

**SHORELINE RESPONSE - A PARADIGM SHIFT****Edward H. Owens****Helen C. Dubach**

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**ABSTRACT 300090:**

From time to time an event or a series of events can produce a change in strategic thinking or operating practices. One outcome of the Deepwater Horizon response was to learn from the process by which the shoreline response program was developed while the majority of planning and operational effort was directed towards the multi-faceted and intensive on-water program to recover or eliminate oil on the water before it could reach the coastal zone to minimize the impacts of the spill. This emphasis is typical of most marine and coastal spill response operations even though the duration of on-water operations may be a few days or weeks, whereas the onshore phase typically extends over weeks, months, or even years. The chronic nature of the Deepwater Horizon spill resulted in the on-water phase lasting for several months so that resources that typically would have transferred over to shoreline operations within a short time frame (days to a few weeks) remained committed to offshore and nearshore operation well into the summer of 2010.

Shoreline cleanup is arguably the most intensely scrutinized and potentially expensive, in terms of time and effort, part of any response. Pre-planning shoreline cleanup in detail can be very challenging. Notwithstanding the types and volumes of oil, primary factors affecting shoreline cleanup strategy include potential oil pathways, shore types, seasonal coastal ecosystem and individual resource sensitivities, stakeholder involvements, and tactical cleanup options and restrictions. Few organizations have dedicated resources for shoreline cleanup: these must be identified and mobilized for a specific scenario (shore type, oil character, volume, etc.). However, a readiness to respond rapidly and expertly to oil on shore is critical as cleanup actions typically are most effective and efficient immediately following deposition, before oil is remobilized, buried or weathers to a state more difficult to clean.

These preplanning challenges often mean that crucial details in a shoreline response plan are developed while oil is heading towards or even is onshore. The development of a Shoreline Response Program (SRP) addresses these challenges. The model SRP is a paradigm shift in the

sense that it represents a change in some basic assumptions for spill response planning and first-phase response operations related to shorelines.

## **INTRODUCTION:**

Strategic and operation planning for an oil spill response considers a range of possible situations that may present themselves. For the most part, planning at the conceptual and strategic level is based on past experiences and learning from real-world events. From time to time, an event or a series of events can produce a change in strategic thinking or operating practices. One defining point in shoreline cleanup occurred with the 1994 publication of a report on 27 case histories for oiled rocky shore and 22 case histories for oiled salt marshes which concluded that *“In most cases, in relation to the shore organisms on rock shores and salt marshes, cleanup did not significantly promote recovery”* (AURIS 1994, Sell et al. 1995). This study, in effect, said that shoreline cleanup in these habitats had, to that point in time, often resulted in more harm than benefit. One recommendation in particular, *“to develop a guide to the net environmental benefit approach”*, caused planners, regulators and responders to radically change the decision-making process to include weighing *“the advantages and disadvantages of different clean-up techniques and “natural” cleaning”* (AURIS 1994). The concept of Net Environmental Benefit Analysis from an ecological point of view (Baker 1995) was a paradigm shift that has been enshrined in the decision process for two decades (NOAA 2013, Owens and Sergy 2003).

The concept of Shoreline Response Program (SRP) represents a similar change in strategic thinking for shoreline spill response and provides a planned and focused spill management effort from the initiation of a response to the completion of shoreline treatment operations. Shoreline treatment involves the major resource effort and cost component on most oil spill responses, large or small, and continues far longer than the higher profile on-water phase of a response. Although the Environmental Unit may be responsible for the development of shoreline cleanup and assessment plans (for example: USCG 2006, page 8-10), no formal process or template currently exists for the creation of an SRP or an SRP Plan, either during spill planning and preparation or during a response. This lack of a standard and accepted procedure can delay the initial shoreline oiling assessment (often referred to as Shoreline Cleanup Assessment Technique – SCAT) surveys that locate and define the shoreline oiling and can thereby result in missed opportunities to quickly recover stranded oil that may be buried or remobilized. Secondly, this lack can delay the rapid deployment of appropriate resources at a time when they can be most effective. Responding rapidly to oil that has reached shorelines is critical for minimizing risk to people and a host of organisms, including many that have limited mobility.

## **CURRENT AND PROPOSED PRACTICE:**

A number of spill management systems are in use currently, none of which has a formal process or template for the creation of an SRP or an SRP Plan. In one commonly used spill management system, the Incident Command System (ICS), shoreline planning is the responsibility of the Environmental Unit (EU), whose primary purpose is to provide technical advice and guidance to the Spill Management Team (SMT) (USCG 2006, page 8-9). Typically

the planning provided by the EU is based on the short-term objectives that are characteristic of the Incident Action Plan process and rarely is a strategic plan created. An improved response, in terms of a more rapid oil recovery in the short term and a reduction in the subsequent long-term level of effort, is accomplished by:

- a) elevating SRP activities to a higher level of autonomy (to the Unit level) within the Planning Section of the Spill Management Team (SMT) (Figure 1) ,
- b) developing first response objectives for the initial (“reactive”) response phase when shoreline response actions can be most effective,
- c) creating a vehicle for long-range strategic planning from the beginning of a response,
- d) building on the proven attributes of the SCAT process (supporting the decision process, the operational treatment phase and the inspection and completion phase), and
- e) expanding the ability to coordinate SRP and SCAT activities with Operations and Logistics Sections.

