

Looking To The Future – Setting The Agenda For Oil Spill Prevention, Preparedness And Response In The 21st Century

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Abstract

The Oil Pollution Act of 1990 (OPA 90) was largely driven by the catastrophic EXXON VALDEZ tanker spill and several other major tanker spills that followed in 1989. Under the OPA 90 mandate, the U.S. Coast Guard, in partnership with other Federal agencies and industry have implemented a number of initiatives that have significantly enhanced the national oil spill prevention, preparedness and response capability. Declining trends in the volume of oil spilled into U.S. waters indicates that these initiatives are at least in some measure successful.

The Coast Guard is now concerned about what the future may hold in terms of oil pollution threats, and prevention, preparedness and response program shortcomings and opportunities in the future. To address this issue, the Coast Guard, in partnership with other National Response Team agencies and industry, is conducting a Broad-Based Programmatic Risk Assessment to develop a comprehensive vision and strategy for the Oil Spill Prevention, Preparedness and Response (OSPPR) Program in the 21st Century. This study will characterize the current and emerging oil spill threats by source category, assess the potential impacts of these threats to define overall risk, and examine the current and projected effectiveness of OSPPR initiatives in minimizing these risks. Key issues, problems and focus areas will be identified and targeted for follow-on risk analysis and management activities by the Coast Guard and agency and industry stakeholders.

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Introduction - Putting *Exxon Valdez* and OPA 90 in Perspective

It has now been over ten years now since the infamous *Exxon Valdez* spill occurred in the waters of Prince William Sound, Alaska. In the following years the United States passed The Oil Pollution Act of 1990 (OPA 90), and industry, government and the public have expended vast resources and energy to reduce the possibility that this type of spill will ever happen again. International environmental debate and activity during this period has been intense, as the fallout from the Valdez incident, and other significant spills throughout the world focused attention on oil pollution.

The U.S. Coast Guard's Oil Spill Prevention, Preparedness and Response (OSPPR) efforts have been underway for over three decades, since the Santa Barbara Channel oil spill in 1969 raised the nation's awareness of the threat of large spills, and the Federal Water Pollution Control Act Amendments (FWPCA) of 1972 designated the Coast Guard as the lead Federal Agency for spills in the coastal zone. Throughout these years, the Coast Guard, in partnership with other agencies and industry, apparently has achieved notable success in reducing the number and severity of spills in U.S. waters, and mitigating the impacts of spills that do occur.

This success has been achieved by developing and implementing new regulations requiring that preventative measures be taken to avoid spills; undertaking aggressive inspection, monitoring and enforcement programs to ensure that vessel and facility owners are complying with these regulations; establishing a national spill response infrastructure to be able to intervene when appropriate actions are not being taken by the spiller; developing the needed countermeasures and cleanup technologies to respond to spills; and working with other agencies, including the National Oceanic and Atmospheric Administration, the Environmental Protection Agency and the Department of Interior to ensure that appropriate damage assessment, remediation and restoration activities are undertaken. OPA 90 greatly expanded the scope and intensity of the Coast Guard's OSPPR program by mandating a broad array of regulations and Federal initiatives to be implemented and enforced by the Coast Guard and other Federal agencies, and by providing funding to significantly bolster the Coast Guard's capabilities to prevent and respond to spills.

Over the past few years, the volume of oil spilled from vessels into U.S. navigable waters exhibits a downward trend is presented in Fig 1. It is assumed that at least a portion of these environmental gains are due to increased awareness of oil pollution and the aggressive OSPPR measures taken to date, particularly those mandated by OPA 90. Figure 1 also indicates that the number of spills has increased, but this is undoubtedly due to an increase in the number of spills reported because of increased awareness of spill reporting requirements following OPA 90. However, there is still cause for concern in that large oil spills continue to occur, and catastrophic spills always remain a threat as long as large volumes of oil are moved by tanker, barge and pipeline through U.S. waters. This continuing threat of oil spills has been underscored in the past few years by several major barge and non-tank vessel spills in the US, as well as several major tanker spills overseas. It is also clear that oil in large quantities may still be entering the marine environment from smaller but more numerous spills and routine operational discharges.

