RISK BASED PLANNING
WILL YOUR REGULATORY COMPLIANT PLAN MEET YOUR ENVIRONMENTAL GOALS?

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ABSTRACT

During the 2004 and 2005 Hurricane Season, one of the lesser known results, but potentially more environmentally threatening, were damaged, downed production platforms and the associated production.

Downed production platforms have multiple sources of potential releases. Combine multiple downed and damaged production platforms with the need to intervene and secure production, and the risk of an oil release is increased. One question that needs to be answered: What are the related risks to the many different scenarios that could possibly occur during impending, multiple, simultaneous operations?

One of the goals BP established was to not have oil impact the shoreline or nearby economically significant marine facilities. Both shoreline and economically sensitive areas are within 12 miles or less of the downed production platforms.

To accomplish the no impact goal, a three phased approach was used to create a supplemental response capability.

Phase 1: A risk matrix was created to address the multiple potential sources and impacts while evaluating the potential for environmental and economic impact.

Phase 2: Utilizing the existing response plan, which met or exceeded regulatory compliance, evaluated the effective ability to respond to the potential risk in the varied prevailing weather conditions and provide the best opportunity for preventing impact to environmental and economic priorities.

Phase 3: Developed a fiscally responsible plan to address the short-comings of the existing plan and secured resources based on the evaluation that would provide the best opportunity to meet the BP goals.

The paper will provide a discussion of the technical processes used during each phase and present practical means for assessing multiple risks and scenarios. This will include a unique application of a safety risk matrix evaluation. The second area of emphases will expand on the process of using the risk matrix results for resource planning.

The principles employed to prepare the response capability are well developed and historically substantiated, but they have been combined in a practical, technical and unique way to planning for environmental response in a real world risk.

FULL TEXT OF PAPER

Regulatory Plans are in place to provide a basis for response to any given emergency situation. All of these plans address major, worst-case emergencies based on the governmental regulations, but few address the actual emergency based on the goals of the company they serve. Using the 2004 – 2005 hurricane season's impact on production platforms as an example, many companies were faced with the issue of long-term, ongoing problems. These problems are usually very specific to the individual company and a particular situation because of the results of the hurricanes. These situations have to be addressed in accordance with the company's environmental goals as well as the Regulatory Plan. Will your Regulatory Plan actually meet the environmental goals set forth by your company?

The following scenario addresses this situation specifically with the supplemental plans set forth by BP in accordance with the company's goal of having no oil impacting sensitive areas.

During the hurricanes that plagued the US Gulf Coast offshore oil and gas industry during the summers of 2004 and 2005 many spills occurred, production was shut in, and refineries were temporarily disabled. These occurrences provided great editorial material for the many world news media agencies which thrive on great video footage of visual disasters to engage audience's undivided attention. But, when the pictures show nothing but a slightly leaning platform or, worse yet, nothing but clean blue ocean, there is little left for the shock addicted media to parade across the screens. Many oil and gas structures sustained considerable damage or total devastation and, yes, several major spills occurred. But, to the credit of a highly sophisticated series of emergency procedures and shut down systems, most spills were limited to just the oil in transit or lubricants. The vast production in the multiple reservoirs remained safe behind the carefully engineered down hole temporary plugs. Due to regulations and BP's general concern for environmental protection, the task remained to permanently plug the production associated with un-repairable offshore production facilities they owned. This task is usually easily completed with conventional tools associated with the industry. However, when the facilities are damaged to the point where they are not safe for equipment or workers required to conduct the abandonment activities, or in still more severe cases, where access is below the mud line and buried under tons of twisted iron on the ocean floor 100 or more feet below the ocean surface, there are challenges still to be met two years later.

Damaged and downed production platforms have multiple sources of potential releases. Combine multiple downed and damaged production platforms with the need to intervene and secure

production, and the risk of an oil release is increased. One question that needs to be answered: what are the related risks to the many different scenarios that could possibly occur during impending, multiple, simultaneous operations?

One of the goals BP established was to avoid having oil impact the shoreline or nearby economically significant marine facilities. Both shoreline and economically sensitive areas are within 12 miles or less of the downed production platforms.