In the model, the SRP Unit is part of the Planning Section in the Spill Management Team (SMT) that is activated at the beginning of a spill incident to provide integrated strategic planning and recommendations for shoreline treatment and cleanup. The primary end product is an SRP Plan that is based on Shoreline Treatment Recommendations (STRs) generated by the SCAT teams. The STRs are, in effect, the work orders that describe to Operations where and how to treat or cleanup shorelines.

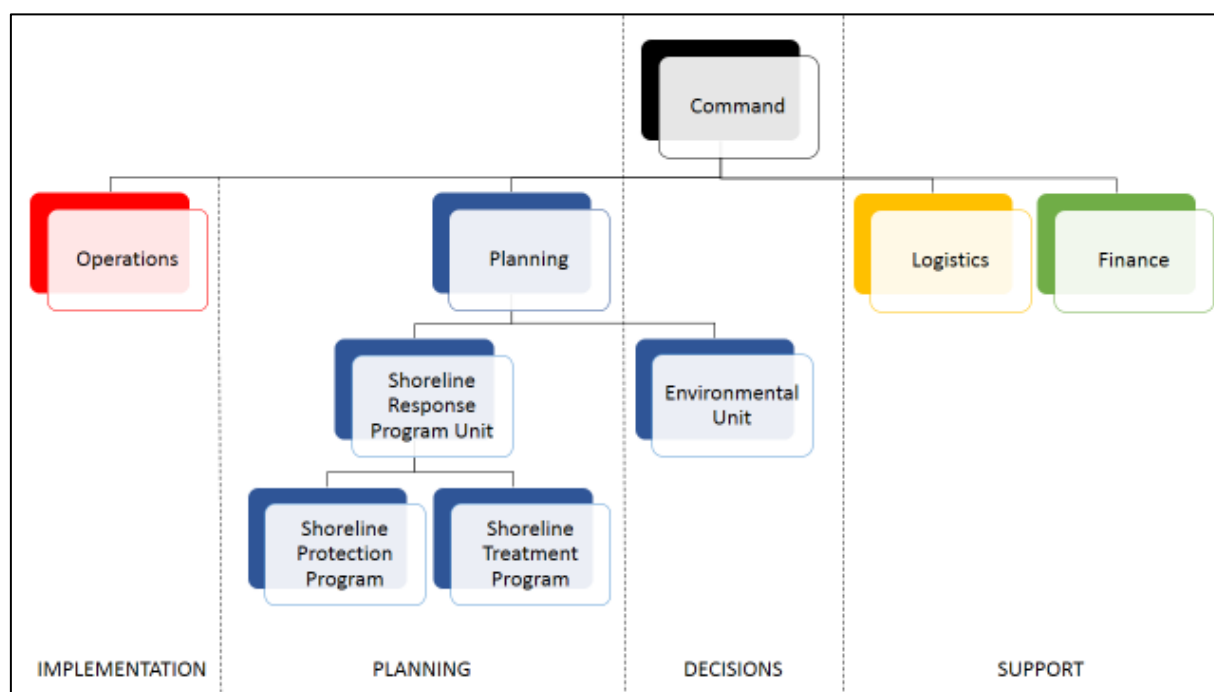


Figure 1 Proposed practice with an SRPU involved in the planning process, allowing the EU to focus on recommendations for decisions.