It is also important to note that past enhancements in the national oil spill prevention, preparedness and response posture and capabilities have been triggered by major spills that capture public attention and highlight specific shortcomings. Although OPA 90 is landmark environmental legislation, it was very much driven by a single event, and focuses primarily on major tanker and barge spills. History shows that there is an inherent tendency to focus our energies on preventing, preparing for, and responding to the “last big spill”, without due recognition of other existing or evolving oil pollution threats. As a result the U.S. Coast Guard is concerned as to what these threats may be and whether current regulations and initiatives implemented under OPA 90 will adequately address these threats in the future.

Developing a Vision and Strategy for the Future

To address these concerns, the Coast Guard is seeking to develop a more comprehensive vision of continuing and emerging oil pollution threats, and formulate a coordinated prevention, preparedness and response strategy to deal with these threats in the 21st Century. Accordingly, the Coast Guard Office of Marine Safety and Environmental Protection is undertaking a Broad-Based OSPPR Program Risk Assessment to provide direction and guidance for the prevention, preparedness and response program in the coming decade. This risk assessment follows the general risk-based decision-making philosophy currently embraced by the Coast Guard as part of its business planning strategy. It will seek to consolidate and analyze the available information and experience gained over the past three decades on oil spill threats and the effectiveness of prevention, preparedness and response measures, and project forward to identify new oil pollution threats and new opportunities for strengthening the OSPPR program.

Much of the groundwork for this Broad-Based Risk Assessment has already been accomplished or is currently in progress. A number of databases and reports exist that document oil pollution trends and risks over the past three decades, and numerous studies have been conducted that address the effectiveness of various OSPPR initiatives in dealing with these risks. For instance, the National Academy of Sciences published extensive studies in 1975 and 1985 on the inputs, fates and effects of oil pollution in the marine environment (NAS, 1975; NAS 1985). A third comprehensive study sponsored by the National Academy is currently underway and will be completed within the year. Statistics and trends in oil spills are routinely reported by the Oil Spill Intelligence Report (Etkin, 1999 a-c), [Oil Spill Intelligence Report no longer does this] and data on spills in U.S. waters is continuously collected through the Marine Safety Information System (MSIS) and summarized on the Coast Guard’s Web Page.

A number of studies have recently been completed addressing the risks posed by current and emerging oil spill threats including oil transport by barge (USCG/AWO, 2000), lightering operations (NRC, 1998), non-tank vessel bunker spills (USCG, 2001), marine pipelines (NRC, 1994) and deepwater oil exploration and production operations on the continental shelf (MMS 2001 a and b). The Coast Guard recently completed a study addressing the effectiveness of various OPA 90 preparedness initiatives (USCG, 1997), and is currently undertaking a detailed analysis of the effectiveness of OSPPR focused regulations implemented since OPA 90 (VNTSC, in preparation). In this sense, the Broad-Based OSPPR Program Risk Assessment will be a “study of studies”, an effort to capture and categorize current information on the oil pollution threats and OSPPR needs and opportunities. This will provide a comprehensive

knowledge base and understanding of the current situation, and facilitate development of a future vision and strategy.

Another key component of the effort will be capturing the perspective and wisdom of other stakeholders involved in preventing and responding to oil spills including other agencies, non-governmental organizations, and members of the oil transportation industry. This is being accomplished by gathering information at workshops and conferences. A panel session was conducted during the 2001 International Oil Spill Conference in Tampa, Florida, which summarized and discuss the current perspective on the effectiveness of OPA 90 prevention, preparedness and response measures (IOSC, 2001). In addition, a Public Hearing was advertised in the Federal Register and held at Coast Guard Headquarters in December 2000 to allow stakeholders to provide comments on the Broad-Based Risk Assessment, and identify key issues and problems that need to be addressed. Comments and questions were submitted through a public docket, and from participants at the CGHQ listening session. Off-site participation in the listening session was made possible by broadcasting the session on the Internet. A summary of these Public Hearing Proceedings is available through Coast Guard Headquarters. As the Broad Based Risk Assessment proceeds, stakeholder input will be solicited on an ongoing basis, and key agency, NGO and industry stakeholders will be asked to actively participate in the risk analysis and strategy formulation process.

