Lessons of the Exxon Valdez for the Gulf of Finland

Richard Steiner, Professor and Conservation Specialist,
University of Alaska Marine Advisory Program: afrgs@uaa.alaska.edu

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Maritime transport of petroleum and other hazardous substances presents significant risk of widespread, even catastrophic environmental, economic, and social damage from large spills. This risk can, and must, be significantly reduced (by 70% or 80%) through the implementation of stringent risk reduction measures in the maritime transport system.

Experience suggests that once a major oil spill has occurred in the marine environment, it is difficult (if not impossible) to contain, recover from the sea surface or shorelines, rehabilitate oiled wildlife, restore injured ecosystems, and adequately compensate people and businesses that suffer losses. Thus, while it is important to improve oil spill *response* technologies and preparedness, much of our collective effort needs to be applied to oil spill *prevention*. As context to better appreciate the urgent challenge of enhancing the safety of maritime transport of oil in the Gulf of Finland (GoF), this presentation will discuss lessons from the catastrophic Exxon Valdez oil spill in Alaska in 1989 as well as the 2004 Selendang Ayu spill in the Aleutian Islands of Alaska.

Exxon Valdez oil spill

The March 24, 1989 grounding of the super-tanker *Exxon Valdez* in Alaska spilled over 11 million gallons (40,000 tons) of Alaska North Slope crude oil into Alaska's Prince William Sound, becoming one of the most significant man-made environmental disasters in human history. The resulting spill covered over 10,000 square miles of Alaska's coastal ocean, and oiled some 1,500 miles of some of the nation's most productive and ecologically sensitive shoreline - three national parks, four national wildlife refuges, a national forest, five state parks, four state critical habitat areas, one state game sanctuary, and many ancestral lands for Alaska Natives. Though not the largest in terms of volume spilled, the Exxon Valdez spill killed more marine organisms than any other oil spill on record. Hundreds of thousands of seabirds, marine mammals, fish, intertidal and subtidal invertebrates and plants in the coastal ecosystem were killed by the acute effects of the oil, and chronic injury was and continues to be serious as well almost 20 years later. Human communities dependent on the marine ecosystem for their livelihood were seriously impacted, showing increased indices of stress, substance abuse, domestic problems, and other anxiety related illnesses, giving rise to what sociologists described as "corrosive communities" in the spill region. The economic disruption caused by the spill was enormous as well.

Today, almost 20 years later, government science confirms that most of the natural resources injured by the 1989 Exxon Valdez spill have still *Not Recovered*. Of the 30 resources and resource services that were officially monitored by the government, the *2006 Status of Injured Resources and Services* (the government's official position on the condition of the ecosystem injured by the Exxon Valdez oil spill) lists only 10 today as fully *Recovered*, with the rest in various stages of recovery. Two species – Pacific herring and pigeon guillemots – are still listed as *Not Recovering*. Resource services that have not fully recovered include subsistence, passive uses, recreation and tourism, and commercial fishing. And there is still a significant amount of toxic Exxon Valdez oil (about 40,000 gallons) in beach sediments in the region. Some scientists suggest that the Prince William Sound ecosystem *may never recover* to pre-spill conditions. Ecologically, socially, and economically, the Exxon Valdez Oil Spill was, and continues to be, an enormous catastrophe. The governments settled their claims with Exxon in 1991, paying $1 billion (USD) for the governments to conduct a restoration program. The private litigation continues, with the U.S. Supreme Court rendering a decision in June 2008 reducing the punitive damages owed by Exxon to $507 million (USD). Contributing causes to the Exxon Valdez disaster include corporate recklessness in allowing a relapsed alcoholic to master a super tanker, the captain leaving the bridge under command of a mate without proper credentials for the waterway, lack of an autopilot alarm, inadequate VTS tracking, and inadequate spill response preparedness.

Beyond the actual acute and long-term damage caused, the spill became a powerful symbol across the world for the potentially tragic environmental consequences of corporate recklessness. As such, the Exxon Valdez has an indelible place in history, alongside other totemic industrial disasters such as Chernobyl and Bhopal, and serves as a poignant example of the *true costs* of our dependence on oil.

Selendang Ayu oil spill

The Selendang Ayu was a Malaysian flagged freighter carrying soybeans in 2004 from the U.S. west coast to Asia when it lost engine power in a winter storm in the Bering Sea, and drifted ashore on Unalaska Island in Alaska's remote Aleutian Islands. The ship broke apart, six crewmen were lost, and 350,000 gallons of heavy fuel oil spilled into waters of the Alaska Maritime Wildlife Refuge, killing several thousand seabirds in the region. Contributing causes include failing to maintain the engine, failures in on-board decision making (shutting down the engine off a lee shore to attempt repairs in a force 10 storm), company policy (financial incentives to keep underway), delay in reporting the loss of engine to shore side authorities, the lack of adequate shore side vessel tracking, and lack of an adequate emergency tug capable of rendering a tow in storm conditions.

Lessons for Gulf of Finland

Lessons of these two disasters will be discussed as they apply to the Gulf of Finland (GoF). The take home lesson is that if we are going to continue transporting oil in ships, then we can and must reduce risks of spills as much as possible. There are any number of scenarios for catastrophic oil spills from tankers and freighters in the Gulf of Finland (GoF), including grounding or collisions caused by power or steering loss, navigational error, hull failure, fire/explosion, etc.