To accomplish the "no impact" goal, BP used a three phased approach to create a supplemental response capability.

Phase 1: A risk matrix was created to address the multiple potential sources and impacts while evaluating the potential for environmental and economic impact.

Phase 2: Existing response plan was utilized, which met or exceeded regulatory compliance, to evaluate the effective ability to respond to the potential risk in the varied prevailing weather conditions and provide the best opportunity for preventing impact to environmental and economic priorities.

Phase 3: A fiscally responsible plan was developed to address the short-comings of the existing plan and secured resources based on the evaluation that would provide the best opportunity to meet the BP goals.

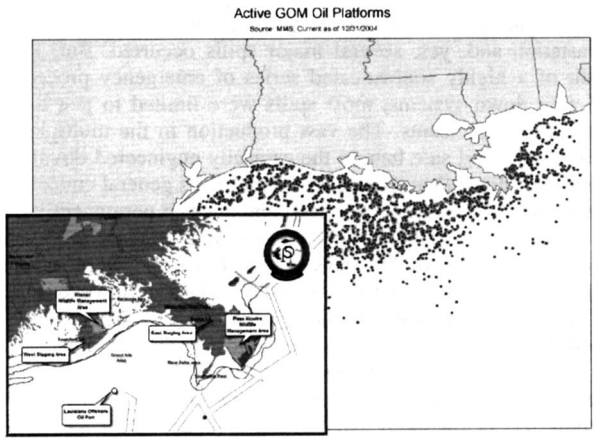
This paper will provide a discussion of the technical processes used during each phase and present practical means for assessing multiple risks and scenarios. This will include a unique application of a safety risk matrix evaluation. The second area of emphasis will expand on the process of using the risk matrix results for resource planning.

The principles employed to prepare the response capability are well developed and historically substantiated, but now have been combined in a practical, technical and unique way to plan for environmental response in a real world risk.

Production potential was carefully evaluated for each well involved in the project and, although no exact maximum expected rate of release volume was able to be calculated, educated guesses capped the number at a modest 50 to 150 bbls/day.

These are hardly numbers that would keep most major producers up at night, but combined with the obvious difficulty that would prevail to control one of these open holes along with the proximity to shoreline, some investigation into the need for immediate response capability was warranted. The chief enemy of effective oil containment and recovery on open water is time and the BP goal was to prevent oil from impacting the shoreline. But what measures are appropriate and how are they determined?

FIGURE 1



Sensitive areas are located in all directions and some are as close a 5 miles. (Figure 1) Water currents are unpredictable and can carry the oil at a rate of up to 1.2 knots per hour. Trajectories, although helpful in determining what might happen in a given set of conditions, can only tell us what a simple vector calculation depicts. A full stochastic model illustrates on a statistical basis what might occur. The models can only simulate 2 things: 1) what will happen based on an instantaneously observed set of conditions or 2) what would have happened based on historical stochastic data. But no spill model can accurately dictate a universal response tactic to meet a broad goal without pre-deploying all recovery and protection strategies for the entire Louisiana Gulf Coast, which is not practical. Close evaluation of sensitivity mapping yielded a focused emphasis on shore side protection; priorities and staging were dictated by the trajectory time estimates. This information was used by The O'Brien's Group (TOG) Response Management Team to provide a practical combination of equipment and personnel to be deployed in the event of a threat.

RISK EVALUATION

Risk evaluation is usually a process used to determine if an action should or should not be pursued. This process also involves identifying actions that can be taken to eliminate the hazard, reduce the probability of occurrence, or reduce the severity of the problem. In this situation, the elimination of the hazard, the downed platform, was not going to be easily accomplished. The team also knew that the actions to remove the structures and plug and abandon the wells would cause releases. Efforts would be taken to reduce the probability and severity of a release.

