Offshore Information for Area Contingency Planning

Gulf of Mexico

Offshore Response Concept of Operations (CONOPS)

Technical Document #3

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1 Introduction

In 2019, the Bureau of Safety and Environmental Enforcement (BSEE) sponsored a project in cooperation with the United States Coast Guard (USCG) to improve the content of the coastal zone area contingency plans (ACPs) with respect to the information necessary to effectively plan for and respond to large oil spills from offshore oil and gas facilities. This collaboration between BSEE, USCG District Eight, resource trustees, state agencies, oil spill response organizations (OSROs), and Area Committees resulted in a series of technical documents that provide offshore information for the Gulf of Mexico (GOM) on:

- Oil and Gas Infrastructure (GOM Technical Document #1)
- Worst Case Discharge Scenarios (GOM Technical Document #2 and Appendices 2A-F)
- Response Concept of Operations (GOM Technical Document #3)
- Response Strategies and BMPs (GOM Technical Document #4)
- Sensitive Species Profiles (GOM Technical Document #5).

These documents were developed specifically for incorporation by reference into the coastal zone ACPs and are hosted on the BSEE Oil Spill Preparedness Division's (OSPD) website. In addition to the above technical documents, an inventory of offshore spill response equipment and a set of offshore Environmental Sensitivity Indices (ESI) maps were created and embedded in NOAA's Environmental Response Management Application (ERMA). Collectively, these materials provide a foundation of risk assessment, resources at risk, and conceptual response information to inform coastal zone ACP planning and responses to a significant offshore facility oil spill incident.

This technical document contains a Concept of Operations (CONOPS) framework for planning, rapidly organizing, and responding to a Worst Case Discharge (WCD) incident in an offshore setting. The CONOPS is viable for any size of offshore spill incident whether it is a WCD or a smaller oil spill. This framework aligns with government and industry best practices and is not intended to be prescriptive in nature. During an actual offshore oil spill, an incident-specific CONOPS should be developed based on this construct but which is also adapted for actual spill conditions.

2 Purpose and Objectives

This CONOPS explains, in broad terms, the process and strategy involved in preparing for, responding to, and mitigating the impacts from a large offshore oil spill. To effectively manage a WCD-like incident, the CONOPS must clearly demonstrate a geographically and functionally layered, dynamic approach for deploying mitigation capabilities and strategies. The CONOPS also must be organized in a temporal sequence that reflects response priorities, the availability and deployment timelines of resources, and the evolving conditions on-scene. To that end, this CONOPS is built around the creation of divisions and zones that can be customized and sequenced, as appropriate, to most effectively address:

- The Availability and Phased Arrival of Response Resources On-scene
- Site-specific Circumstances of the Oil Discharge and Facility Location

- The Changing Properties (weathering), Distribution, Concentration, and Location of the Discharged Oil Slick, both Spatially and Temporally, and the Subsequent Mitigation Strategies and Response Equipment to be Used.

This CONOPS is centered on the response activities that could be taken for an uncontrolled offshore well incident occurring in deep waters on the outer continental shelf (OCS) but recognizes that there are differences in the response to alternate spill scenarios. To illustrate some of these potential differences, two examples of divisions and zones for different scenarios are included in this document. One scenario is provided as an example of a CONOPS for a deep water well blowout, while the second scenario is a surface blowout provided as an example of a shallow water nearshore incident. Additionally, some of the differences are further discussed in Section 10, "Alternate Scenario Considerations".

This CONOPS excludes some elements which are integral to a spill response, but out of scope for this technical document. These elements include:

- Initial Notifications
- Search and Rescue
- Marine Firefighting
- Incident Investigation
- Intentional Wellhead Ignition (IWI) as an Oil Spill Response Tactic
- Site Safety Requirements
- Authorization of Use Procedures for Alternate Response Technologies
- Wildlife Recovery Operations
- Decontamination, Waste Management, and Disposal

This document should not be seen as requiring the use of any specific spill response countermeasures and strategies during an incident. Instead, it is an effort to model a multilayered response to a large complex offshore spill. The use of any response strategy in an actual spill is subject to the authorization requirements of that strategy. Users of this CONOPS should refer to other documents in the RCP which are relevant, e.g., authorization of use annexes for alternate response technologies, the Offshore Response Strategies and BMPs Technical Document (#4), and other relevant references, e.g., the Aerial Dispersant Response After Action Report, Deepwater Horizon MC252 (Aerial Dispersant Group, ICP Houma, 31 Dec. 2010). All statutory and regulatory definitions apply.

3 Optimizing the Use of Response Countermeasures

In accordance with the NCP, the primary means of removing an oil spill should be through the use of mechanical oil recovery systems. However, incident specific circumstances may dictate that responders use multiple countermeasures to most effectively mitigate the impacts of an oil spill. Underlying this CONOPS is the necessary process of identifying the optimal mix of response strategies that will most effectively remove the discharge while minimizing ecological, socio-economic, and cultural impacts to the resources at risk. This has traditionally been accomplished through the use of comparative risk assessment models, with the most recently proposed model being described as a Spill Impact Mitigation Assessment (SIMA). SIMA is an updated approach to Net Environmental Benefit Analysis (NEBA) that also incorporates socio-economic considerations. Ideally, these assessment models are used in the planning phase to identify and assemble the information that will inform the use of response options for representative planning scenarios. During a spill response, the Unified Command can conduct an expedited or qualitative SIMA to rapidly select the response option(s) that are expected to yield the greatest overall environmental benefit. SIMA should neither pre-empt a response decision nor be the starting point for every decision. The goal of the SIMA methodology is to obtain agreement among the various parties over which response options will be most effective and result in the least overall impact on the environment.

4 Deployment of Strategies and Capabilities

As soon as an incident occurs, the responsible party (RP) will initiate a response drawing from the capabilities outlined in the facility's Oil Spill Response Plan (OSRP) consistent with the strategies and procedures contained in the NCP, RCP, and ACP. A well blowout is a continuous discharge of oil into the environment each day until the source is secured. Responders should characterize and monitor the evolution of incident-specific oil characteristics and behavior, and implement strategies as necessary to deal with varying degrees of fresh and weathered oil. This information will inform the selection of response strategies and equipment, and the deployment of these capabilities as the response progresses. This CONOPS assumes that the RP will efficiently and effectively manage the levels of ongoing logistical and technological support that are necessary to carry out assignments approved by Unified Command for all offshore vessels, secondary storage for mechanical recovery, and the supply chain for the stockpile of dispersants.

This CONOPS for an offshore facility WCD is organized around two key elements:

- The Temporal Phases of a Response
- A Geographical-based Layered Construct

This CONOPS describes each of the basic geographical layers in terms of divisions and zones and discusses the potential evolution of response activities within these areas over the course of the response in very general terms. There is also some discussion on alternative scenario considerations, such as spills occurring close to shore, and how that may affect the organization of the CONOPS. The document also contains several examples of geographically organized divisions and zones for response activities drawn over spill trajectory maps, for different points in time during the temporal phases of a response. These divisions and zones are drawn based on the oil thickness, distribution, and viscosity information provided by the trajectory analysis, relative to how that may affect various spill countermeasures, and are provided for illustration purposes only.

4.1 Temporal Phases of a Response

As the incident evolves, certain critical events will affect the structure and the geographic organization of the offshore response activities. These events are used as inflection points to identify the potential phases of the CONOPS. Specific times have not been applied to these different phases, due to potential variations in source location, travel times, availability of resources, and other uncertainties. The phases and corresponding inflection points are presented in Table 1.

Table 1. Temporal Response Phases with corresponding Inflection Points.

Response Phase	Inflection Point
Assessment	Arrival of surveillance and monitoring capabilities
Initial Response	Arrival of first mitigation resources (fast recovery vessels supplemented by the potential use of dispersant aircraft) and initial on-site Command and Control capabilities
Primary Removal Operations – Mechanical Recovery, Dispersants, and In-Situ Burning (ISB)	Arrival of high-volume mechanical recovery; supplemented by the potential use of surface-applied dispersants, subsea dispersant injection (SSDI), and in situ burn assets
Expanded Source Control Operations	Arrival of assets for implementing temporary source control solutions
Post-Discharge Removal Operations	Successful installation of temporary source control measures

4.1.1 Assessment

Assessment is the first phase immediately after initial notification where both the slick and the source are initially evaluated, determinations are made about the potential severity and impacts, and resources needed for the response begin to mobilize. Assessment activities may be carried out by offshore facility personnel using subsea observation and monitoring capabilities, as well as satellite surveillance and aerial observation and remote sensing.

Should a blowout occur in the Gulf of Mexico, the Unified Command will meet to discuss the initial assessment findings discovered by the RP, including well and spilled oil characteristics to predict oil volumes and flowrates, hazards, behavior, fate, and transport. Securing the source is a response priority of the highest order. The longer the discharge lasts, the more complicated and widespread the on-water response becomes, and the more critical and sensitive resources are impacted.

4.1.2 Initial Response

The initial response phase begins when the first response resources arrive at the scene. Fast response vessels (FRV) and dispersant aircraft are the fastest response assets available in the Gulf of Mexico. Dependent on conditions at the site and authorization of use procedures, they would likely be the first response assets that could be deployed on-scene.

Early responding resources must consider the safety of personnel before initially entering the "hot zone." Air monitoring readings will determine what actions can be taken and/or what additional personal protective equipment (PPE) is required for activities depending on the levels of Volatile Organic Hydrocarbons (VOCs), explosive vapor mixtures, and benzene. While FRVs may be first on-scene, these vessels do not carry respirators or PPE onboard for personnel to conduct removal operations in oil slicks that are producing high levels of volatile oil vapors. They only have the capability to detect if the area is safe for the responders onboard who work in Level D PPE. If initial air monitoring efforts reveal that conditions are not safe, any FRVs would retreat to a safe operating distance. Oil vapor readings over or near the well may exceed lower explosive limits (LEL), creating conditions that may result in explosion hazards.

The USCG or Responsible Party must be employed on site to provide command and control on-scene, and to provide direct communications with the shoreside Unified Command.

4.1.3 Primary Removal Operations

This phase is marked by the creation of a Fresh Oil Response Division (FORD) and the arrival of larger, high-volume oil recovery response equipment operating in the freshest, thickest oil coming from the discharge area. As stated in Section 3 above, the primary means of removing an oil spill should be through the use of mechanical oil recovery systems whenever possible. However, incident specific circumstances may dictate that responders use multiple countermeasures to most effectively mitigate the impacts of an oil spill. As such, this phase may also include the continued use of aerial dispersant operations and the start of in situ burning (ISB) operations in thicker oil areas further away from the source.

