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## Scientifically-Based Environmental Salvage: Applications of State-of-the-Art Analytical Modeling

BY DAGMAR SCHMIDT ETKIN, Ph.D.  
President, Environmental Research Consulting (ERC)

Twenty years after the *EXXON VALDEZ* oil spill, the threat of oil pollution still ranks high on the public's radar screen. It was not the largest spill in history, but its devastating impacts and wide media coverage reached the public conscience in all corners of the world. This incident ushered in a new era of prevention and preparedness efforts from government regulators and industry. It also made the public acutely aware of the potential for significant oil spill impacts.

In the last several years, there has been a great deal of interest in recognizing sunken vessels as undersea pollution threats. A landmark 2005 study estimated that there are over 8,500 large sunken vessels worldwide that could be holding as much as 17.5 to 140 million barrels of oil and other hazardous materials – potentially the equivalent of 60 to 500 *EXXON VALDEZ* spills!

Public concern over these threats is high, as demonstrated by the reaction to the January 2009 sinking off Nova Scotia of the dredging barge *SHOVELMASTER* loaded with 440 barrels of diesel. This incident caused a frenzy of public interest, but also indicated a lack of awareness of the magnitude of this issue. While the risk from the *SHOVELMASTER* is not trivial, it is dwarfed by the much greater risk in the 200 larger wrecks that litter the North Atlantic in and near Canadian waters. The amount of oil on those

wrecks is estimated to be at least 1,000 times the volume of the diesel in the *SHOVELMASTER* – and much of that oil is of a heavier type likely to have much greater environmental impacts.



DAGMAR  
SCHMIDT-ETKIN

### Quantifying Benefits of Proactive Removal

There is an urgent need to effectively harness this concern and persuade officials to adopt a rational approach to addressing these undersea threats in a proactive manner and to focus on those wrecks that truly present the greatest risk based on both the

probability of leakage and the magnitude of impacts. In the current economic climate, it will also be essential to convince decision-makers that there are cost-effective methods to address these threats and that there is a real benefit to doing so.

State-of-the-art modeling and cost-benefit analyses have been instrumental in helping state and federal agencies develop and institute spill prevention and response preparedness measures. The same approach has important applications for environmental salvage and wreck oil removal, such as the Wreck Oil Removal Project (WORP) underway in the U.S. In that effort, a systematic cost-benefit analysis based on modeled costs and impacts of potential wreck spillage will be used to assess risk and prioritize wrecks for removal operations.

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## Soundings

*Soundings* is published by the American Salvage Association to deliver the latest news on the marine salvage industry.

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Educating officials with compelling, yet easily understood scientific information is the first step in this process. In light of the overwhelming scope of potentially-polluting wrecks, it is vital that decision-makers have rational tools with which to systematically evaluate risks to coastal waters and on which to base decisions for action on wreck oil removal. After initial educational efforts, decision-makers can be provided with the quantitative data needed to properly evaluate risks from specific wrecks. Assessment of the wreck problem and identification of solutions can then be approached through a prioritized risk assessment – focusing on those wrecks that pose the greatest risk as quantified by state-of-the-art modeling and cost-benefit analyses, as in WORP.

### Applying State-of-the-Art Capabilities

State-of-the-art three-dimensional oil and chemical spill trajectory, fate, and effects models can simulate leakage that might occur in the absence of proactive oil and hazardous material removal. This modeling can then be used to quantify environmental and socioeconomic impacts that might occur, as well as costs of comprehensive on-water spill response and shoreline oil removal operations.