Considering these factors, the team knew that releases were going to happen and that a quick and planned response would be needed. Now the risk process switches its focus to reduce the probability and severity of the releases from impacting the shoreline or economically sensitive areas. A resource risk matrix was developed, which is driven by various scenarios for each platform and multiple releases from different platforms. A case was built for an expected release and the worst case release from each individual platform, as well as, multiple platforms. A special case was developed for a night release from each platform. The scenarios were reviewed to determine what spill resources, including both personnel and equipment, would be needed to respond to the scenario. An assessment was made to determine if the equipment was readily available or whether it needed to be purchased or put on retainer. Essentially, this led to a gap assessment between what was needed and what was available. An action plan and timeline was put into place to fill the needs. Based upon the review, it was determined that there were some factors which could not be overcome. These were severe weather and undetected, night-time releases. Based upon these actions, an assessment of the remaining risk of oil impacting the shoreline or economically sensitive areas was conducted. (See attached Appendix for resource risk matrix)

THE REALITY OF A DOWNED PLATFORM CAUSED BY A HURRICANE

When a full evaluation of the downed platforms was performed, it revealed that the risers (vertical production piping) were bent to the point of kinking; several of the kinks were below the sea floor and the production platform was crushed on top. The reality is that the activities to properly plug and abandon a platform downed in a hurricane will almost absolutely cause oil releases to the near offshore surface water environment that will require on water oil recovery. This activity is required to mitigate an existing problem: the effected platform is not properly plugged and abandoned as required by regulation. The usual company goal is to prevent a release by not engaging in an activity where releases cannot be prevented by engineering out the risk. The fact that the activity was required, and the possible result of the event will be in direct

contrast to the company goal, dictated that risk management functions be employed with the usual risk prevention functions.

Risk management is the human activity which integrates recognition of risk, risk assessment, development of strategies to manage the risk, and mitigation of risk using managerial resources.

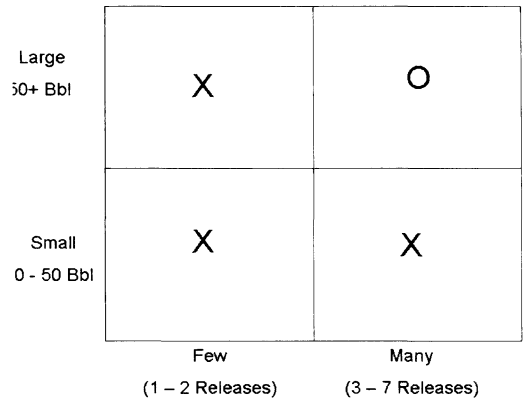
To summarize, response management planning accepts the risk assessment and thereby drives straight to the demand for risk to be managed. As a matter of industry practice, oil pollution response planning is largely a matter of compliance with regulations for offshore production, and starts and ends with a regulatory plan. This regulatory plan, although good for mandating available equipment, has little to do with any operational considerations related to managing specific risk associated with unique activities or corporate environmental goals, and it does not demand continuous improvement.

As with any risk management planning, research to determine the potential was provided by the engineering and operations experts. In the case of the downed platforms, the potential was limited to predictable work and the volume of potential was backed by many years of production records. It amounted to a few hundred barrels, mostly contained in the piping, which would need to be cut and removed to allow new access below the kinked risers. The identified situations were then submitted to a risk management team for development of a plan to achieve the company's environmental goal during the multiyear operation. The operations plan called for multiple work activities being conducted at the same time. Again, the regulatory plan does not address multiple simultaneous spills.

When evaluating risk management, a clear, concise, non-emotional evaluation of response resources must be developed to prevent astronomical expenditures. A quick, easy and well accepted method has been used in similar problems. The Boston Square (Figure 2) is an effective tool for matrix evaluation of subjective calculations. Using high probability-low risk, high probability-high risk, low probability-low risk, and lastly low probability-high risk scenarios will quickly reveal weakness and thus bring out qualitative needs with appropriate levels of effort to address.

FIGURE 2

BOSTON SQUARE RISK MATRIX



The qualitative analysis revealed that for the highest probability and highest risk (multiple releases low in volume), the regulatory plan resources provided little response security in achieving the company goal. In Figure 2, "O" is risk that is covered and "X" is risk that is not covered.