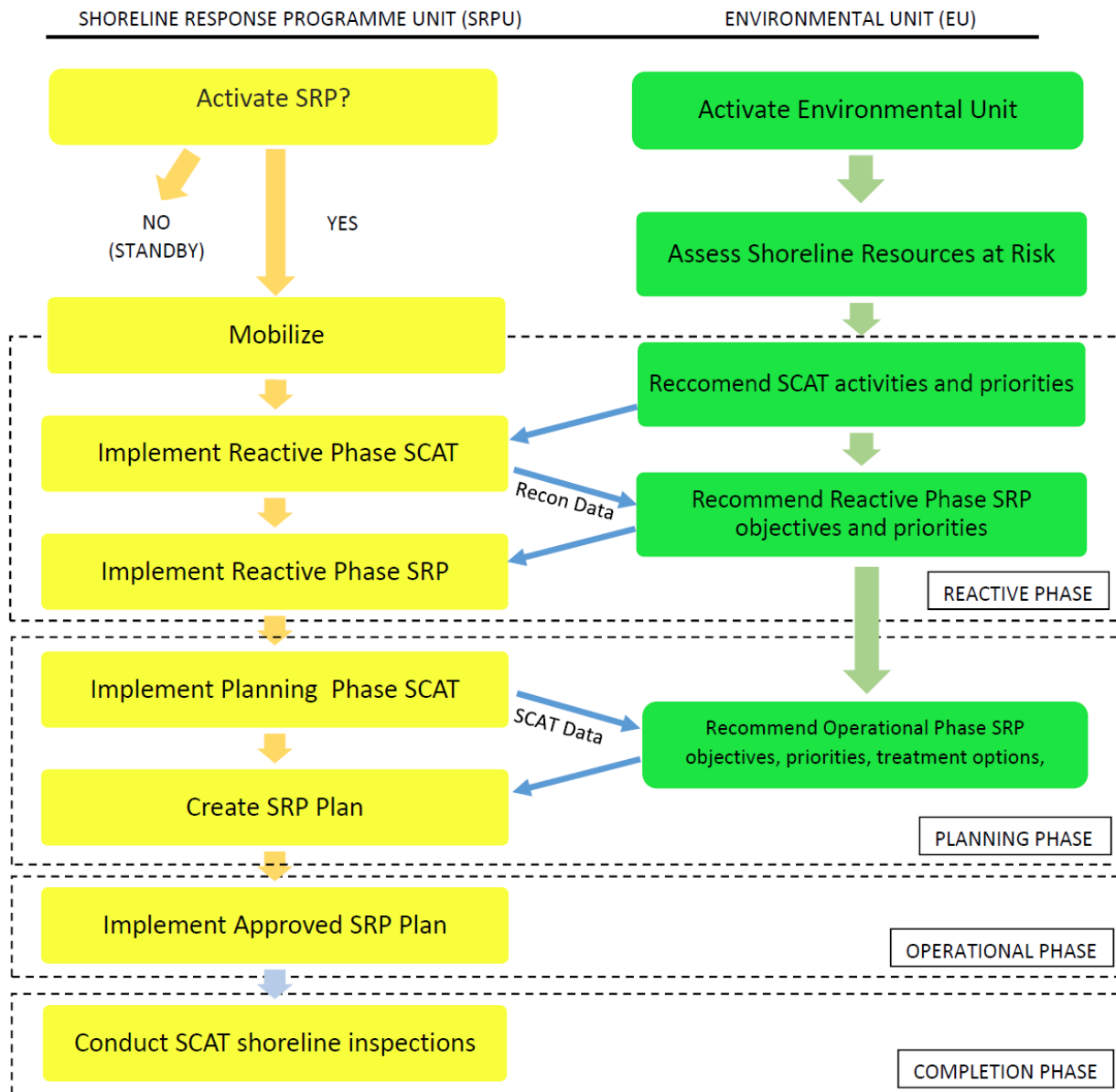
**KEY FEATURES OF AN SRP:**

- The SRP Unit (SRPU), part of the Planning Section, focuses on strategic planning for the shoreline response – the Shoreline Response Program.
- The SRPU works closely with the Environmental Unit (EU), whose focus is on providing technical advice and guidance, to quickly develop the decisions that define the objectives and priorities of shoreline response (USCG 2006, page 19-24).
- The SRPU works closely with the Operations Section, which is responsible for managing the cleanup (USCG 2006; page 19-16) and for the implementation of the SRP Plan which directs the cleanup activities.
- Data and information generated by the SRPU's SCAT field surveys are a necessary and fundamental cornerstone of the shoreline response decision process.
- The focus of the EU is on environmental issues and on achieving consensus within the SMT and with stakeholders regarding decisions that define the shoreline response objectives, priorities, constraints and end points.
- The focus of the SRP is on creating Shoreline Treatment Recommendations (STRs) as part of the SRP Plan and liaising with Operations to ensure that the STRs and the Plan are understood and implemented.
- The STR program incorporates an inspection program that enables closure of treatment operations when pre-agreed end points are achieved.

**SHORELINE RESPONSE ACTIVITIES:**

The sequence of activities that is typical of most response operations is presented in Figure 2 and Table 1. These illustrate schematically the separate, but complementary, roles of the Shoreline Response Program Unit, which includes the SCAT program (SRPU - in yellow), and the Environmental Unit (EU - in green).

- This sequence involves an initial SCAT reconnaissance (**REACTIVE** Phase) to scale and define the degree of shoreline oiling for the EU to decide where to quickly mobilize Operations to high priority cleanup locations.
- This SCAT reconnaissance is followed by a **PLANNED** Phase in which the EU uses the data generated by SCAT to develop decisions that define the shoreline response for the SRPU to generate STRs and an SRP Plan.
- **STEP E5** in Table 1 is one of the critical drivers of a shoreline response as this involves the engagement of the SMT and stakeholders, by the EU, in deciding shoreline response objectives, priorities, constraints and end points. This decision process at some point may involve approvals by regulatory bodies for the use of non-standard treatment techniques and culminates in approval of these decisions by the SMT Command.
- These decisions enable the SRPU SCAT teams to generate STRs (**STEP S5**) for segments to be cleaned or treated and the preparation of an SRP Plan.
- SCAT is directly involved throughout this sequence of activities and SCAT data are the basis for the decision process and the STRs. The sequence of SCAT activities is summarized in Figure 3.



