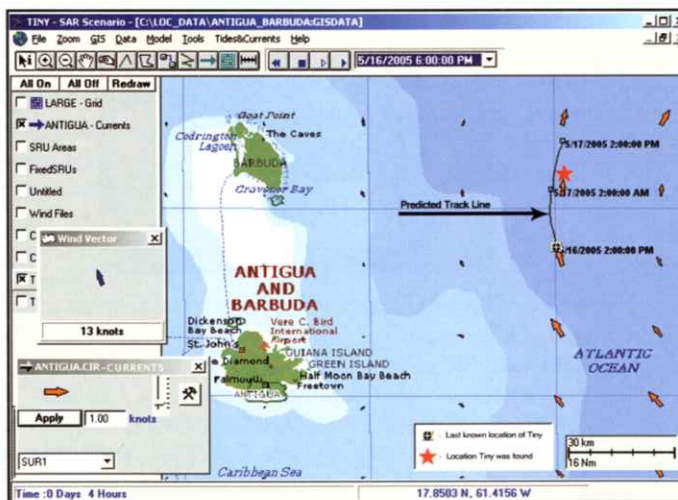
**ECM 9 Updates:** ECM9 will be held from 31 October to 2 November at the Double Tree Guest Suites in Charleston, SC. There have been a record 120 abstracts submitted for presentation at the 2½ day meeting. Additional information on the conference can be obtained at the conference website ([www.oce.uri.edu/ecm9](http://www.oce.uri.edu/ecm9)). Abstracts are available at the website and the conference program will be posted there later this summer.

### SARMAP in the News

#### SARMAP & The Western Australian Police Service

The Western Australian Police Service have committed to adoption of the SARMAP system covering waters off the coast of Western Australia, which stretches for over 18,000 km. Asia Pacific ASA is customizing the system to include tidal and geostrophic current inputs as well as GIS data covering the state.

#### Antigua Barbuda Search & Rescue Utilize SARMAP in Rescue



SARMAP predicted track line and location where the Trans-Atlantic rower was found.

Antigua Barbuda Search & Rescue (ABSAR) uses SARMAP to assist in logistical support for missing vessels in the waters surrounding Antigua and Barbuda. On 14 May, ABSAR assisted in retrieving a Trans-Atlantic rower, James "Tiny" Little, using SARMAP. The rower was caught in a current about 50 miles NE of Antigua and running out of food. Although ABSAR had good communications with Tiny, they used SARMAP to predict his drift so that the retrieval vessel could plot an accurate course for intercept. The search team found him within 1.5 miles of the predicted drift location.