Subsea dispersant injection (SSDI) equipment could also be on-site and ready for use as soon as 48-72 hours following the start of the incident. Arrival of subsea dispersant assets will trigger some significant changes in the response. If implemented, SSDI operations will alter the amounts and expression of oil on the surface of the water, which may also shift the location and type of primary removal operations being conducted as time progresses. Aerial dispersants may start to be curtailed while mechanical recovery operations may shift mostly toward assets that are geared toward tracking down and removing distributed, discontinuous, thinner oil patches. Aerial dispersants would become more targeted once SSDI is employed concentrating on those areas that cannot be mechanically recovered due to time, distance, and proximity to shore or environmentally sensitive areas.

As soon as feasible, the Unified Command should conduct an assessment of dispersant quantities consumed daily for both SSDI and surface application. The long-term dispersant requirement for the response must be estimated as early as possible. A Dispersant Management Plan (DMP) should be developed in order to balance available dispersant resources with incident response requirements in order to avoid exhaustion of dispersant inventories before the source of the discharge can be secured. A DMP plans for the apportionment of dispersant stockpiles between the surface and subsea application methods.

Dispersants and SSDI can also change the characteristics and behavior of the oil as it rises in the water column. In the context of worker health and safety, SSDI may significantly reduce concentrations of VOCs, which are hazardous to human health, that are emitted from the oil that reaches the water's surface. Subsea dispersant and air monitoring data should be collected and analyzed simultaneously to validate the effects of SSDI operations in lowering VOCs, especially in work areas in the vicinity of the wellhead.

4.1.4 Expanded Source Control Operations

The arrival of source control assets for debris removal, deployment of a capping stack and, if necessary, flowback equipment will significantly increase the complexity of operations occurring at the source of the discharge, and will greatly expand the footprint of the Source Control Exclusion Division (SCED). This increased footprint may reduce the areas of access to fresh oil for high-volume, mechanical removal assets operating near the discharge source.

4.1.5 Post-Discharge Removal Operations

This phase begins once the source is secured through the implementation of temporary source control measures, such as a capping stack, and fresh oil is no longer being discharged. The response will shift focus to actions in areas further away from the source involving the recovery of weathered oil that spreads into distributed, discontinuous patches. High volume primary removal assets may be reassigned to these more distant divisions or demobilized. Responders must be aware that the characteristics of the oil in the Weathered Oil Removal Division (WORD) will likely require changes in removal operational approaches and/or equipment capabilities.

4.2 Geographical-based Layered Construct

Spill response operations in this CONOPS follow a geographical-based set of operational layers, starting at the spill source and expanding outward (see Figure 1). The actual boundaries will vary with incident-specific oil movement and weathering, as well as the duration and overlap of activities in these divisions. This section outlines the response operations that may be conducted in each of the various geographical divisions and zones, as the spill progresses from assessment to post-discharge removal operations. It includes spill trajectory modeling snapshots for these phases and corresponding graphics to depict the potential deployment of resources.

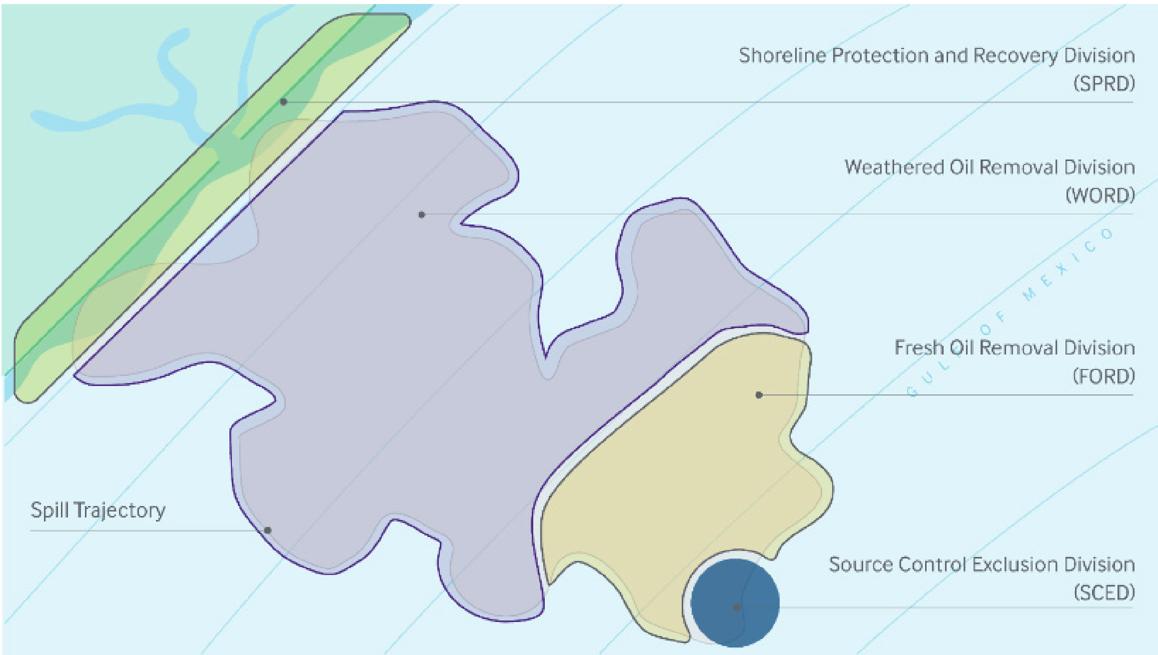

Figure 1. CONOPS Geographical Divisions.

5 Source Control Exclusion Division (SCED)

The Source Control Exclusion Division, or SCED, will be established around the location of the well blowout (or other discharge source type) for the duration of the event. As the response evolves, it may be expanded to a larger size to accommodate source control vessels, equipment, and actions that may occur on the damaged exploration/production facility and/or on the surrounding seabed. Additionally, operators are required to pre-identify potential locations for drilling relief wells. During the incident, relief well locations will be chosen based on safety considerations with the intent to also minimize impacts to the on-water spill response. Relief well operations will require their own safety zones/exclusion areas which could further expand the size of the SCED. The SCED should be sized to ensure that appropriate space is provided to source control assets, with the understanding that any expansion of the SCED may reduce access to the freshest oil for mechanical oil recovery operations. A 500-meter exclusion area should be set around each drilling rig or flowing well and is included in an expanded exclusion area to encompass all source control operations. While not discussed in this CONOPS, other critical tasks may be occurring near the source during the early response to the incident, which may also restrict access to the area and limit response options, such as search and rescue (SAR) and marine firefighting, etc. A possible configuration for the SCED is presented below in Figure 2.

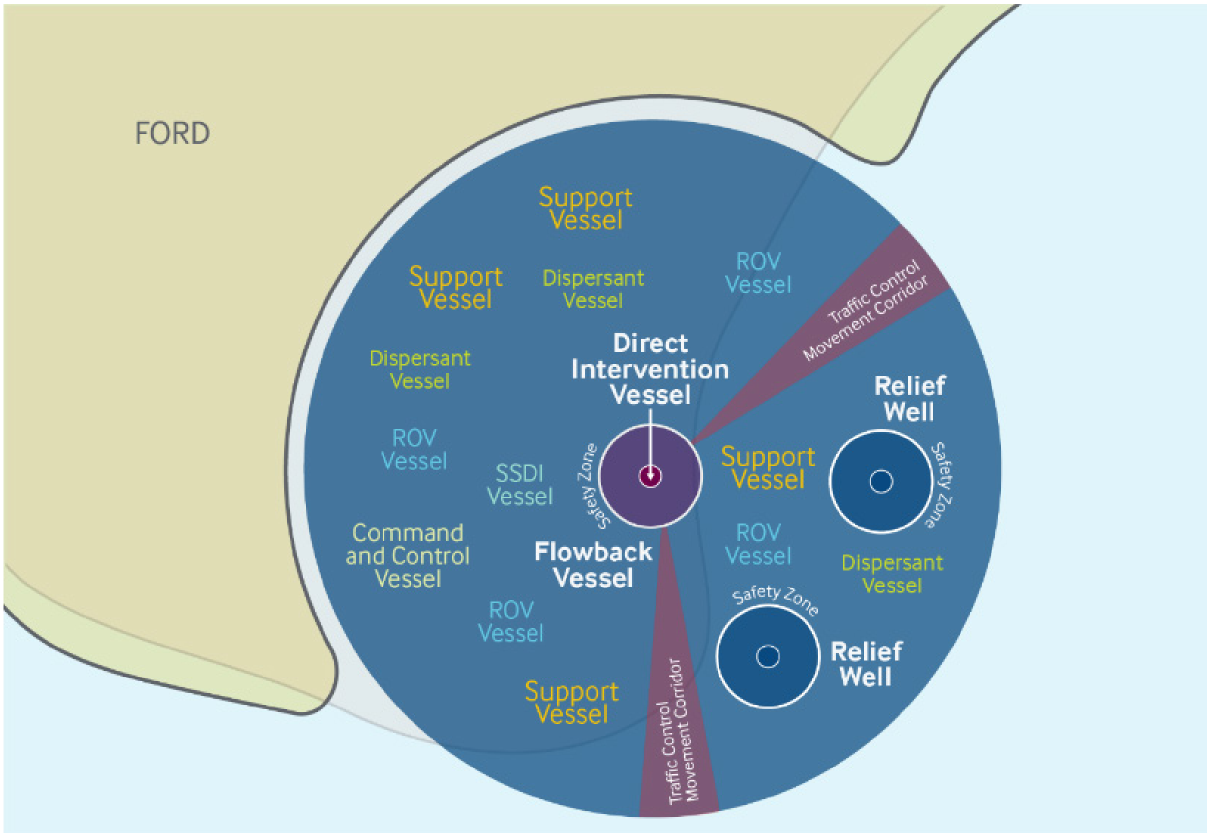

Figure 2. SCED Configuration. Drawing is not to scale.

The SCED discussion below for each temporal phase of the response focuses on source control activities for a well blowout for a subsea well. Differences in the evolution of the SCED for other discharge scenarios are discussed in Section 10.

5.1 Assessment

If there are personnel available on the facility during the assessment phase, they will communicate known or probable causes of the discharge to the incident management team (IMT). If facility personnel are not available, there may be remotely operated vehicle (ROV) vessels or other vessels at the source able to provide information to the IMT.

If personnel are on the facility, they will also likely begin to take initial source control actions, such as attempting to function the blowout preventer (BOP) and/or disconnecting the facility from the wellhead. If an ROV is available, it can be used to survey the BOP and attempt to manipulate various rams and ports to regain control of the well.

During this phase, the offshore facility operator will likely be able to conduct an initial well integrity assessment before the Unified Command forms in person and make an early determination of well flow, well integrity, and BOP assessment. The first attempt to shut-in the well using the BOP may be a decision made by the offshore facility personnel in order to quickly regain control of the well and reduce oil discharging into the water.

During this phase, the RP will also begin aerial reconnaissance using aircraft and/or drones to characterize any oil that is surfacing in order to determine the extent of the spill. By assessing the size of the slick on the surface along with known facility parameters, the Operator can begin to estimate spill volume and initiate oil spill trajectory modeling. Information on potential well volumes, oil characteristics, and spill trajectory should be promptly relayed to the USCG Federal On-Scene Coordinator (FOSC) as the Unified Command is formed.