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Figure 2 Sequence of activities for a Shoreline Response Program (SRP)

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Table 1 Step-wise Sequence of SRP Activities

SRP Unit	ENVL UNIT (with respect to Shorelines)
<b>STEP S1</b> Activate SRP team ("Yes/No" decision by PSC)	<b>STEP E1</b> Activate EU
<b>STEP S2</b> Mobilize to appropriate scale	<b>STEP E2</b> Assess Shoreline Resources at Risk (which includes transport, weathering, etc.)
	<b>STEP E3</b> Develop <i>REACTIVE PHASE</i> SCAT activities and priorities recommendations and, once approved by the EUL, provide to the SRP Unit
<b>STEP S3</b> <ul style="list-style-type: none"> <li>• Implement <i>REACTIVE PHASE</i> SCAT</li> <li>• Provide reconnaissance data to the EU</li> </ul>	<b>STEP E4</b> <ul style="list-style-type: none"> <li>• Process SCAT reconnaissance data</li> <li>• Develop <i>REACTIVE PHASE</i> SRP objectives and priorities recommendations</li> <li>• Once approved by EUL, provide recommendations to the SRP Unit</li> </ul>
<b>STEP S4</b> <ul style="list-style-type: none"> <li>• Implement <i>INITIAL/REACTIVE PHASE</i> SRP activities</li> <li>• Prepare SCAT Plan</li> </ul>	<b>STEP E5</b> <ul style="list-style-type: none"> <li>• Process SCAT data</li> <li>• Obtain acceptance (TWGs) and approval (RRT) of <i>PLANNED PHASE</i> SRP treatment objectives, priorities, options, constraints (BMPs) and end points</li> <li>• Once approved by Command, provide to the SRP Unit</li> </ul>
<b>STEP S5</b> <ul style="list-style-type: none"> <li>• <i>PLANNED PHASE</i> SCAT data collection based on approved STEP E5 decisions</li> <li>• Data used by SCAT teams to generate STRs</li> <li>• Ops monitoring, testing, experimentation etc.</li> </ul>	
<b>STEP S6</b> <ul style="list-style-type: none"> <li>• Prepare SRP Plan based on STEP E5 decisions and STRs for approval by Command</li> <li>• SRP Plan defines what Ops will do (when and how) during the <i>DECISION/PLANNING PHASE</i></li> </ul>	
<b>STEP S7</b> <ul style="list-style-type: none"> <li>• SRP Plan Implementation (<i>OPERATIONS/TREATMENT PHASE</i>)</li> <li>• OPS Liaison activities in ICP and in the field</li> <li>• Monitoring</li> </ul>	
<b>STEP S8</b> <ul style="list-style-type: none"> <li>• Inspections and closure (<i>COMPLETION PHASE</i>)</li> </ul>	

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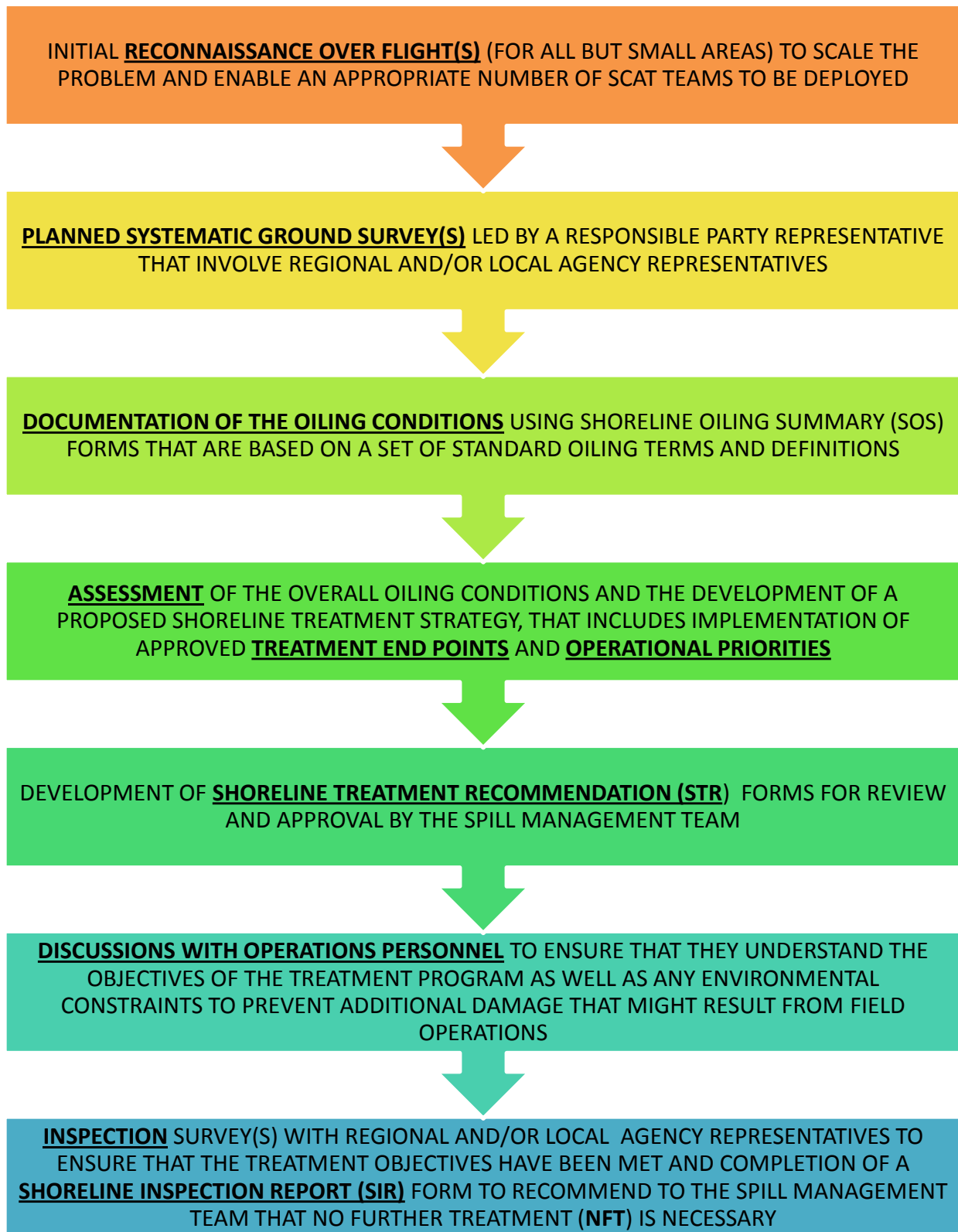