The three principal components of the Gulf of Finland oil transport system that should be carefully evaluated to reduce risk of catastrophic spills are *the ships*, *vessel traffic systems / shore side monitoring*, and *the crews*.

Ships**:** In order to adequately evaluate and manage the risk of oil transport through the GoF, it is necessary to fully characterize the fleet that is used to haul oil: name of vessels, age, hull design, classification society, owner and operator, previous owners, insurer, status of class reports, flag and changes in flag, complete casualty history, pollution history, company vetting policies and maintenance schedules, major repairs completed, history of any and all deficiencies and violations found by classification society or flag state or port state, history of detentions and/or refusals to enter port in vessel's history, etc. Also, companies that charter ships have established vetting procedures by which they screen the quality of vessels. These procedures need to be thoroughly evaluated by independent analysts, and the inspections should be a matter as well for government maritime authorities.

Regarding vessel construction standards, while the United States and subsequently the International Maritime Organization (IMO) have mandated the phase-in of double-hulled oil tankers, until this requirement is fully implemented, the GoF remains exposed to additional risk from single-hulled tankers. Double hulls provide a significant degree of reduction in risk of oil spills in the event of grounding or collisions of loaded tankers. Further, new tankers should be fitted with twin engines, twin rudders, and bow thrusters. This is the sort of tanker now used in the Alaska trade, and they are actually safer than that required by U.S. law.

Until the fleet of tankers sailing the GoF is entirely double hulled, there are several interim structural and operational measures that could be used to reduce spill risk from single-hulled vessels. Restrictions against carrying oil in wing tanks would provide additional protection in the event of an accident (particularly collisions). Hydrostatic Balanced Loading (HBL), whereby the cargo holds are not filled all the way so that in the event of a hull rupture the inward pressure of seawater is greater than the outward pressure of oil, would greatly reduce oil outflow in grounding situations. Another interim possibility is to fit single-hulled cargo holds with a horizontal mid-deck, essentially resulting in a hydrostatically balanced load. Extensive testing has confirmed the validity of the mid-deck design. Such minimum interim measures should be considered until the entire GoF fleet is double-hulled, with redundant engine and steering systems.

Vessel Traffic System / Shore side Monitoring: The vessel traffic situation needs to be thoroughly analyzed and safe routing agreements should be established and continually monitored. These agreements could include an east-west traffic lane with a traffic separation scheme that is located as far from shore as possible. This traffic assessment should also identify what shore side monitoring system would enhance the safety of navigation - a vessel traffic service (VTS), an automated dependent surveillance system (ADSS), Automatic Identification Systems (AIS) receivers along the route, use of distress satellite transponders on vessels (GMDSS) for tracking, and tug escorts in hazardous seaways. Additional navigation aids should be considered along the entire route.

Of critical concern is how to render assistance to disabled tankers and freighters. A plan should be developed that would identify and evaluate existing tugs and emergency towing and salvage capabilities both in-region, and include an assessment of various alternative equipment and deployments that would improve the safety of the system. Protocols should be clearly established whereby tanker / freighter masters are required to immediately notify governmental shore side authorities of any loss of power or steerage, so as to avoid potentially disastrous delays in dispatching rescue tugs to the scene. Emergency tow packages similar to those employed in Prince William Sound, Alaska are now required on all tankers, and should be considered for freight vessels as well. Additionally, portable tow packages that can be lifted via helicopter to a disabled ship should be stationed along the route. And the ship salvage assets of the GoF should be assessed. Also, communication protocols should be established whereby loaded tankers are required to report positions along their transit route to both shore side government authorities.

As well, prior to a tanker loading or unloading at one of the GoF terminals, there should be rigorous inspection conducted by trained government maritime personnel. The inspections should include the tanker's inert gas system operability, the oily water separator, fire fighting systems, cargo pump emergency shut- down systems, tank level alarms, combustible gas detectors, steering gear systems and failure alarms, back up steering gear operability, emergency generator operability, vent pipes, pump-room shutdowns and explosion proofing, navigation equipment, engine room systems, and so forth.

Crew: Finally, because over 80% of maritime disasters are caused by human error, it is incumbent upon the governments to insist on the highest possible crew standards for the tankers and freight vessels using the GoF. The IMO Standards for Training, Certification, and Watchkeeping (STCW) Convention of 1984 provides just the bare minimum, and GoF authorities should insist on higher crew standards. In general, the quality of seafarers has eroded over the past few decades. Crew complements are now about 1/2 of what they were just 30 years ago, which causes increased fatigue, additional stress, reduced on-board training and maintenance time, decreased morale, and less ability to respond to emergencies. Also, many ship owners are now relying on manning agencies to supply crew, who generally supply the least expensive, least experienced, multinational crews that often have trouble simply communicating with one another in a common language.

Attached are recommendations from my 2004 visit to the Gulf of Finland sponsored by the U.S. State Department. Of particular note to reiterate here is recommendation #4: the need for a Comprehensive Vessel Traffic Risk Assessment for the Gulf of Finland to identify what can go wrong, how likely it is, what the consequences would be, and what risk-reduction measures would be cost-effective.