5.2 Initial Response

If air monitoring results on-scene indicate conditions are unsafe for response personnel, the RP will likely request authorization from the FOSC or Regional Response Team (RRT) to use SSDI operations to reduce VOCs rising to the surface in the SCED. If SSDI operations are approved, dispersant monitoring capabilities and protocols should be ready to become active as SSDI commences. Alternatively, the application of dispersants may be conducted by vessels on oil at the surface in an attempt to reduce VOCs near the source. Fast Response Vessels (FRVs) will arrive on-scene and may commence oil spill skimming operations in the SCED.

Site assessment and source control operations will continue. The first source control resources likely deployed to the site will be ROV support vessels to determine the discharge source(s) and to take additional response actions, such as attempting to close the BOP rams or wellhead valves to stop or restrict the flowing well. If the site was evacuated following the incident, source control personnel will begin planning to reboard the facility if it is safe to do so.

The USCG District Commander will establish a safety zone for offshore facilities greater than 3 miles from shore (33 CFR 147.5). This safety zone is limited to 500 meters or less. A USCG cutter will likely be assigned to provide command and control of water and air assets in and around the incident until command and control can be established by the shoreside Unified Command ICP. Additional USCG vessel(s) would also be on site to enforce any established safety zones around the entire response. There may be a need for the FAA to restrict the air space in the vicinity of the incident response to ensure the safety of aerial operations.

5.3 Primary Removal Operations

Additional resources, such as debris removal tools and dispersant vessels for VOC control, will continue to arrive at the SCED, requiring an expansion of the exclusion area. SIMOPS (Simultaneous Operations) will need to be activated, as multiple types of vessels will be conducting activities within the SCED, including:

- SIMOPS Command and Control Vessel
- Surface Application Dispersant Vessel to Suppress VOCs
- Subsurface Flow Line Vessel
- SSDI and Subsea Application and Monitoring Vessels (upon FOSC Approval and RRT Concurrence)

If SSDI operations commence, the consumption of dispersant stockpiles will need to be carefully managed to ensure stocks are sufficient to allow both surface and subsea applications to continue until manufacturers can begin producing additional dispersant.

5.4 Expanded Source Control Operations

Around 6-7 days after the start of the incident, major source control response assets will begin to arrive on-scene. These assets may include:

- Debris Removal Tools
- Additional ROV Vessels
- Direct Intervention Vessels
- Recovered Oil Temporary Storage Vessels (as applicable)
- Pumping Vessel
- Kill Fluid Supply Vessel
- Survey Vessels
- Relief Well Rigs and Support Vessels

As a result, the SCED will need to expand, and SIMOPS will become more complex.

Plans will need to be developed at the time of the incident for any offshore response, whether it is a subsurface blowout or a surface blowout from a floating platform. These plans could include:

- Air Quality Monitoring and Site Safety Plan
- Site Survey Plan
- Dispersant Management Plan (DMP)
- Air Traffic Control Plan

Critical source control strategies must also be developed and implemented into the response effort. These strategies include:

- Engineering (Well Integrity, Flow Rate)
- Debris Removal for Source Access
- SIMOPS
- Interim Collection Systems (Top Hat, Riser Insertion Tool)
- Top Kill
- Capping Stack / Offset Capping
- Containment and Flowback / Offset Containment and Flowback
- Relief Well Planning

This phase would begin with debris removal in order to gain access to the well. Containment debris removal options (e.g., super shear) could occur over a 7–10-day period. However, debris removal could be more complex and delay primary source control actions. Temporary alternative control measures, such as BOP intervention, top hat, containment domes, interim flow and collection systems, and flaring, should be considered immediately while longer term solutions are developed. An anticipated timeline for this phase would include 10-30 days for cap and flow activities, 7-10 days for well containment; and 14-28 days for flow back vessels.

5.5 Post-Discharge Removal Operations

At this phase of the incident response, the source will be completely secured, and there will be no additional discharge of oil. Many of the source control assets can begin to demobilize, and the SCED can be reduced in size. Relief well drilling will continue until the original well is intercepted and plugged. Although demobilization of most response resources will occur during this phase, maintaining sufficient response resources on standby in the SCED to respond to potential events should be considered during relief well drilling.

6 Fresh Oil Removal Division (FORD)

Operations in this division will be focused on removing high volumes of fresh oil near the source. Geographic boundaries will expand and/or contract based on the situation, e.g., weather, the availability of resources and their efficiency in recovering or successfully treating the oil, trajectory of the oil, and changes in the oil as it spreads, weathers, and is transported away from the discharge site. This division may be divided into separate operational zones for Skimming, In-Situ Burning, and Aerial Dispersant Application operations. In order to mitigate conflicts, these zones may change daily. ISB and dispersant zones would include stand-off buffer areas to ensure proper separation from other activities and responder safety. Vessel dispersant operations will typically not be considered in this division due to their slow, lower oil-encounter rates in the offshore environment compared to aerial application. However, Unified Command may consider dispersant vessel application platforms for specialized use, e.g., around oil platforms to avoid potential aerial application overspray. Vessel dispersant operations, in the right circumstances, can also be useful at the surface in the vicinity of relief wells that are being drilled or other operations that require personnel to be on the deck of ships or other such areas where high VOC concentrations may be present. A possible example of the breakdown of the zones within the FORD is presented in Figure 3.

Figure 3. Zones within the FORD.

Due to the potential for ISB and dispersant operations conducted in the SCED, the mechanical recovery operations will normally be assigned in the zone nearest to the SCED.

6.1 Assessment

At the start of the response, surveillance aircraft and fast response vessels (FRVs) will be the first spill response assets arriving on-scene. In certain scenarios, response equipment may have limited access to the site during the initial phases of the incident due to activities such as search and rescue or firefighting. The FRVs are likely to be the initial assessment vessels on-scene and will initiate air sampling to determine if the skimming operations in the vicinity of the discharge site can be performed safely.

Various surveillance platforms and sensors are used for ongoing assessment to support response assignments and operations throughout this division. Depending on the numbers of vessels and aircraft being used on the response in this division, deconfliction of vessel and air traffic will be essential for safe operations.

Decisions on where to place each oil spill response countermeasure, e.g., mechanical, ISB & aerial dispersants, must be decided daily in order to avoid conflicts between these response assets. These decisions are based upon multiple factors, e.g., weather/wind direction (ISB smoke/air quality), spill modeling for fate and transport, oil weathering progression impacting dispersibility/burnability/skimming effectiveness, etc. The IMT will need to re-evaluate operational zones as the spill characteristics change daily. Continual monitoring of the overall situation and adjustments to the response are required as oil location and behavior evolve over time.

6.2 Initial Response

If approved by the FOSC (or the RRT as appropriate), aerial dispersant application platforms may be the first resources to respond, especially for scenarios that are far offshore. After a test spray and Tier 1 visual evaluation has confirmed that the oil is successfully being dispersed, dispersants may be applied to the most concentrated oil slick areas; however, once mechanical recovery assets arrive, dispersant aircraft should be tasked to treat large patches and streamers of oil that move past the mechanical recovery assets in the FORD.

Once initial site assessments are conducted, any FRV(s) on-scene will begin recovering spilled oil near the source. During this phase, additional skimming and aerial dispersant resources will continue to mobilize and deploy to the site. The FRVs on-scene are likely to have minimal onboard storage and will rapidly fill their storage tanks, so it is important that secondary temporary storage assets arrive on-scene as quickly as possible. Decanting is another vital operational need in order to mitigate limitations to skimming that might be caused by a lack of temporary storage on-scene. Decanting approvals should be addressed in the first 24 hours concurrent with the mobilization of mechanical recovery resources.

Specialized offshore support capabilities, such as the previously mentioned government assets (berthing, air control, skimmer support), should be activated early in the response to enable continuous mechanical recovery operations. These assets include temporary storage resources due to the arrival of fast response mechanical recovery resources with limited on-board storage. Skimming operations may "bottleneck" and suffer delays without early offshore support and temporary storage on-scene. It is necessary to ensure that vessels used for recovery and/or temporary storage are appropriately classed for the geographic area they will operate in.

6.3 Primary Removal Operations

As more resources with longer deployment times arrive on-scene, including larger oil spill response vessels (OSRVs) and vessels of opportunity skimming systems (VOSSs) and oil spill response barges (OSRBs), the FORD may be divided into operating zones for in-situ burning, aerial dispersant application, and mechanical recovery, with a safety corridor separating each zone. Large OSRVs, VOSSs, and OSRBs provide significant operational value in the FORD due to their significant onboard storage. Several task forces should be formed consisting of mechanical recovery assets with high oil recovery rates and large onboard storage capacities, additional secondary temporary storage assets, and surveillance support. These mechanical recovery assets will normally be assigned to the area nearest to the SCED where the oil slicks are likely to be more concentrated and less weathered.

Surveillance and modeling will be used to differentiate dispersible/burnable oil from non-dispersible/non-burnable oil, which should assist in prioritizing and assigning locations for these spill response assets. During this phase of the response, numerous aerial dispersant application platforms may be operating with each performing multiple sorties per day. In-situ burn (ISB) assets will also begin arriving on-scene during this phase.

Effective ISB requires multiple vessels, fire boom, boom handlers, igniters, and spotter vessels for ensuring the avoidance of wildlife. This logistical complexity may prevent ISB from being readily available during the initial response. Once assigned, ISB teams will need to begin collecting oil and conducting test burns. Surface collecting agents (aka herders) may be a potential alternative or supplement to fire boom, but their use is also subject to authorization in accordance with Subpart J of the NCP. ISB should be assigned a zone downwind of the other response zones to ensure the smoke does not impact other operations. Air monitoring of the ISB smoke plume should be implemented to ensure the safety of operations. Due to the potential for ISB and dispersant operations to impact operations in the SCED, these response zones will usually be located further away from the source.

Each operating zone should have dedicated aerial support for the purposes of oil tracking and positioning equipment for oil removal operations. Given the need for persistent, localized and wide-area oil tracking and surveillance, the operation of multiple dispersant spray and spotter aircraft, and frequent logistical flights, the response will need to be prepared to set up management structures to deconflict the significant air traffic throughout the offshore response. Depending on the numbers of aircraft used and normal air traffic, an Air Traffic Control organization should be implemented at the request of the COTP/FOSC, and the response area should be covered by a Federal Aviation Administration (FAA) Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) to avoid any non-response aviation platforms operating in the flight area above the incident.

If SSDI operations are commenced, the oil slick on the surface is likely to change significantly. There may be much less oil on the surface to recover, and the oil may rise to the surface further away from the source. The reduction in the surface expression of the slick will further reduce the recovery capability of on-water response assets. If SSDI operations are initiated, it is critical that the mechanical recovery assets in the FORD maximize their recovery capacity through enhanced encounter rate tactics (open apex towed booms, etc.) and dedicated surveillance support.