In essence, the three-dimensional modeling allows for visualization and quantification of the behavior and fate of spilled oil and hazardous chemicals from subsurface release from a submerged wreck to the transport, movements, and physical and chemical behavior (evaporation, dissolution, etc.) on the water surface and in the water column to shoreline impacts. The modeling allows for detailed simulations of the impacts of the oil and chemicals on birds, fish, and other organisms, as well as the impacts on socioeconomic resources (e.g., fisheries, tourist beaches, port access). Through stochastic (probabilistic) modeling, the wide range of possible outcomes due to variations in winds, weather, season, and currents can be simulated to determine most-probable-, as well as worst-case outcomes. The details of appropriate spill response, on the water and on the shoreline, can also be simulated to estimate costs. The modeling simulations also provide valuable information for contingency planning for specific wreck oil and hazardous material removal operations.

### Verifiable and Quantifiable Benefits

The “benefit” of a proactive removal operation is the total amount of damages and costs averted through the removal of the pollution threat. These damages and costs are quantified in the modeling and cost analysis phases of the assessment. The averted costs (the benefit) must then be compared to the costs of the removal operation to complete the cost-benefit analysis. In some situations, qualitative factors, such as the need to preserve cultural, historical, or natural resources on which it is difficult to place a monetary value, may also need to be considered. In some cases, a “leave alone and monitor” policy may be more appropriate than an actual removal. Often, the benefits of removing a substantial threat will far outweigh the costs of the removal operations. The modeling and cost-benefit analysis allows decision-makers to distinguish between these two situations!

Decision-makers want to clearly see verifiable and quantifiable benefits of potentially expensive projects before they agree to undertake and fund these operations. Toward this end, a scientific risk-based modeling approach provides:

- Scientifically-sound and internationally-respected state-of-the-art three-dimensional modeling of hypothetical spills involving sub-surface releases;
- Defensible data on averted response costs;
- Scientifically-based data on averted environmental damages specific to the jurisdictions of concern to the government officials;
- Specific data on averted socioeconomic damages specific to the regional economy;
- Graphic presentations that can clearly demonstrate geographic distributions of impacts for better visualization of the outcomes of hypothetical spill scenarios;
- A quantitative rather than qualitative cost-benefit analysis to provide government officials and decision-makers with the information needed to effect action; and
- State-of-the-art simulations of oil releases for planning of spill preparedness for actual salvage operations.

*(continued on page 3)*

## Other Applications in Environmental Salvage

In addition to cost-benefit analyses and risk assessments for wreck oil removal for the large number of sunken wrecks, there are other important applications of this state-of-the-art modeling and cost analysis in the field of environmental salvage. The simulations of hypothetical spills and estimation of averted costs and impacts can and have been used in salvage cases in which compensation is based on demonstrated “averted damages” from the operations. These methods have also been successfully used in a number of key court cases, litigation, and settlements involving spill costs and impacts.

Environmental salvage and oil removal technologies have improved dramatically in the last decade making for more effective and safe removal operations. Three-dimensional modeling of hydrodynamics (currents) and winds can be used to better plan these complex operations to prepare for potential spills and to determine the best times to conduct operations.

Spill impact and cost modeling studies have clearly demonstrated the benefits of early and effective spill responses in reducing not only total response costs, but also in reducing the environmental and socioeconomic damages from spills. Recognizing this, state and federal agencies have looked at ways in which response time and capabilities can be dramatically improved. Clearly, the first order of response should be effective “source control” and the mitigation of any further leakage through effect salvage techniques. The benefit of “source control” operations for hypothetical spill situations, or in revisiting past spill scenarios in “lessons learned” exercises, can be quantified through the use of this type of modeling study.

## Conclusions

Nations around the world have recognized the environmental threat posed by oil and chemicals remaining onboard shipwrecks located in their respective waters, and that the time has long since come when action must be taken to deal with those pollution threats. Now, in light of the need to provide for a heightened level of marine environmental protection, and with the benefit of today’s capabilities, there exists the capability to

address the threat to the world’s coastal and ocean environment posed by the aging population of shipwrecks by employing a proactive, rational, scientifically-based strategy. The use of a scientifically-based risk assessment process using state-of-the-art modeling capabilities provides authorities with rigorous data that can be used to make informed decisions on wreck oil and chemical removal. And the salvage industry can clearly benefit from the use of state-of-the-art modeling capabilities in its efforts at being part of that process.