Figure 3 Sequence of SCAT program activities

**ADVANTAGES AND VALUE OF THE SRP CONCEPT:**

The SRP concept was developed based on experience which has shown that:

- shoreline response generally is considered to be a lesser priority for resources during the initial (emergency or reactive) phase to a spill on water, and
- the decision process and communications within an SMT often are poorly understood and executed.

One consequence of this profile is that opportunities are frequently missed during the initial response phase to more effectively and efficiently recover stranded oil, thus prolonging the response activities and the exposure of resources at risk. The consequence of a poor understanding of the decision process and poor communications is that lines of responsibility and accountability are often not clear during the critical initial phase of a response.

Currently no formal process exists for the creation of an SRP or an SRP Plan, either during planning and preparation or during a response. The Environmental Unit (EU) typically is assigned to develop shoreline assessment and cleanup plans, which includes a shoreline oiling assessment program (or Shoreline Cleanup Assessment Technique - SCAT). The current system for on-water spills poses several important issues that can be resolved with an SRP:

- **INITIAL RESPONSE ISSUES**
  - During the initial (REACTIVE or emergency) phase the primary focus of resources, both management and operations, is on-water operations (Figure 4).
  - In the initial, inevitable, competition for resources, shoreline response planning and mobilization, including SCAT surveys, often takes a secondary role.
  - A key to success for on-shore operations is to recover oil quickly before it can be reworked, buried or remobilized. Because of this secondary role, shoreline mobilization may be initially slow and a valuable window of opportunity may be lost, thereby prolonging the subsequent shoreline response operation.
  - This delay can create issues related to effectiveness, efficiency and the exposure of resources at risk.
  - A shoreline response straddles the Planning (in particular the EU) and Operations Sections and in the past, on other than small spills, this has led to management and communications issues particularly during the initial (REACTIVE) phase of a response.
- **PLANNED RESPONSE PHASE ISSUES**
  - The typical spill management process is designed for flexibility and the ability to make decisions quickly. These attributes are important for all response activities, including shoreline operations, in the initial response (REACTIVE phase).
  - Shoreline operations require a long-term (weeks to months) strategy for the PLANNED phase that does not fit easily into the short-term (days) focus of the typical spill management process.
  - Shoreline operations become the dominant response component once on-water operations are complete (Figure 5). After this transition, virtually all of the EUL's efforts change focus as they are then required to maintain this onshore program. This frequently becomes a span of control issue.