It should be noted that the amount of oil reaching the surface will also be impacted by the volume of dispersant injected subsea relative to the oil discharge rate. This factor is particularly important with higher flow WCD scenarios in order to match the SSDI injection rate and adequately treat the oil flow volume.

6.4 Expanded Source Control Operations

As source control resources arrive on-scene, the SCED will expand and may require assets in the FORD to relocate, potentially reducing their access to the most concentrated areas of oil. Zone assignments should be frequently reassessed to ensure that mechanical recovery, aerial dispersant, and ISB resources are properly positioned over the slick footprint, are allocated appropriate room to operate, and are deconflicted with each other and the SCED.

6.5 Post-discharge Operations

Once the source is secured through the implementation of temporary source control measures, such as a capping stack, the response will shift focus to actions in areas further away from the source involving the recovery of weathered oil that spread into distributed, discontinuous patches. High volume primary removal assets may be reassigned from the FORD to more distant zones in the WORD or demobilized.

7 Weathered Oil Removal Division (WORD)

As the oil spreads on the surface of the Gulf of Mexico and is transported away from the source, it will become thinner and more discontinuous in nature, breaking up from large slick areas into smaller patches and windrows of increasingly weathered oil. These various patches of oil will become increasingly distributed across a large area and may be many miles apart. Typically, as the oil weathers, its viscosity also increases which affects the various efficiencies and effectiveness of each response methodology. Therefore, the size of the WORD will likely be considerably larger than the FORD in surface area and may extend all the way to the shoreline. A possible breakdown of the zones within the WORD is presented in Figure 4.

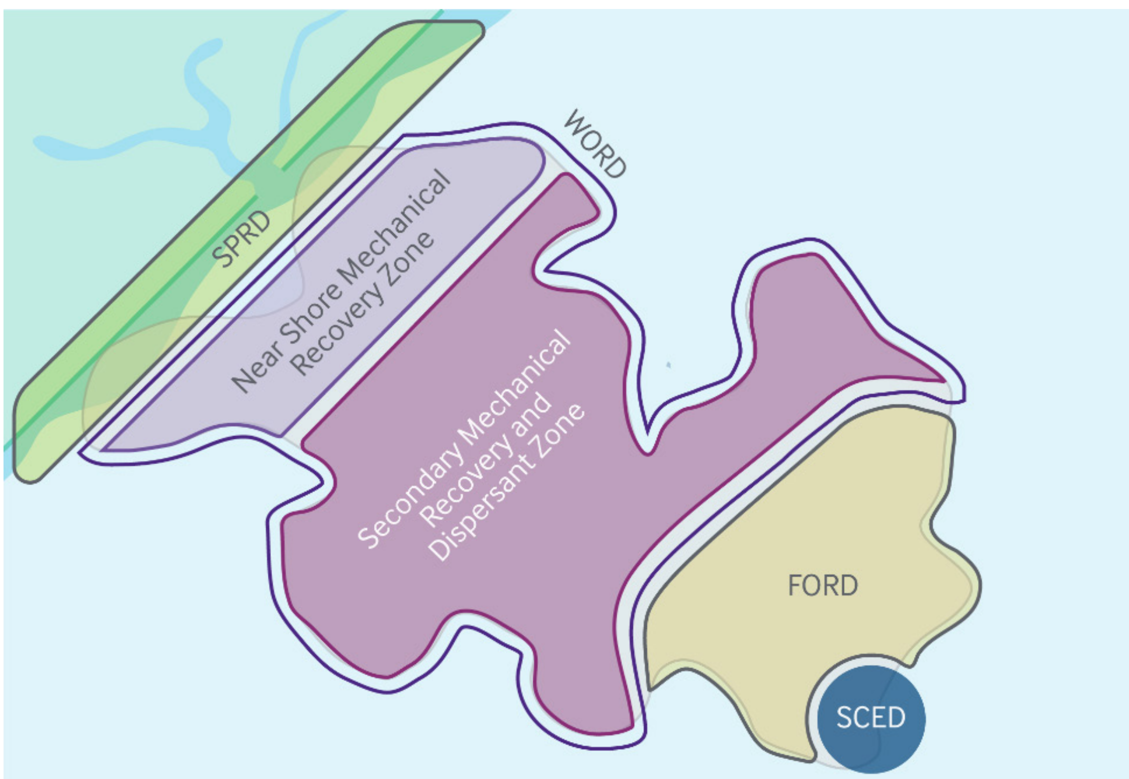

Figure 4. Zones within the WORD.

7.1 Primary Removal Through Post-Discharge Operations

By the time the oil slick moves beyond the recovery assets operating in the FORD, it will be broken up into more widely distributed patches, streamers, and windrows due to the influence of the wind and currents. The oil will also have weathered and become more viscous in this division. Due to these natural processes and the changing oil characteristics, the oil will become increasingly difficult to locate, track, contain and remove.

Aerial reconnaissance/surveillance increases in importance to locate the oil, determine its state in relation to recoverability, dispersibility, and burnability. The WORD will require a larger number of surveillance assets, including aircraft, drones, and vessel mounted systems to meet the challenge. Satellite images may also be used to detect large areas of oil.

Recovery of weathered oil will be the prime operation in the WORD. Mechanical skimmers adapted to more viscous oils will likely be the primary removal countermeasure in the WORD. Due to the spreading of the oil, it will be even more critical than in the FORD to use skimming assets with enhanced encounter rates and with the ability to effectively remove higher viscosity oil. Enhanced encounter rates can be achieved through skimming systems that can operate at increased speeds of advance, such as a current buster or rigid sweep arms, or through enhanced skimming tactics for oil collection that increase the effective swath width, such as vessels towing a U-shaped boom configuration with an open apex as shown in Figure 5. Increased skimmer effectiveness for higher viscosity oils can also be improved by evaluating different types of skimmers and using positive displacement skimmer pumps.

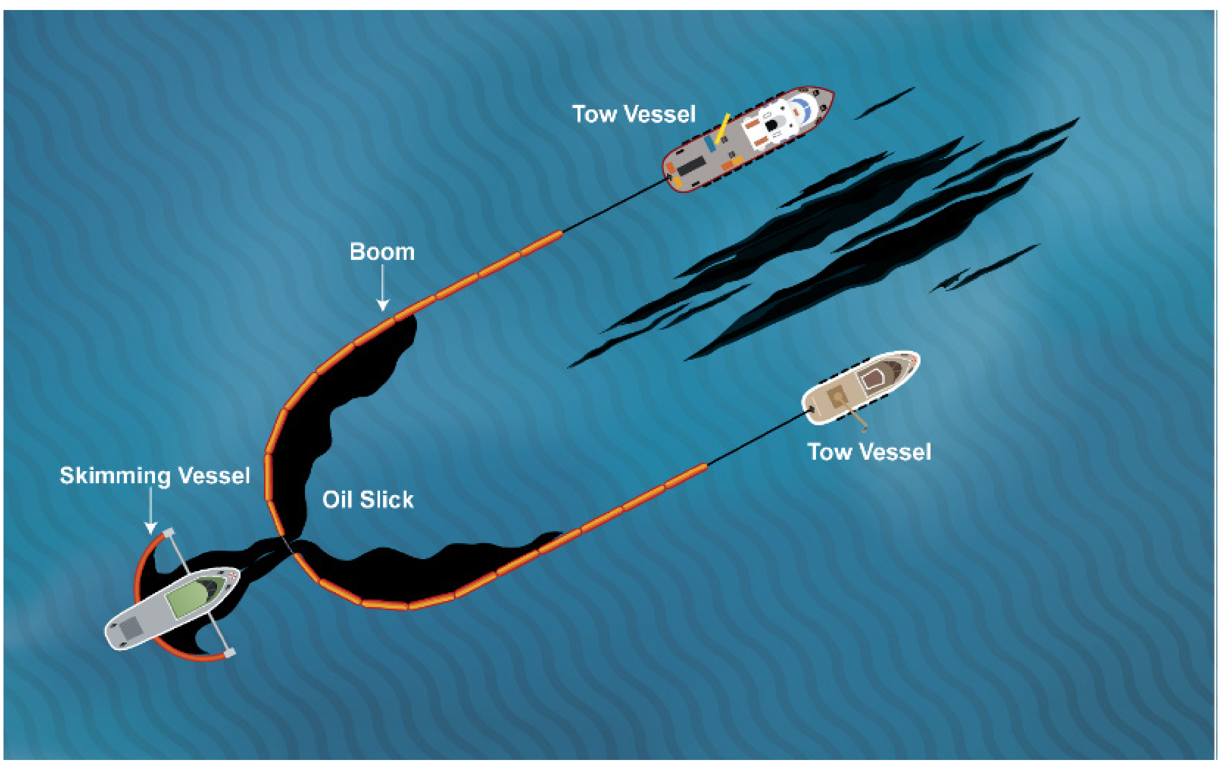

Figure 5. U-Shaped Boom Configuration with an Open Apex.

In addition to the large numbers of skimming resources required, there are other logistics issues associated with this strategic and tactical approach. Secondary storage resources with heaters can make it easier to offload compartment contents faster. Task forces will likely encounter oil at different stages of weathering and emulsion and should be equipped with skimming options for recovering increasingly viscous oils. Many dedicated oil spill response vessels (OSRVs) and vessels of opportunity (VOOs) will not have the advanced X-Band Radar, infrared sensors, or dedicated drones found routinely aboard the larger OSRVs and OSRBs. Due to the large area that this division will cover and the distributed nature of the oil, dedicated spotting using aerial observation, remote sensing, and/or opportunistic vessel-based surveillance systems is critical to support these skimming and ISB groups and task forces. However, the sensors on spill response vessels can be used to guide other vessels, including VOOs and OSRVs, not outfitted with remote sensing equipment to areas of concentrated oil.

Dependent on the viscosity and other properties of the weathered oil, there may be an opportunity for ISB and dispersant operations to continue in the WORD, as needed. If so, separate operating zones would be established with safety separation corridors between them. Seaward of the 10-meter depth contour and greater than 3 miles from shore, the use of dispersants have been preauthorized for use by the FOSC. For the state of Florida in the Gulf of Mexico, the preauthorization area for the use of dispersants remains seaward of the 10-meter depth contour but extends greater than 9 miles from shore. Dispersant use also could be considered on an incident-specific basis shoreward of these boundaries under the right environmental conditions. Vessel application of dispersants is also plausible in near shore operations to minimize the potential for over spray. The Region 6 RCP contains an expedited-decision process for considering dispersant use in areas where preauthorization currently does not exist.

As oil reaches the coastal areas, a Nearshore Mechanical Recovery Zone will need to be established. Since water depths of 20' or less extend out several miles into the Gulf of Mexico, the vessels operating in the Nearshore Mechanical Recovery Zone must have drafts that allow them to operate in shallow water. The skimming operations, however, will be similar to those conducted in the rest of the Division, only with generally smaller skimmers and support vessels. Therefore, the vessels operating in this zone will also be more affected by sea and wind conditions. They must remain close to areas of safe-haven and seek shelter should weather conditions deteriorate.