*Dagmar Schmidt Etkin received a BA in Biology from University of Rochester, and Masters and Ph.D. degrees in Biology (specializing in population biology, ecology, and statistical analysis) from Harvard University. She has analyzed and modeled oil spill risk, costs, and impacts for 20 years. Dr. Etkin is President of Environmental Research Consulting, an independent firm specializing in providing regulators and industry with scientific information for sound environmental decision-making.*

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## From the Editor

BY DEBRA COLBERT  
Managing Editor - *Soundings*

## Opportunities Lie Ahead

In thinking about our upcoming National Maritime Salvage Conference next October about which much information is provided in this issue of *Soundings*, I began looking at various blogs related to conference attendance in this period of economic downturn.

One said, “With layoff news day by day, conferences are getting canned left and right... Still, there’s no true substitute for real, live, face-to-face discussions and networking. ...The most important ingredients are content and people.”



DEBRA COLBERT

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Another said, "In this day and age of fast communications and the ubiquitous internet, you might think that you can get all the information in electronic form without going through the hassle and expense of travel, lodging and local transportation. But I think you might be missing the element of peer networking which has the highest value in terms of sharing experiences, new ways of looking at old problems, and proven shortcuts for daunting problems."

And a third, in the form of a new year's resolution, said "I will use the downturn as an opportunity to expand my employees' knowledge by having them attend a conference."

There are many reasons why people attend and participate in conferences in good and bad economic times and your reasons are your own. But as you search for conferences that focus solely on maritime salvage and training issues, you will be hard pressed to find one that rivals the content and value of the National Maritime Salvage Conference hosted by ASA and *Marine Log*.

Contact us for additional information if you need it. Think about sponsoring an event, or taking the training course. Interact with members of Congress and those in the Navy, Coast Guard, NOAA and other agencies. Use this conference as an opportunity to learn more, to visit with experts doing marine salvage work here and around the globe, and to network for opportunities that could include your company in the future. 🌐

## President's Message

BY JOHN A. WITTE, JR.  
President, American Salvage Association

The new OPA-90 era is upon us. After years of waiting, the membership of the ASA, as well as the affected maritime community, are now all working to put into place the additional response capabilities that are required to fulfill these new modifications. There has been much discussion since December 31, 2008 over what



JOHN A. WITTE, JR.

the regulations actually require of named salvors as well as the requirements and liabilities that are now placed upon vessel owners and operators. From my perspective, the level of concern, while warranted, may be approaching a point where our individual concerns may begin to cloud the overall value of these regulations to our industry, our clients and our nation from the perspective of national and maritime security. While after over an eight-year delay, the modifications were finally promulgated. Now that they are, we must remain united.

What has been made clear to the ASA leadership by the USCG is that these modifications will not be changed. There will be a document provided by the USCG in the future which hopes to clarify some of the industry questions that have come up but, again, there will be no changes.

During one of your leadership's meetings with the USCG, they made one statement which I believe warrants passing on. We were told that when reading and evaluating the modifications, "don't try to read anything into them." They were written in an attempt to clearly demonstrate the expectations of the USCG, not an attempt to use confusing and misleading language to create instability. This said, clarity in one person's review may not be the same for another. If, as a member, you have a question, you may work through the ASA for non-commercial issues and directly with the USCG for commercial issues. For non-ASA members, the USCG will be just as receptive to your questions as those directly from the ASA. The modifications to OPA-90 are for the benefit of us all.