Structure and Methodology for the Broad-Based Risk Assessment

In carrying out the Broad-Based OSPPR Program Risk Assessment, the Coast Guard will follow, an adapt as necessary, its Risk-Based Decision Making (RBDM) process which has evolved over the past several years. Simply stated, Risk-Based Decision Making is “a process that organizes information about the possibility for one or more unwanted outcomes into a broad, orderly structure that helps decision makers make more informed management choices” (USCG R&D Center, 2001). The first step in the process is defining the decision structure, which includes determining the decisions that need to be made, identifying key factors that influence these decisions, gathering information about these factors, and identifying key stakeholders in the process. The second step, risk assessment, further defines the undesirable events or situations, determines the likelihood of their occurrence, and estimates how severe the consequences may be taking into consideration both the inherent impacts and mitigation measures. In the risk management step, the stakeholders analyze the various risks, determine which are acceptable and which are not, and formulate strategies to reduce risks as necessary. Impact assessment, the fourth step involves tracking the effectiveness of these strategies (actions taken) to manage risks. If the program is not benefiting from actions, it must accept current risks or revisit the process to find better answers. Throughout the process, there must be open communication with stakeholders to stimulate the flow of information and obtain buy-in to the process so that the final decisions and strategies are supported by all parties. The overall RBDM process is depicted in Fig. 2.

In actuality, Risk Based Decision Making processes have been continuously, albeit sometimes informally applied in developing and implementing many of the OPA 90 oil pollution prevention, preparedness and response initiatives. For regulatory initiatives this takes the form of a Regulatory Assessment, which includes a careful analysis of the objectives, costs, benefits and environmental and economic impacts of the proposed regulatory initiative. The current Broad-Risk Risk Assessment represents the first time the Coast Guard has applied Risk-Based Decision

Making principals at a strategic, programmatic level to gain perspective on the overall direction and effectiveness of the oil spill prevention, preparedness and response program, and make adjustments to its marine environmental protection strategy as appropriate.

Phase I of the Broad Based Risk Assessment focuses specifically on the first two steps in the process – defining the RBDM analysis structure and assessing current and emerging risk factors, potential impacts and the effectiveness of current risk mitigation measures. A general schematic for the Phase I, Risk Assessment Process is provided in Fig. 3. The in-depth analysis of management options to reduce risk and the formulation of implementation plans will follow from the current effort (Phase II), and involve further analysis, stakeholder input, and mitigation strategy formulation. However, as part of the Phase I process, methodologies for accomplishing the management and implementation portion of the RBDM process will be investigated and key risks, issues and problems to be addressed I Phase II will be identified.

The risk assessment will begin with a detailed review and characterization of current and emerging risks of oil spills by industry source category. The overall risk of pollution from a specific source category is a function of the probability of occurrence and the consequences. Regularly occurring events with low to moderate short-term consequences, such as recurring hydrocarbon input from a storm drain due to non-point source runoff may appear to deserve less attention than rarely occurring events with catastrophic consequences. However, the long-term impact of chronic events cannot be ignored either. Only by fully characterizing risk events or category of events can an adequate understanding of the problem be gained.

Risks will be characterized by various source categories (e.g. tankers, barges, non-tank vessels, marine pipelines, offshore facilities, and onshore facilities). The frequency and likelihood of spills from each category will be assessed based on available statistics on number of spills, volume of spills, and causes of spills. This will provide a perspective on how the threats from the various source categories have evolved over the past three decades. Having defined the current risk status quo, an assessment will be made as to how risks may change in the coming decade, based on external drivers such as an increased demand for imported oil and increased volume of marine transportation, and the emergence of new source categories such as offshore Floating Production, Storage and Offloading (FPSO) units for deepwater oil production.

The consequences of spills from each source category will be assessed in terms of environmental, economic and political impacts. Typical spill impacts will be characterized in terms of spill size, type of oil and spill location. Where possible, order of magnitude environmental and economic costs will be estimated for each spill category, based on available statistical data and past spill case histories. The socio-political impact of spills by source category will be qualitatively assessed based on the literature and past spill case histories.