Nearshore areas may pose significant logistical and operational challenges, including shallow water, increased chop and wave height, and limited staging areas. Nearshore operations will often require the use of smaller boats, e.g., 24' or less in length. These assets will normally be limited to daylight only operations since they do not include living accommodations and must return to their launch points in the evening. Lift vessels could be a possible resource to mitigate these challenges as mobile lodging and staging assets. Access to secondary temporary storage may also be limited in these areas. Larger storage vessels with deep drafts would not be able to operate in shallow areas, and many shallow water storage options are restricted in the distance they can operate from the shoreline.

Task force elements operating in the Nearshore Mechanical Recovery Zone may encounter heavily weathered/emulsified oil and tarballs and may need to adapt their recovery techniques to include dip nets or other physical means of "grabbing" the oil for removal. Special surveillance techniques may also be needed to detect spilled oil submerged in the water column before the oil reaches shore. Some floating oils can interact with sediments and subsequently become heavier than water by mixing with sand suspended in the water column by wave action. The oil-sediment mixture can become slightly negatively buoyant and become suspended in the water column by currents, or it can be dense enough to sink to the bottom. While not common, being able to detect weathered/non floating oil nearshore became an important response activity in the Gulf of Mexico during the Deepwater Horizon and the M/T Alvenus oil spills.

This CONOPS recognizes the need to plan for demobilization activities, including the decontamination of vessels. This may occur during the primary removal phase of the response, as response vessels return to port that had been operating in oil slick areas but will become critical as assets are being demobilized. Gross decontamination sites will need to be established nearshore areas prior to port entry (at least one primary site for large vessels and multiple secondary sites for smaller vessels). Final decontamination activities likely will be done dockside at designated facility sites for anchorages.

8 Shoreline Protection and Recovery Division (SPRD)

This technical document is intended to focus on offshore and nearshore operations and does not discuss shoreline protection or shoreline oil removal operations. These operations are critical to any coastal spill that experiences landfall where oil enters into bays and sounds or strands on shorelines. Information about operations that will occur in the Shoreline Protection and Recovery Division (SPRD) are well developed and can be found in the appropriate ACPs, especially in the Geographical Response Strategies and Plans (GRS and GRPs).

9 Examples of Geographical Divisions and Zones for an Offshore Response Scenario

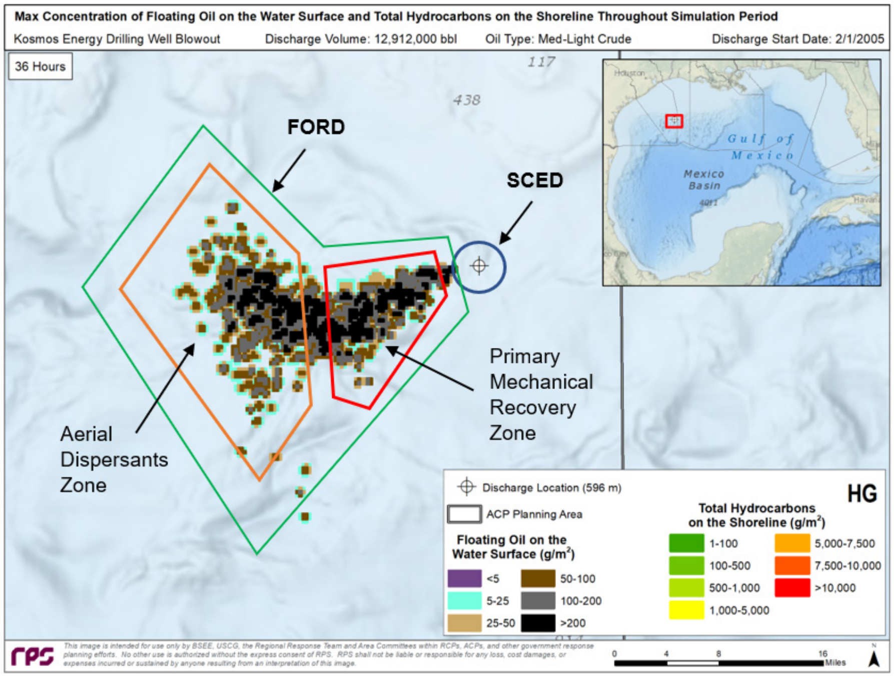

Figure 6. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation Period (36 Hours).

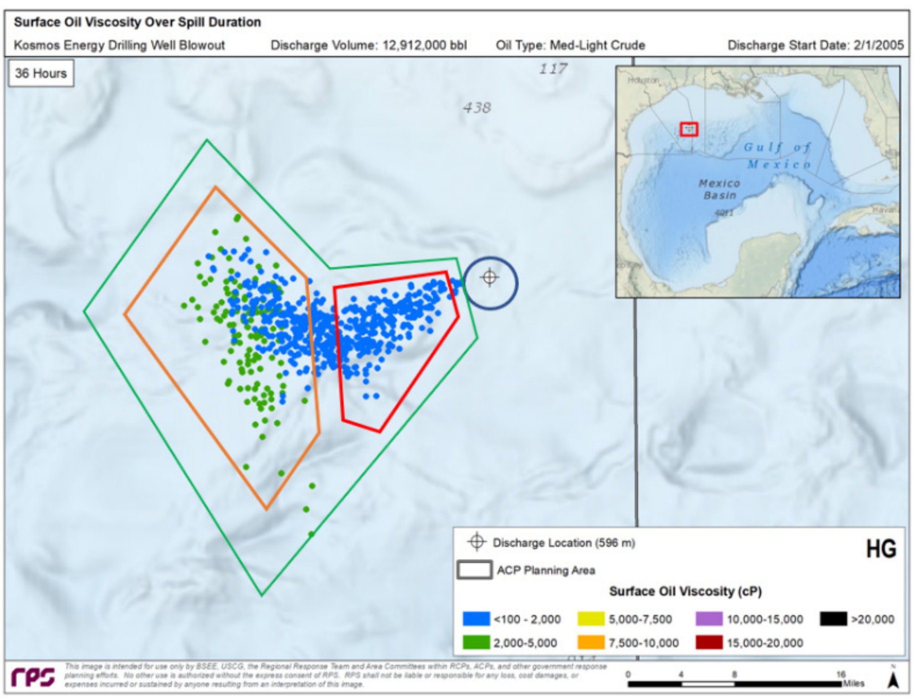

Figure 7. Surface Oil Viscosity Over Spill Duration (36 Hours).

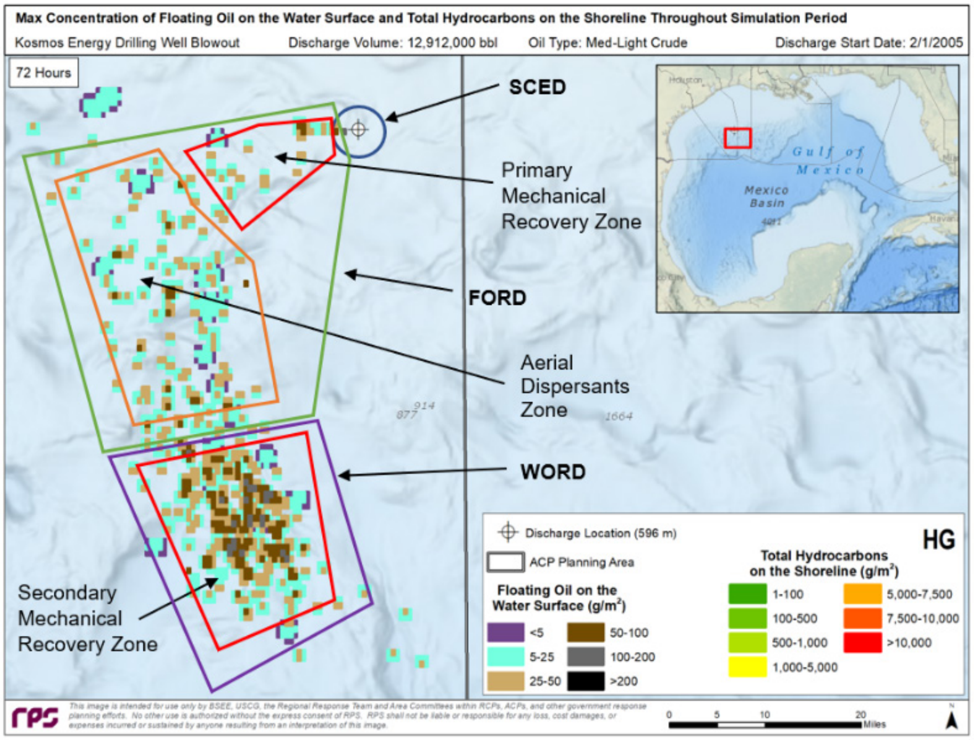

Figure 8. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (72 Hours).

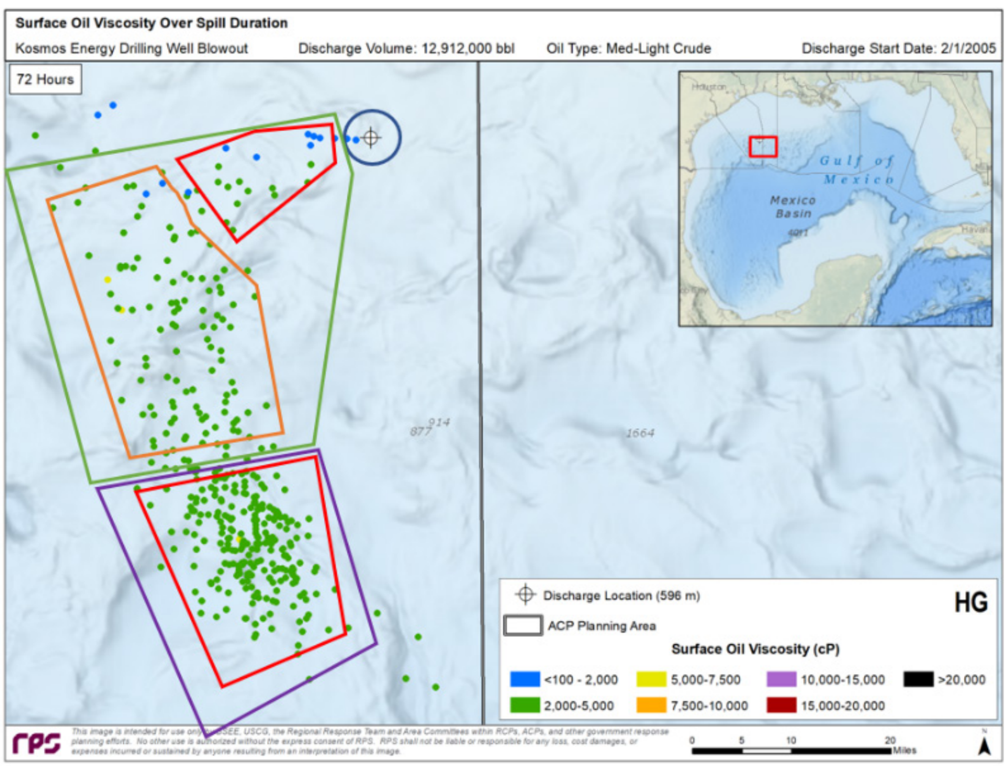

Figure 9. Surface Oil Viscosity Over Spill Duration (72 Hours).