Armed with specifics of the risk, sensitivities from the Area Contingency Plan (ACP), and equipment capabilities, supplementary plans were developed that gave a much better chance to successfully achieve the goal.

BP REGULATORY PLAN

Because BP has substantial production in the Gulf of Mexico, they have response plans that address worst-case scenarios far greater than the 50 to 150 bbls at risk in the decommissioning project and resources, deployable within 12 hours, that bring to the site recovery and storage capacity of more than 10,000 bbls per day. Dispersants are available in as little as 3 hours with pre-approval. All of this will combine to mount a capable and mighty oil recovery armada on water and in the air for an enormous ongoing release. The response plan, which is driven largely by a worst case discharge regulation, did not really address that a small spill, close to a sensitive area, could have a big impact on said sensitive area if not quickly contained and recovered. Based on trajectories and the years of open water recovery experience provided by TOG it was determined that to best meet the goal, two things needed to be continuously available: 1) onsite observation and 2) appropriate containment and recovery. A defensive strategy was then built to protect the various sensitive areas. Because of the strong statement of the BP environmental goal, the plan more resembles the approach of a multi-line military defensive strategy than a regulatory plan - focused, detailed, with few single-point-of-failure risks.

SUPPLEMENTARY PLAN

Objective:

Provide continuous surveillance, spill response preparedness and asset capability throughout the area of operation to contain, recover and remove free-floating oil from the surface of the water and to prevent oil from impacting the shoreline.

On Water Response/Recovery Assets:

- Three 150 foot workboats (ID boat) to be on station in the at risk areas at all times. (weather permitting)
- IR Camera Operator for night watch response, command and control and camera operation.
- Each ID boat will be outfitted with the following oil spill response containment and recovery equipment:
  - 1 each, Oleophilic Skimmer
  - 1 each, Weir Skimmer
  - 100 bbl Offshore Rated Storage/Decant Tank, Skid Mounted, Standard Boom Vane (1 meter water depth)
  - 500 feet x 22" Oil Containment Boom
- On-water oil containment will be made available by placing approximately one thousand feet of offshore rated boom onboard the most appropriate work platform.
- Organization: The Response Organizational concept will consist of a designated On Scene Commander, positioned on board the most appropriate vessel, reporting to the field operations supervisors.

Reporting and Response Sequence:

- On Water Tier I Concept:
  This concept requires response resources in the field be capable of effectively responding to the "average most probable discharge" sheen releases for any of the downed platforms including multiple releases over a 24 hour period. These releases would require the use of enhanced sorbent boom skimming using the ID vessels jib arm and containment boom.
- On Water Tier II Concept:
  Requires the use of the mechanical skimming capability on spills considered as recoverable by mechanical means. This could incorporate the use of either one or both of the proposed skimming systems pre-positioned on the dedicated ID

vessels. Recoverable oily/water liquids would be pumped to the on-board 50 barrel storage tank pre-positioned on the back deck of the ID vessel.

- On Water Tier III Concept:
  In the event of a Worst Case Discharge, (multiple Tier II events, subsurface well blowout or a large quantity pipeline release) the response posture would require all ID vessels in maximum skimming operations and the possible incorporation of additional Oil Spill Response. This response may also entail the use of dispersants via air deliverable platforms from MSRC/ASI.

Shoreline Protection Pre-Planning:

In the event of a substantial, instantaneous, or ongoing release in heavy weather, the probability of all oil being recovered or dispersed is unlikely. Heavy weather in this case is defined as seas greater than six feet and/or winds greater than 18 knots. Therefore, should the oil be on a trajectory for shoreline impact, it is prudent to stage equipment where it is readily available to deploy on very short notice, given the proximity to land of the downed platforms. Figure 1 (see page 4) illustrates the highest sensitivity location identified in the Area Contingency Plans. Two stockpiles of protection boom and ancillary equipment are pre-staged on the west at Fourchon and the east at Venice. This will allow area responders to quickly deploy protection boom as the last line of defense to prevent impact to the shoreline

Air Operations Support:

Aerial surveillance is critical to early detection, tracking and tactical support. It is recommended that a small helicopter (Bell 206 or similar style) be available at all times.