Once the current and emerging risks have been characterized by source category, the Phase I study will analyze the sensitivity of various risks to current mitigation measures including prevention, preparedness and response initiatives that have been or could be implemented to address risks posed by spills from a particular source category. Specific mitigation measures, many of which were mandated or promoted by OPA 90, include:

Prevention:

- Double Hull Requirements
- Vessel Crew Training and Licensing Requirements (STCW)
- Vessel Management Requirements (ISM, Industry Programs)
- Oil Transfer Spill Prevention Requirements

- Port State Control Inspections
- Offshore Platform Spill Prevention Measures
- Pipeline Spill Prevention Measures
- Non-Point Source Control Measures

Preparedness:

- Federal/State Agency Contingency Planning (National & Area Plans)
- Coast Guard Regulated Responsible Party Response Planning (Vessel and Marine Transportation Facilities)
- Qualified Individual Requirements
- Other Federal Agency Regulated Responsible Party Response Planning (Offshore Facilities, Pipelines, Non-marine Transportation Related Facilities)
- Oil Spill Removal Organization (OSRO) Classification Program
- National Preparedness for Response Exercise Program (PREP)

Response:

- National Strike Force Augmentation
- Incident Command System Implementation
- Salvage and Vessel Containment Countermeasures
- Augmented Responsible Party Liability (Criminal & Civil)
- Mechanical Recovery Advances
- Alternative Countermeasures Advances (In Situ Burning and Dispersants)
- Shoreline Cleanup Advances
- Natural Resource Restoration (NRDA Procedures, New Technologies)

Information is being compiled to characterize the current contribution and effectiveness of these mitigation measures in preventing or reducing the impact of oil spills from the various source categories. This information will be obtained from a review of the substantial literature compiled in technical papers, reports and Web pages, as well as, the various Proceedings of the Biennial International Oil Spill Conference and other workshops and conferences. Case histories from significant major spills over the past three decades will be analyzed to determine the effectiveness of mitigation measures on this important category of spill events. Perspective will also be derived from the results of the stakeholder Public Hearing that was held at Coast Guard Headquarters in December 2000. In examining the sensitivity of spill source categories to the various initiatives above, the risk assessment will focus on the major categories: vessels, facilities, offshore platforms, pipelines and non-point sources. In each major category, effectiveness of each measure in mitigating the present and future risks associated with a source category will be examined.

The final step in Phase I of the Broad Based Risk Assessment will seek to identify emergent oil spill risks for which there do not appear to be adequate preventative, preparedness or response measures in place, as well as identify areas where a point of diminishing returns has been reached in addressing a particular risk. For each of these notable risks a list of key issues, constraints and opportunities will be compiled. However, Phase I will not attempt to resolve exactly how these shortfalls will be overcome as this is part of the risk analysis and management process. It will provide the needed source material to be used in a subsequent risk management

analysis to be conducted by the Coast Guard, or by a team of Federal and industry stakeholders. Such a risk management analysis will be conducted using a specific RBDM methodology suited or tailored to the oil spill prevention, preparedness and response program.

Summary and Future Directions

In summary, we in the United States, and indeed the world must be forward looking if we are going to meet the opportunities and risks that will present themselves in the coming years. The United States Coast Guard has initiated a process that will allow us to do just that. Phase I of this Broad-Based Risk Assessment process will characterize the nature and frequency of spills from present and likely future sources. Next, the expected impacts associated with each source category will be analyzed and the sensitivity of risks to prevention and mitigation by various OPA 90 prevention, preparedness and response initiatives will be examined. Finally, the study will highlight key issues and problems to be addressed through a follow-on risk analysis and management process (Phase II). Phase I of the Broad-Based Risk Assessment will be completed in the summer of 2001.

The Coast Guard is keenly aware that solutions to future threats cannot be solely addressed by a single stakeholder. After the completion of Phase I, the Coast Guard will seek review and assistance from Federal and State agencies, organizations and industry partners to produce a comprehensive strategy and plan for oil spill prevention, preparedness and response in the 21st Century. As always, the Coast Guard will interact with international partners and stakeholders as well, to coordinate national policy with the interests and needs of international commerce and environmental protection.

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Figure 1. Vessel Spills in U.S. Navigable Waters 1973-2000.