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- A considerable part of the EU effort in this PLANNED phase is the SCAT program, which is an essential and continuous activity that generates critical shoreline oiling data, creates Shoreline Treatment Recommendations (STRs) and conducts inspections that provide closure to treatment activities.
- The focus of the EU is on environmental issues and the generation of environmental data, rather than on Operations. As such, EU members are not necessarily familiar with the manner in which Operations functions or with issues related to shoreline treatment tactics. In particular, it is critical to work closely with Operations to ensure that the actions and constraints in the STRs, which frequently are technical in nature, are understood and practical.
- ISSUE RESOLUTION WITH AN SRP
  - A dedicated Shoreline Response Program (SRP) Unit with an SRP Unit Leader (SRPUL) would be able to:
    - focus on this one component of the response and maintain span of control,
    - develop long-term strategies,
    - interface with Operations on a daily basis at the management and field levels,
    - develop and test new or improvised treatment tactics,
    - generate and track STRs and operational progress,
    - manage the SCAT program, and
    - fix minor problems before they become larger and engrained in the process.
  - An SRPU would generate an SRP Plan that would focus on (strategic) planning, within which a (tactical) SCAT program would be embedded.
  - The focus of the EU would remain on environmental issues and on achieving consensus within the SMT and with stakeholders regarding shoreline response objectives, priorities, constraints and end points.
  - The EU decision process would not need to change.
  - The SCAT process would not need to change.

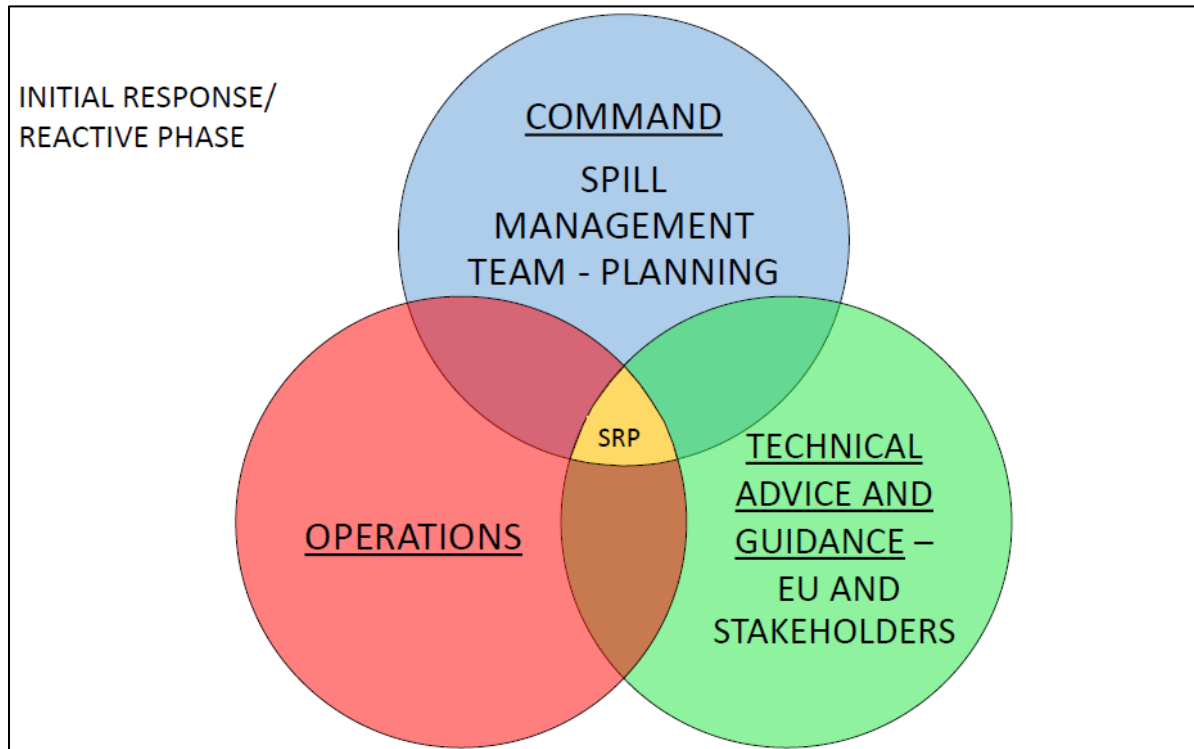


Figure 4 Relative level of effort on an SRP during the initial (REACTIVE) phase of a response