Now more than ever, the ASA and the marine community which came together for the common good to support the promulgation of these modifications to OPA-90 must remain committed, unified and clearheaded when applying these modifications to their own needs. Distrust, fear and isolationism will only dilute the true benefits of these modifications. If we keep the same attitude of cooperation and understanding that led the marine community as a whole to support these modifications, the actual implementation will be much easier. I believe a good part of success is based upon attitude. If you believe and work hard enough, good things will happen. Let us all keep this attitude as it relates to the work in progress known as OPA-90. 🌐

# Mark Your Calendar to Attend the Most Important Industry Conference This Year!

The American Salvage Association and *Marine Log* are partnering once again to host the National Maritime Salvage Conference & Expo, October 6-8, 2009 at the Key Bridge Marriott in Arlington, Virginia.


A central part of discussion at this year's event will be the U.S. Coast Guard's Final Rule on the new OPA-90 Salvage and Marine Firefighting regulations. Other topics on the agenda will include:

- Environmental Salvage
- Media Relations
- Port Operations & Salvage
- Salvage Contracting
- Marine Salvage Training

Scheduled speakers for the event include:

- CAPT Patrick Keenan, Supervisor of Salvage and Diving, U.S. Navy
- RADM Brian Salerno, Marine Safety, Security, & Stewardship, U.S. Coast Guard (Invited)
- CAPT Anthony Lloyd, Office of Incident Management Preparedness, U.S. Coast Guard
- Dr. Dagmar Schmidt Etkin, Environmental Research Consulting
- CAPT Jim Shirley, JTS Marine

Sponsorships and table-top exhibits are still available, so for more information on those opportunities, please contact Jane Poterala, Conference Director, at (212) 620-7209 or via email at [jpoterala@sbsub.com](mailto:jpoterala@sbsub.com).

Additional speakers are to be announced – please visit [www.marinelog.com](http://www.marinelog.com) for conference updates. 



**AMERICAN SALVAGE ASSOCIATION** **MARINELOG**

## NATIONAL MARITIME SALVAGE CONFERENCE & EXPO

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JOIN US FOR THE MOST IMPORTANT INDUSTRY EVENT OF THE YEAR!

TUESDAY, OCTOBER 6	WEDNESDAY, OCTOBER 7
Registration / Continental breakfast (sponsorship available) / Expo open	Continental breakfast (sponsorship available) / Expo open
<b>Opening Remarks</b> John Witte, Jr., American Salvage Association CAPT Patrick Keenan, Supervisor of Salvage and Diving, U.S. Navy	<b>Opening Remarks</b> John Witte, Jr., American Salvage Association
<b>OPA 90 Salvage &amp; Firefighting</b> Moderator: John Witte, Jr., American Salvage Association Jonathan Waldron, Esq., Blank Rome LLP	<b>Media Relations</b> Moderator: Debra Colbert, American Salvage Association Carleen Lyden-Kluss, North American Marine Environmental Protection Association John Snyder, Publisher & Editor, Marine Log Don Phillips, Transportation Journalist
Coffee break (sponsorship available) / Expo open	Coffee break (sponsorship available) / Expo open
<b>OPA 90 Salvage &amp; Firefighting (continued)</b> Mauricio Garrido, American Salvage Association CAPT Anthony Lloyd, Office of Incident Management Preparedness, U.S. Coast Guard	<b>Media Relations (continued)</b> James Lawrence, International Marketing Strategies
Luncheon (sponsorship available) <b>Luncheon Address</b> RADM Brian Salerno, Marine Safety, Security, & Stewardship, U.S. Coast Guard (Invited)	Luncheon (sponsorship available) <b>Luncheon Address</b> David Westerholm, NOAA Office of Response & Restoration
Break / Expo open	Break / Expo open
<b>Environmental Salvage</b> Moderator: Tim Beaver, American Salvage Association J. Arnold Witte, International Salvage Union (ISU) Archie Bishop, Counsel to International Salvage Union	<b>Port Operations and Salvage</b> Moderator: George Wittich, American Salvage Association CAPT Michael Herb, USN (Ret.), SUPSALV, U.S. Navy
Energy break (sponsorship available) / Expo open	Energy break (sponsorship available) / Expo open
<b>Environmental Salvage (continued)</b> Dr. Dagmar Schmidt Etkin, Environmental Research Consulting	<b>Port Operations and Salvage (continued)</b> Rick Chianelli, American Salvage Association
Cocktail reception to Recognize Congressman Elijah E. Cummings, Chairman, House Subcommittee on Coast Guard and Maritime Transportation	<b>Closing Remarks</b> Mauricio Garrido, American Salvage Association
	<b>Additional speakers to be announced.</b> Visit <a href="http://www.marinelog.com">www.marinelog.com</a> for conference updates.