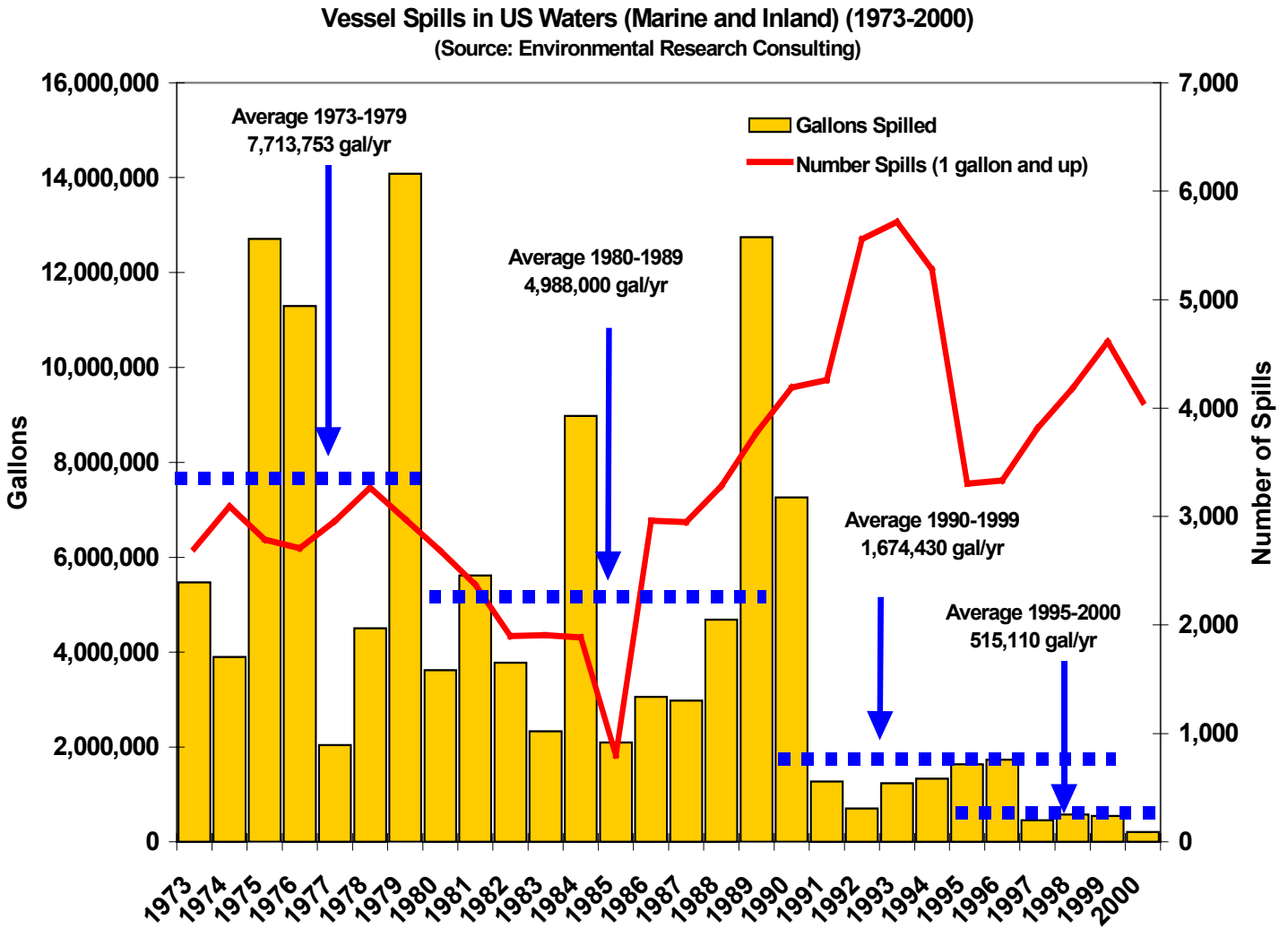
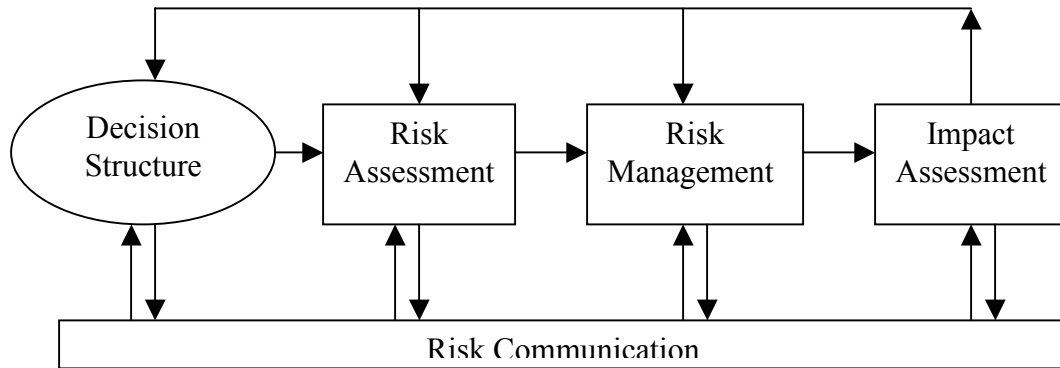