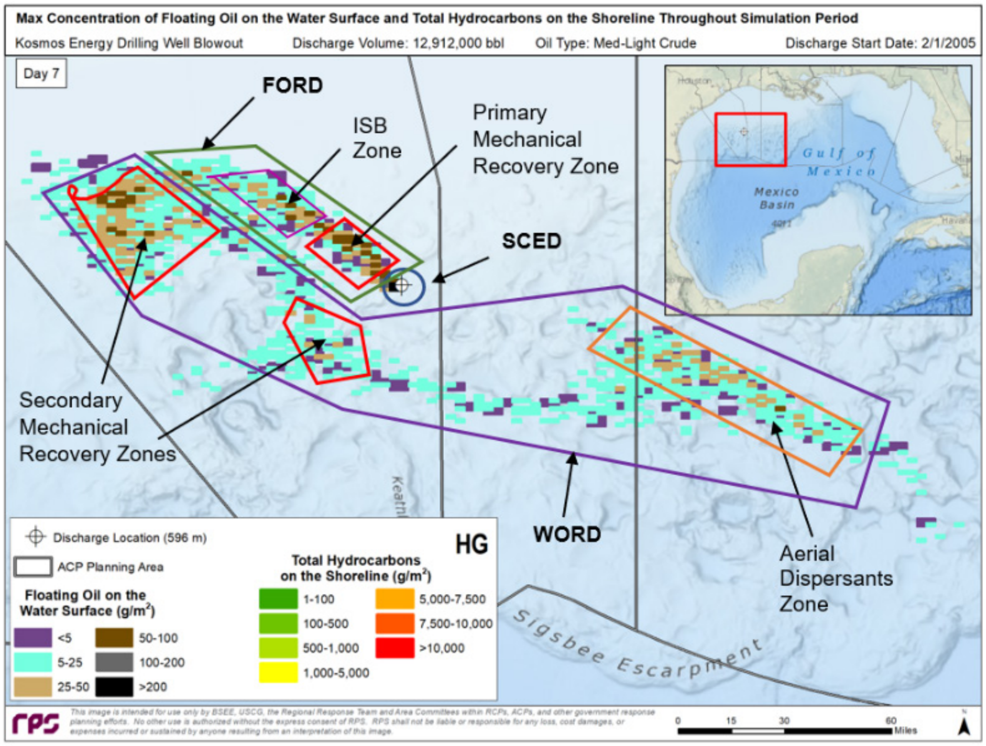

Figure 10. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (Day 7).

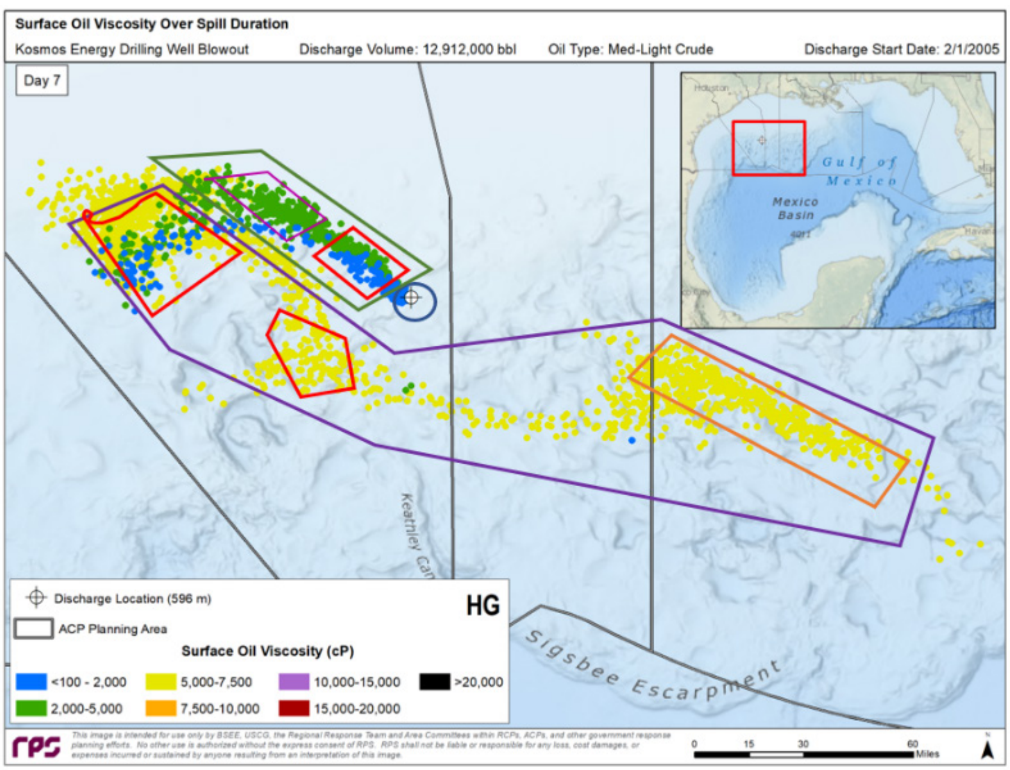

Figure 11. Surface Oil Viscosity Over Spill Duration (Day 7).

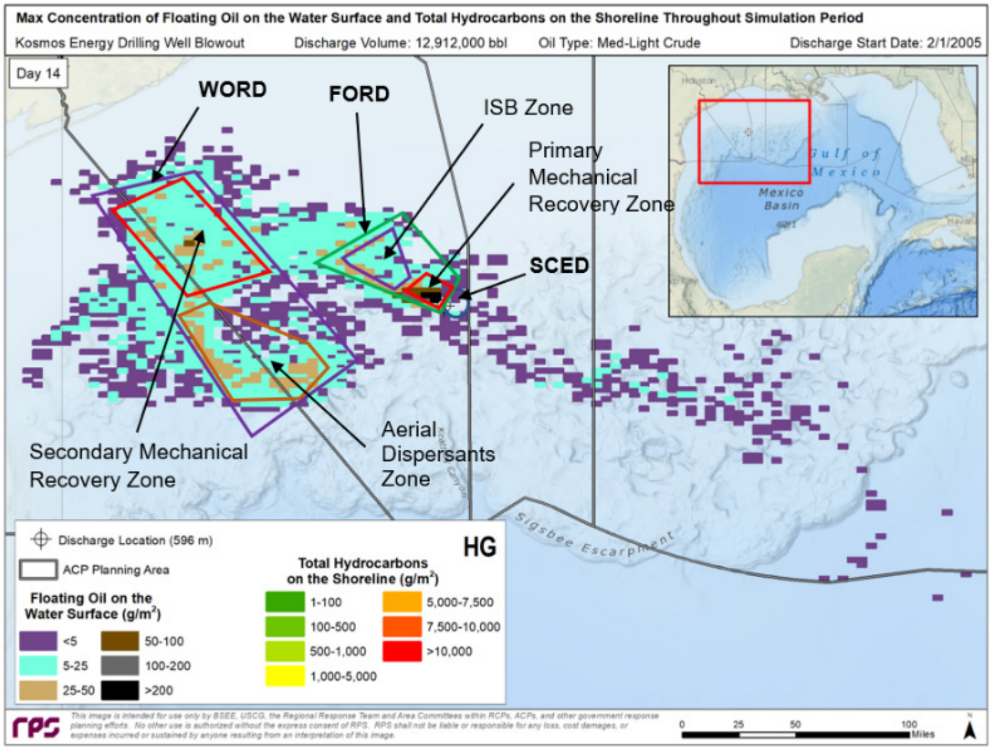

Figure 12. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (Day 14).

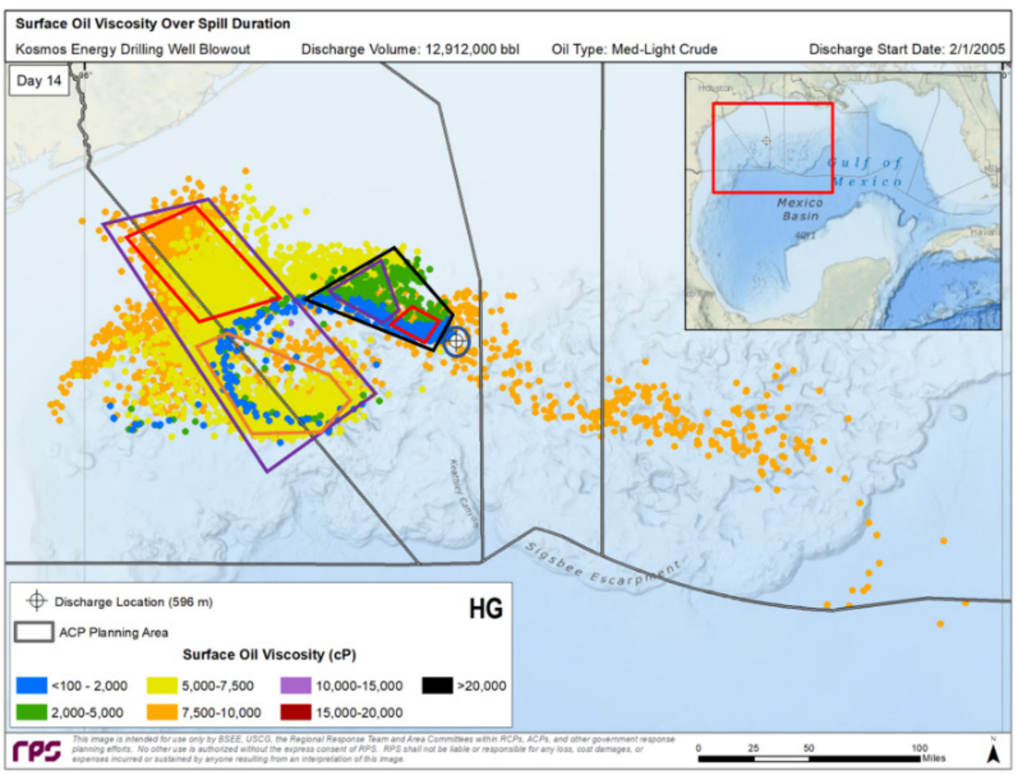

Figure 13. Surface Oil Viscosity Over Spill Duration (Day 14).

10 Alternate Scenario Considerations

While this CONOPS focuses on a deep water well blowout spill scenario, an offshore discharge can occur anywhere from 200+ miles offshore to the surf zone, and from the topside deck of a production platform down to the wellhead 10,000 ft depth below the water surface. This section discusses alternate scenarios and other considerations that may significantly affect the Offshore CONOPS.