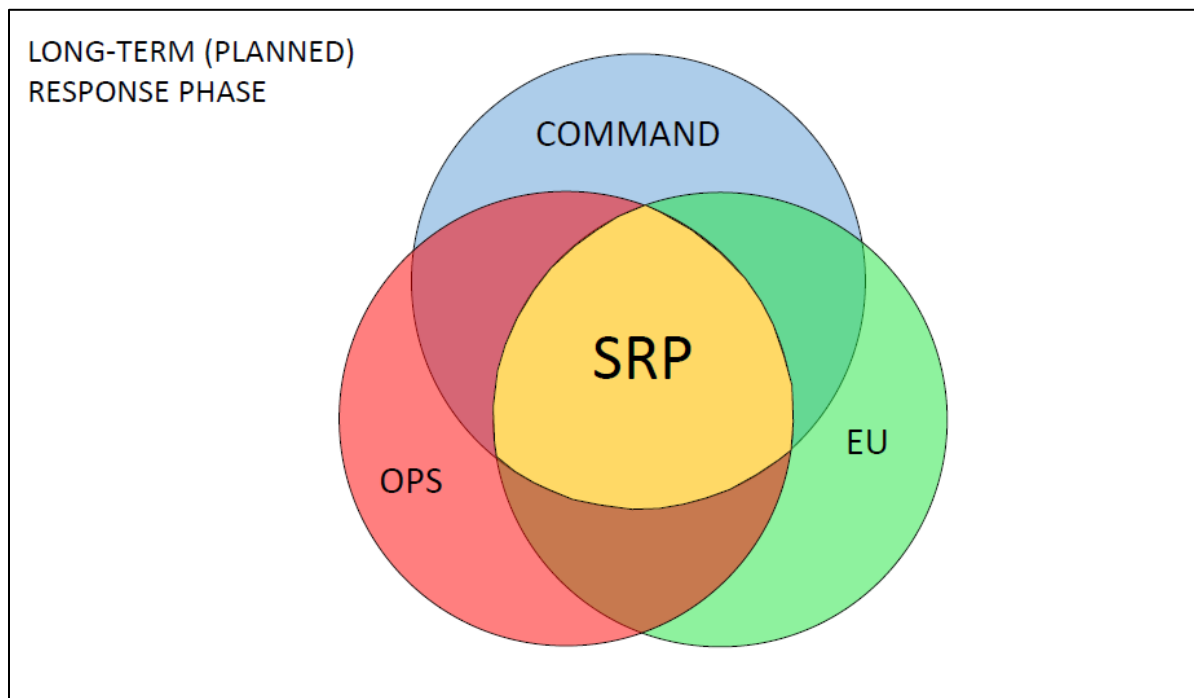


Figure 5 Relative level of effort on an SRP during the long-term (PLANNED) phase of a response

**SRP MANAGEMENT:**

The model Shoreline Response Program Unit (SRPU) fits both vertically and horizontally within the SMT under the Planning Section (Figure 6, Table 2). The Shoreline Response Program Unit Leader (SRPUL) reports directly to the Planning Section Chief and maintains strong links and communications with the Operations Section Chief, the Environmental Unit Leader (EUL) and the EU Shoreline Cleanup Assessment Technical Specialist (SCA-TS).

The number of personnel involved in an SRP and the number of layers in the vertical structure of the SMT organization are a function of the scale of the response and the necessary span of control. On a small-scale response, several roles may be filled by one person. On a large response, span of control is maintained by subdividing management activities vertically by inclusion of “deputy” or other management positions in the chain of command and/or horizontally by subdividing activities by function or by geography.

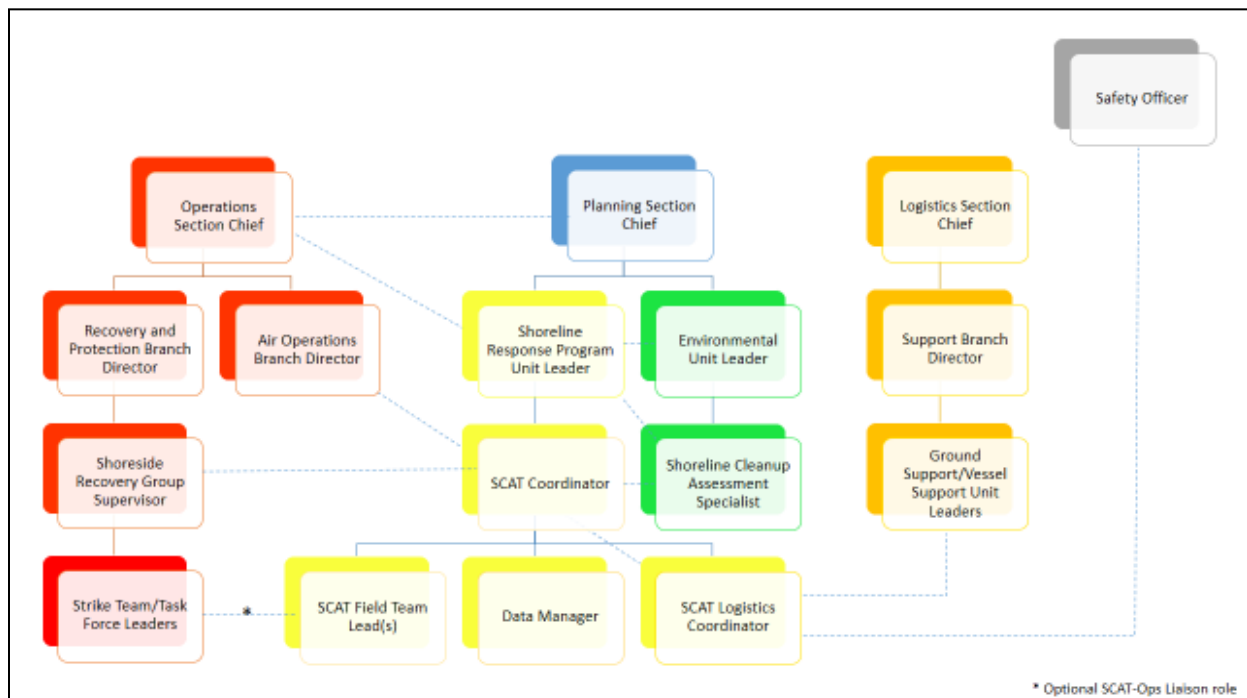


Figure 6 Integration of SRP and SCAT personnel within the ICS structure

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Table 2 Options for where an SRP fits in a Spill Management Team?