Figure 2. Risk-Based Decision Making Process (CG R&D Center, 2001)



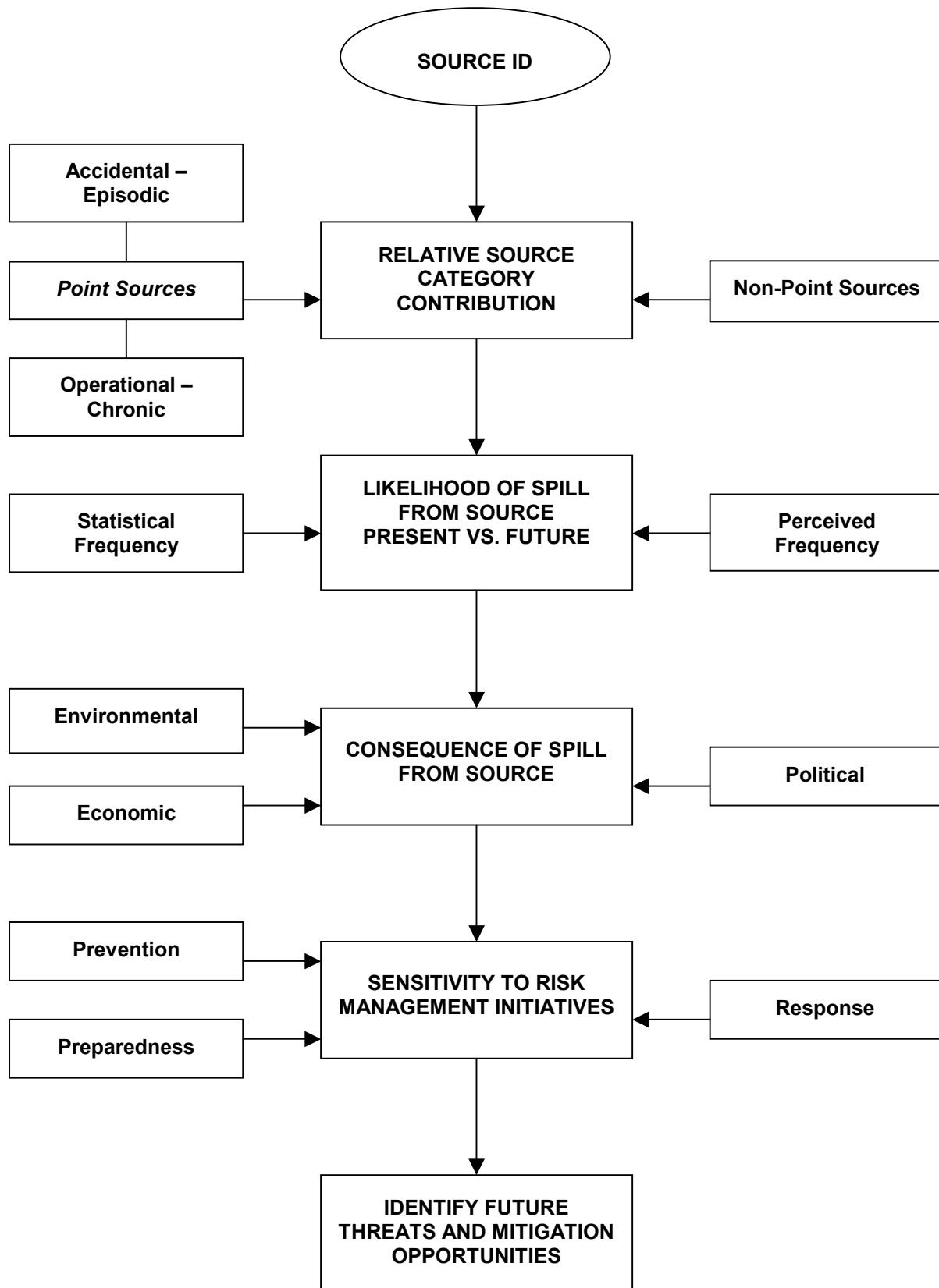


Figure 3. Process Schematic for Phase I of the OSPPR Broad-Based Risk Assessment.