Multiple possible source control scenarios have been identified for consideration in the CONOPS. The main point here is to highlight the critical issues that would affect changes in the CONOPS phases, divisions, or response assets capabilities, i.e., subsurface vs. surface discharges.

10.1 "Source Control" Scenario Considerations

If the well blowout occurs at the surface, there is likely to be more floating oil and VOCs to contend with immediately adjacent to the site of the discharge. If the VOCs in the immediate vicinity of the source are above the lower explosive limit (LEL), access to the source could be significantly restricted and the size of the SCED may be increased. This could also restrict access to the freshest and thickest oil. SSDI would not be an available response tool in a surface blowout, and increased volumes of oil will need to be recovered/removed by response assets. Alternatively, the facility may be on fire.

If the facility is still connected to the well and intact, intervention could be performed from the surface. Alternatively, the facility may have to be disconnected from the well by cutting and removing the riser, shifting the discharge to the seafloor. If the facility cannot be moved, specialized equipment will be used to maneuver and attach the capping stack to the wellhead under the facility. If the well cannot be directly accessed for source control operations due to debris on or around the BOP or wellhead, debris removal activities may cause delays in the source control timeline. Debris removal activities can include:

- Cutting Away the Riser
- Straightening the BOP if it is Tilted
- Removing the Lower Marine Riser Package and/or the BOP if they are Damaged
- Removal of Large Debris Requiring Heavy Lift Vessels.

Debris removal to gain access to a BOP or wellhead in order to land a capping stack is not considered the same as salvage operations. Salvage operations would be required if the rig sank or partially sank or if the well needed to be removed after it was secured for reasons outside of the response, such as for insurance reasons or regulatory requirements.

For subsea wells in water depths between roughly 300 to 1,000 ft water depth, access directly above the wellhead may be restricted, and offset installation of a capping stack may be required. There are a very limited number of intervention vessels capable of operating in this water depth. If a subsea blowout were to occur in these water depths, it may significantly lengthen the timeline for the operator to obtain, prepare, and deploy a surface intervention vessel.

Source control for a well blowout in shallow water on a bottom-founded structure would likely require a significantly smaller SCED footprint than other scenarios. Primary source control actions would occur on the facility and would begin sooner than for deep water source control activities. There would be no need for a subsea capping stack, subsea dispersants, or ROVs. As a result, the geographic restrictions to the on-water response would be significantly reduced. The oil would also be discharging at or near the surface, increasing the availability of the fresh oil but also the potential for high VOCs, necessitating restricted access near the source and the freshest oil.

If there is a subsurface discharge in shallow water, the potential use of SSDI should not be automatically discounted but evaluated being cognizant of SSDI effectiveness in shallow water and the NRT's *2013 Environmental Monitoring for Atypical Dispersant.*

10.2 Nearshore Scenario Considerations

For nearshore discharges within 12 miles of the coastline, the IMT may be restricted in the response strategies available to mitigate the discharge. Responses in the nearshore environment will likely have limited or no ability to use aerial dispersants or ISB, as preauthorization for use of either response measure in the Gulf of Mexico is generally limited to waters greater than three miles from shore and greater than 10 meters in depth. For the state of Florida in the Gulf of Mexico, the preauthorization area for the use of dispersants remains seaward of the 10-meter depth contour but extends greater than 9 miles from shore. In the nearshore scenario example below, the discharge site is over ten miles from shore, but sits shoreward of the 10-meter contour. As a result, the suggested CONOPS divisions/zones do not include the use of dispersants or ISB for the majority of the simulation. Dispersants and in-situ burning may still be considered for use in these areas but must follow Subpart J of the NCP (40 CFR 300.910(b)) requirements.

The on-water response will be primarily focused around mechanical recovery, and significant shoreline impacts may occur within a much shorter timeframe. Shoreline protection and clean-up are likely to be a major part of the overall CONOPS for many nearshore scenarios and certain offshore scenarios. However, this technical document is focused on on-water operations. Water depths may also restrict the available mechanical recovery assets that can be deployed. The oil will also move along shore, following the dominant direction of long-shore currents. This movement will result in an elongated WORD, Nearshore Mechanical Recovery Zone, and SPRD.

The below images layout a possible CONOPS for a large nearshore well blowout. Note that a SPRD would exist for the scenario, but it is not depicted on the images. In a real event, the SPRD would be established along the shorelines and barrier islands potentially impacted by the spill.

10.3 Examples of Geographical Divisions and Zones for a Nearshore Response Scenario

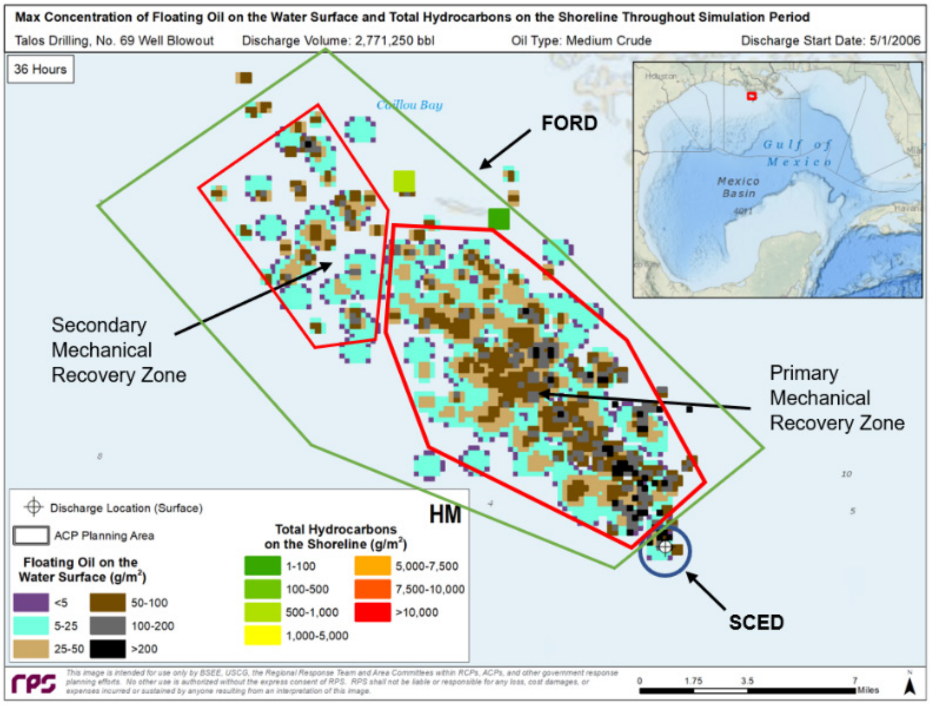

Figure 14. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (36 Hours).

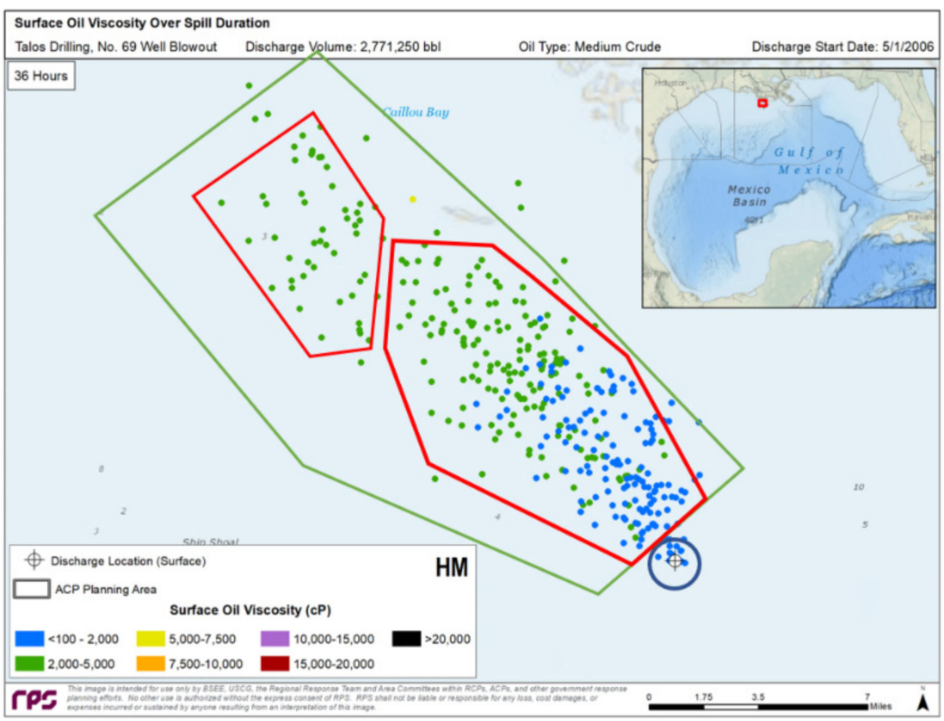

Figure 15. Surface Oil Viscosity Over Spill Duration (36 Hours).

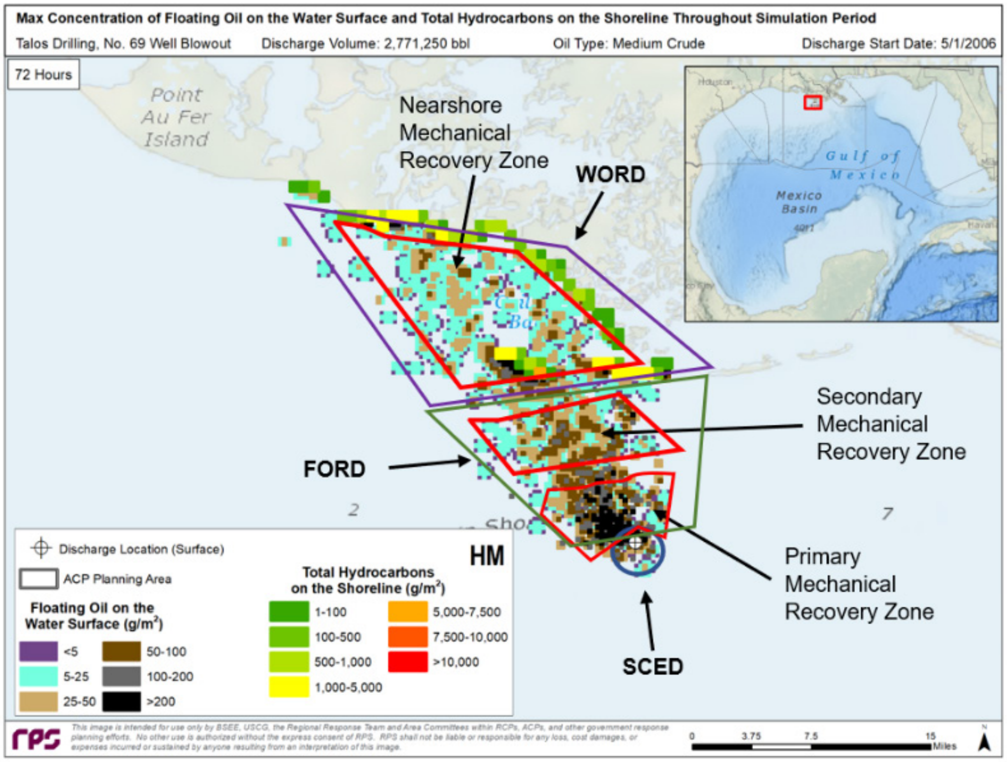

Figure 16. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (72 Hours).