To view the full program, visit [www.marinelog.com](http://www.marinelog.com)

## ASA Membership Meets in Connecticut

The ASA membership met for a meeting of its Executive Committee and Membership on Monday, February 23 in conjunction with SHIPPING 2009, sponsored by the Connecticut Maritime Association (CMA), in Stamford, CT. In addition to reports from the ASA leadership, General Members and Associate Members, Carleen Lyden-Kluss, Executive Director of NAMEPA, Paul Holthus, Director of the World Ocean Council, and CAPT David Westerholm, NOAA - Office of Response & Restoration, also made presentations.

ASA members participated in a luncheon hosted by the Women's International Shipping &

Trading Association (WISTA), an international organization for women in management positions involved in maritime transportation business and related trades worldwide, at which Vice Admiral Vivian Crea, Vice-Commandant of the United States Coast Guard, received WISTA's Personality of the Year award. Admiral Crea, the Coast Guard's highest ranking woman, discussed the challenges she faced and the opportunities she received throughout her illustrious career in the maritime industry.


ASA's members will next meet at the National Maritime Salvage Conference in October in Arlington, Virginia. 



Photo by Will Watson, Fairplay

VADM Crea, USCG, accepts the "Personality of the Year" award from WISTA President Jeanne Grasso. ASA members were in attendance at this event.

### UPCOMING EVENTS



**May 21**  
National Maritime Day  
Washington, DC  
[www.namepa.net](http://www.namepa.net)

**September 17-18**  
Global Greenship  
Washington, DC  
[www.marinelog.com](http://www.marinelog.com)

**October 6-8**  
National Maritime Salvage Conference  
Arlington, VA  
[www.marinelog.com](http://www.marinelog.com)

## Meet the ASA Membership

For membership information, please contact Brad Rosello, Chairman, ASA Membership Committee via email at [bradleyengineering@yahoo.com](mailto:bradleyengineering@yahoo.com), or Dick Fredricks, ASA Director, via email at [rfredricks@vesselalliance.com](mailto:rfredricks@vesselalliance.com).

### Associate Corporate Members



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## Spotlight on Global Diving & Salvage, Inc. *A Leader in Excellence*

Founded in Seattle, WA, Global Diving & Salvage, Inc (GDSI) has been developed around Puget Sound's unique maritime heritage and rigorous geographical challenges. The company was incorporated in 1980 by the two current owners: Tim Beaver, CEO, and John Graham, CSO. Today GDSI is an established leader in the marine and environmental industries with regional offices in Washington, California, and Alaska.

Global Diving & Salvage, Inc. currently operates five service-based divisions: General Diving, Casualty Response, Marine Construction,

Environmental Services, and Offshore Support Services. Each division has its own skill set and work experience, yet they work together as one cohesive unit to create a safe, high quality, and efficient solution for the needs of every customer.



Global Diving & Salvage, Inc. strives to go beyond the basic services offered and treat each client as a long-term partner to create a professional atmosphere of trust, integrity, and excellence.

For more information and previous projects visit: [www.gdiving.com](http://www.gdiving.com)

## Meet the ASA Membership

### General Members



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For membership information, please contact Brad Rosello, Chairman, ASA Membership Committee via email at [bradleyengineering@yahoo.com](mailto:bradleyengineering@yahoo.com), or Dick Fredricks, ASA Director, via email at [rfredricks@vesselalliance.com](mailto:rfredricks@vesselalliance.com).