Field Response Implementation:

The Response Supervisor on board the ID vessels is responsible for communicating the need for mechanical recovery or sorbent skimming for OSC concurrence.

CONCLUSIONS

Regulatory response planning has indeed accomplished the very valuable need to increase the available oil spill response resources and also equally valuable identification of sensitive resources. The resources for offshore response are largely aimed at recovering very large releases and not actually aimed at managing risk of impact to sensitive areas. This leaves these valuable resources vulnerable to impact from spills that can not be addressed in a timely manner or with appropriate tools to actually protect resources at risk. Oil spill planning could benefit from agencies and industries collaborating in the response planning process, to have plans and address pre-agreed and documented priorities, strategies and tactics to minimize impact to resources at risk.

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APPENDIX

RISK MATRIX TABLE

Scenarios	Resources to Respond	Resources Available?	Gaps	Actions to Close Gaps	Risk Still in System	Risk Ranking
Block location 1 Small Release < 1BBL at any Downed Platform	ID Boats + Air Ops	Yes			Weather	Low
Site 1						
Site 1 Large Release - 1 - 50 BBL	ID Boats + Disp + Air Ops	Not all needed	ID Boats need to be retrofitted; Severe Weather	Retrofit ID Boats; Activate Shoreline Protection	Weather	Med - Low
Site 1 Worst Case Scenario 150 BBL	ID + MSRC + Clean Gulf + Shoreline + Disp + Air Ops (2)	Not all needed	ID Boats need to retrofitted; Clean Gulf Contract Available; Added Helo (PHI Strike); Severe Weather	Check on Contract and Clean Gulf; Check on availability of 2 helos; Activate Shoreline Protection	Weather	Med
Shoreline Response for Site Release	Equip Staged at Fourchon; Personnel on Stand by	Not all needed	Need skimmers; equip is leased; personnel	Purchase equip; get skimmers; review personnel; conduct drills		Low
Night Release at Site 1	3 IR Cameras	1 IR Cameras	2 IR Cameras	Procure 3 IR Cameras	Weather	Med - Low
Site 2	Same as Site 1					
Site 3	Same as Site 1					
Site 4	Same as Site 1					
Site 5	Same as Site 1					
Multiple Small Releases	Same as Site 1					
Two Large Releases	ID Boats + Air Ops (2) + Clean Gulf 40 footer	Not all needed	ID Boats need to be retrofitted; Clean Gulf Contract; Helo Availability (PHI Strike); Severe Weather	Retrofit ID Boats; Check on Clean Gulf Contract; Check on 2 Helo Availability; Activate Shoreline Protection	Weather	Med - Low
Block Location 2						
Site 6						
Site 6 Large Release	Same as Site 1					
Site 6 Worst Case Scenario	Same as Site 1					
Shoreline Response for Site 6 Release	None that will make in time	Limited	Need skimmers; equip is leased; personnel	Purchase equip; get skimmers; review personnel; conduct drills	Weather	Low
Night Release at Site 6	Same as Site 1					
Site 7						
Site 7 Large Release	Same as Site 1					
Site 7 Worst Case Scenario	Same as Site 1					
Shoreline Response for Site 7 Release	Same as Site 6					
Night Release at Site 7	Same as Site 1					
Multiple Releases in the Block Location 2	Same as Site 1					
Large Release in the Block Location 1 and a large release in the Block 2 area	ID + MSRC + Clean Gulf + Shoreline + Disp + Air Ops (3)	Not all needed	ID Boats need to retrofitted; Clean Gulf Contract Available; Added Helo (PHI Strike); Severe Weather	Check on Contract and Clean Gulf; Check on availability of 3 helos; Activate Shoreline Protection (Need 2 contract companies)	Weather	Med
Another Operator Small Release Impacting Our Work Area	Same as Site 1, except stop work at affected platform. Evaluate situation before proceeding.					
Another Operator Large Release Impacting Our Work Area	Same as Site 1, stop work at all platforms. Evaluate situation before proceeding.		Indemnification paperwork? P&GA Impact	Involve P&GA and Legal		