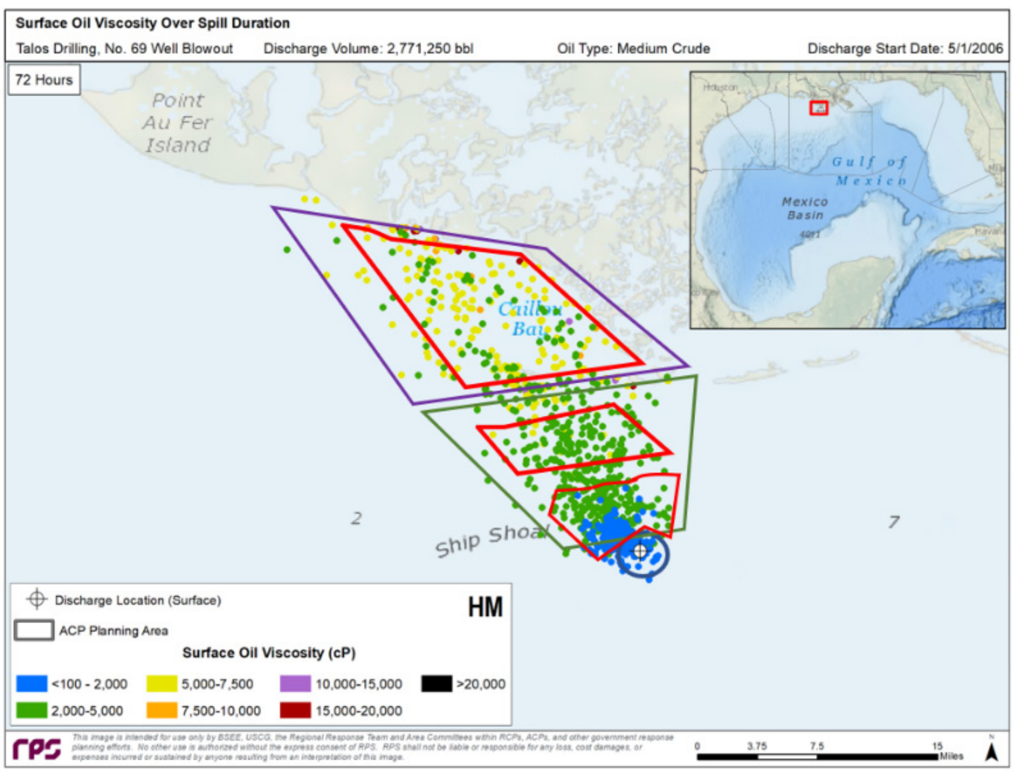

Figure 17. Surface Oil Viscosity Over Spill Duration (72 Hours).

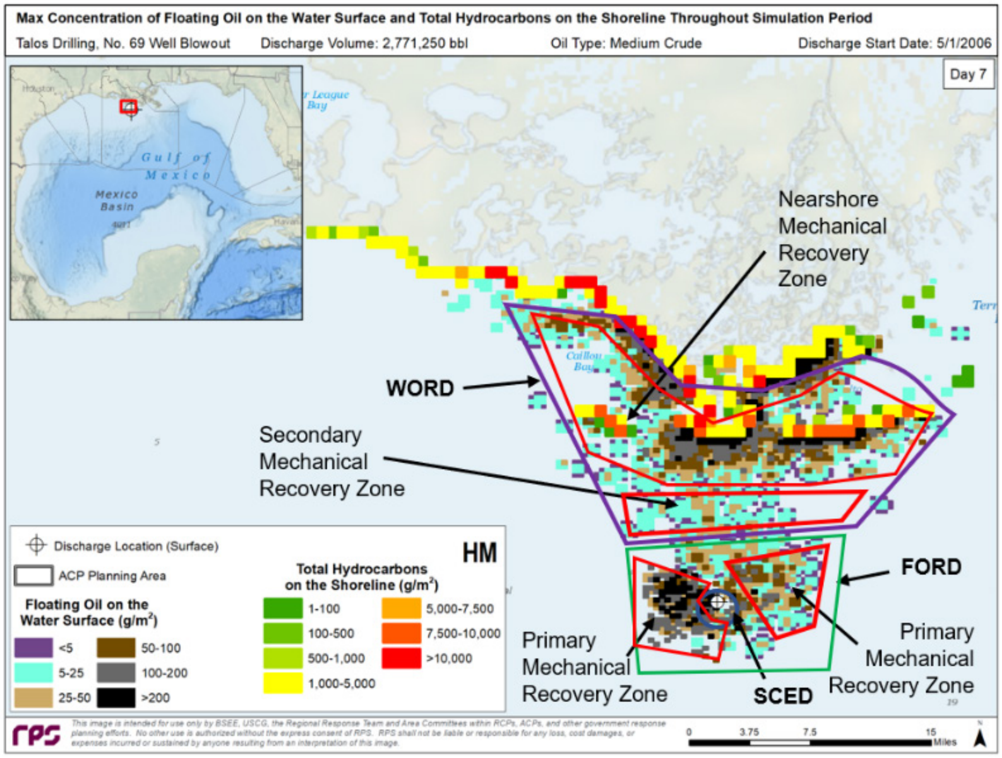

Figure 18. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (Day 7).

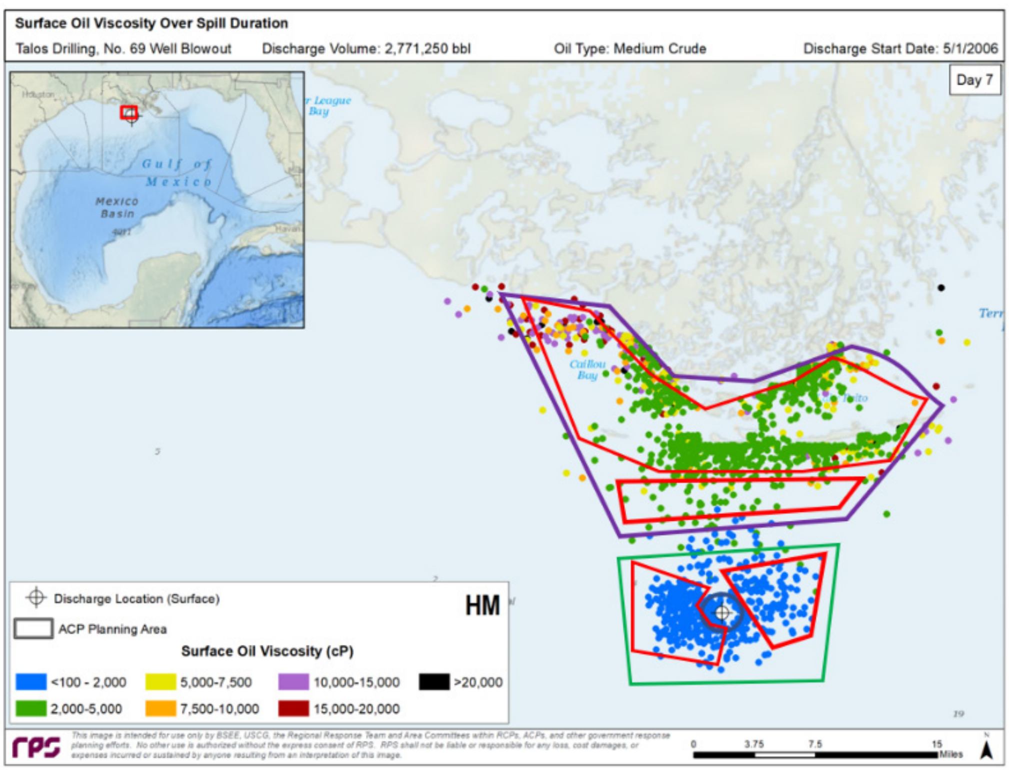

Figure 19. Surface Oil Viscosity Over Spill Duration (Day 7).

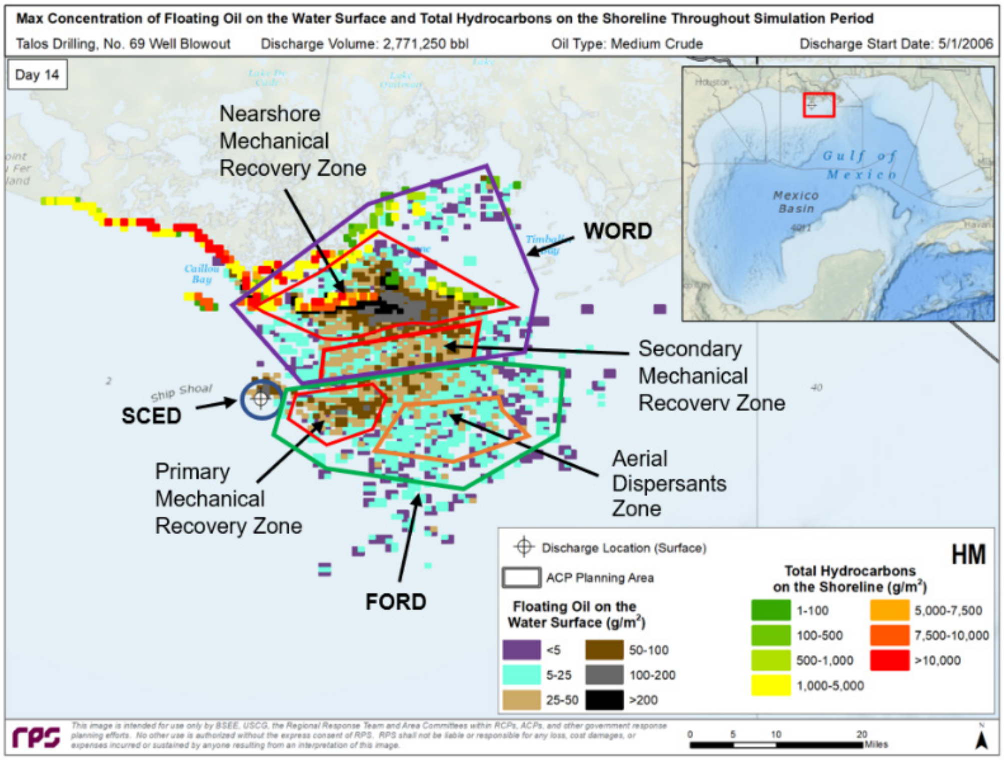

Figure 20. Maximum Concentration of Floating Oil on the Water Surface and Total Hydrocarbons on the Shoreline throughout Simulation period (Day 14).