<b>WITHIN THE ENVIRONMENTAL UNIT (EU)</b>
<p><b>Advantage</b></p> <ul style="list-style-type: none"> <li>• Shoreline Response and SCAT is within the Planning Section where the EU focus is on providing data, advice and recommendations for planning, rather than the Operations Section where the focus is on implementation.</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• The role of the EU is to develop shoreline cleanup and assessment PLANS, but not necessarily to implement or manage the field activities associate with those plans.</li> <li>• The focus in an EU is on strategic issues, modeling, surveillance, monitoring and permitting and on decisions regarding response objectives, priorities, options, constraints and end points, rather than on field surveys and Operations. A field oriented SRP does not fit easily into an organization in which the primary goal is strategic assessment.</li> <li>• Shoreline Response activities often are a low priority for the EU relative to on-water response during the early (“reactive”) stages of an incident</li> <li>• Decreased span of control and responsibility for the EU as a shoreline response program rapidly grows</li> <li>• Increasing concerted effort is required to maintain communications and coordination with Operations as emphasis from on-water to onshore changes and as a shoreline response program rapidly grows</li> <li>• There is a strong link between an SRP, SCAT and the EU in the initial (reactive) stage of a response but once shoreline operations become the dominant activity the relationship between the EU and an SRP is not critical.</li> </ul>
<b>WITHIN THE OPERATIONS SECTION</b>
<p><b>Advantage</b></p> <ul style="list-style-type: none"> <li>• Enables a full communication line with Operations</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• The role of the Operations Section is to MANAGE cleanup activities, rather than to collect field data or to initiate or plan a shoreline response program.</li> <li>• Potential loss of close ties with the EU, and therefore some of the expertise within, and information generated by, the EU</li> <li>• Shoreline Response is often a low priority for Operations relative to on-water response during the early (“reactive”) stages of an incident</li> <li>• Focus on providing data, advice and recommendations is lost to a focus on “getting it done”</li> <li>• Potential for influence of operational objectives on decision-making and recommendations</li> <li>• Field surveys still need to coordinated with Logistics for ground and vessel support</li> </ul>
<b>SEPARATE SRP UNIT IN THE PLANNING SECTION</b>
<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Shoreline Response and SCAT is within the Planning Section where the focus is on providing data, advice and recommendations for planning, rather than the Operations Section where the focus is on implementing and managing the prescribed activities</li> <li>• Elevates Shoreline Response activities to a higher level of autonomy , thereby increasing the level of priority for shoreline response, particularly during the early (“reactive”) stages of a response</li> <li>• Improves span of control within the Planning Section and EU</li> <li>• Separation from (but close ties with) Operations reduces the potential for influence of operational objectives on decision-making and recommendations</li> <li>• Separation from (but close ties with) the EU increases the focus on data and recommendations to more of an overarching and complete plan (which incorporates data and approved recommendations)</li> <li>• Coordination with the EU is maintained through the Shoreline Cleanup Assessment Technical Specialist, who remains within the EU</li> </ul> <p><b>Disadvantage</b></p> <ul style="list-style-type: none"> <li>• Concerted effort is required to maintain communications and coordination with the EU and Operations.</li> </ul>

**CONCLUSIONS:**

No single management system or organizational structure is perfect or can fit all potential challenges. Nevertheless basic organizational elements exist that are common to virtually all of these preplanned concepts, including:

- a vertical command and control structure,
- span of control,
- a separation of duties, roles and responsibilities, etc.

Management is the tool by which decisions are developed and agreed upon, and by which planned actions are implemented. The foundation of those decisions, following an oil spill, is a set of objectives that clearly define response priorities, options, constraints and end points for a range of different activities from on-water recovery or elimination to demobilization. Over time, lessons from spill responses in a range of situations have been learned and applied so that management models and response activities continue to improve.

The concept of a Shoreline Response Program (SRP) and an SRP Unit represents a shift in some basic assumptions for spill response planning and first-phase response operations related to shorelines. This need for change and improvement emerged with recognition that no formal process or template currently exists for the creation of an SRP or an SRP Plan, either during spill planning and preparation or during a response. This lack of a standard and accepted procedure can delay the initial shoreline oiling assessment (SCAT) surveys that locate and define the shoreline oiling and can thereby result in missed opportunities to quickly recover stranded oil that may be buried or remobilized. Consequently, opportunities are frequently missed during the initial response phase to commit management and operational resources to more effectively and efficiently recover stranded oil, thus prolonging the response activities and the exposure of resources at risk.

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