

Integration of a Shoreline Response Program (SRP) and SCAT

Ed Owens

Owens Coastal Consultants, 755 Winslow Way East, #205, Bainbridge Island WA, 98110, USA

Richard Santner

BP International, Chertsey Road, Sunbury-on-Thames, TW16 7LN, UK

ABSTRACT

The Shoreline Response Program (SRP) is an adjustment within an Incident Management System (IMS) intended to improve current practices. An SRP builds on the recognized strengths of an IMS-based organization and of a SCAT program that utilizes an integrated and focused approach to streamline and better coordinate the decision and planning processes and the operational implementation activities. An SRP is an extension of the traditional SCAT program but with a broader focus on strategic and tactical planning to minimize the short- and long-term impacts of oil on shorelines, the efforts and costs involved in a shoreline response, and the volumes of waste that would be generated. The inclusion of an SRP concept in drills, exercises and preparedness training can directly improve the ability to respond quickly and effectively during the initial response phase. Not implementing an SRP at the very outset of a spill response, when typically the best opportunities exist for the removal of bulk oil, can have significant long-term consequences. Shifting an emphasis on management and physical resources from, often only partially successful, on-water activities to onshore shoreline activities when oil can be picked up more rapidly and effectively can significantly reduce i) the footprint of the response, ii) the duration and scale of the shoreline operation, iii) the exposure of shore zone resources to the oil, and so accelerate environmental recovery, and iv) waste generation.

INTRODUCTION

IPIECA-IOGP is an industry association dedicated to advancing the environmental and social performance of the global upstream and downstream oil and gas sectors. Over the past 45 years the association has promoted good practice, in part, through a series of guidance documents and technical reports on relevant topics related to oil spill planning, preparedness and response (IPIECA-IOGP 2020a). Good practice guidelines for incident management (IPIECA-IOGP 2014a), oiled shoreline assessment (SCAT) surveys (IPIECA-IOGP2014b) and on shoreline clean-up techniques (IPIECA-IOGP 2015) have now been supplemented by a Shoreline Response Program (SRP) technical support document (IPIECA-IOGP 2020b). This new guidance document reflects lessons learned during oiled shoreline response operations over the past two decades and identifies areas for improvement within an Incident Management System (IMS). The SRP Guidance provides the basic structure for a focused spill management effort, from the initiation of a response to the completion of shoreline treatment operations.

Importantly, shoreline response should be included in the objectives established right at the start of an incident to ensure that an SRP is supported to an appropriate level and that the role of SCAT is understood, particularly by those involved in the initial response who may not be familiar with the purpose and value of a SCAT program. An SRP can elevate the significance and importance of shoreline response when included in training, drills and exercises so that an SRP is part of that initial response rather than evolving during the transition from on-water to onshore operations. Shoreline response typically is not a point of focus in an exercise or drill and is rarely part of a preparedness training program; although SCAT training is common this is only one element of an SRP. The inclusion of the concept of an SRP as a functional cell within the EU in drills, exercises and preparedness training as well as in the initial response objectives can directly improve the ability to respond quickly and effectively during the initial response phase,

which can have long-term significant environmental and operational consequences. The IPIECA-IOGP guidance technical document describes the SRP concept and supports their SCAT and shoreline clean-up good practice guidelines to encourage the development of an SRP approach for incident and preparedness.

TRADITIONAL FEATURES OF A SHORELINE RESPONSE

The shoreline component of an oil spill response involves the greatest resource commitment, effort, time and cost elements on most oil spill responses, large or small, and continues far longer than the higher profile on-water phase of a response. For most past marine spills, the initial response appropriately has focused on controlling the source and containing and/or removing floating oil. However, typically it is not until after shorelines become oiled that attention begins to shift to the shoreline response. This shift often involves creating and staffing a Shoreline Response Branch within the Operations Section, mobilizing shoreline cleanup resources, establishing the necessary infrastructure to support shoreline operations, developing a Shoreline Cleanup Assessment Technique (SCAT) program within the Environmental Unit (EU), and various other activities, during which time oil continues to impact the shorelines.

Once a SCAT program is operational, the traditional onshore response process involves shoreline assessment surveys to: 1) detect and document the degree of oiling; and 2) to develop recommendations on the most appropriate and effective technique(s) for treating or cleaning each segment of oiled shoreline (i.e. Shoreline/Segment Treatment Recommendations, or STRs). The STRs are processed by the EU, which may or may not include stakeholder input, and then submitted to Incident Command for approval or modification. The approved STRs are then incorporated into the Incident Action Plan (IAP) which is provided, in effect, as a work order to the Operations Section for implementation.

Once operational, traditional shoreline cleanup programs have been effective in removing stranded oil, reducing environmental, socio-economic and cultural impacts and accelerating natural recovery. However, the delays typically involved in becoming fully operational result in greater initial and sustained shoreline impacts as well as longer duration and more costly shoreline response operations and, significantly, considerably greater waste generation. Another drawback with the traditional approach is that typically there has been no direct communication between the SCAT teams/program that creates the STRs and the field Operations crews responsible for their implementation. Consequently, operations supervisors and cleanup crews may not have fully understood how, or even exactly where, to conduct the recommended shoreline cleanup activity. This communications issue has led to reduced efficiency and, in some cases, collateral environmental impacts from the cleanup operations.

RECOMMENDED AREAS FOR IMPROVEMENT THROUGH AN SRP

Five areas identified for improvement in the current IMS process that are addressed by the creation of an SRP include:

1. **SEPARATION OF RESPONSIBILITY:** The current IMS concept is a proven and effective system but can be prone to communication and accountability issues. In the current system the responsibility for a shoreline response program is separated between the Planning and Operations Sections, with the decision processes lodged largely in the EU and implementation of those decisions managed by the Operations Section. An SRP acts as a bridge between these key two distinctly separate components of an IMS and the SRP Manager is assigned the overall responsibility for the strategic planning and appropriate implementation of shoreline response strategies. Accountability for setting response priorities, operational targets and establishing best management practices remains within the Planning Section (EU) through the STR authorization process, whereas the Operations

Sections remains accountable for the implementation of those STRs with support from the SCAT program which is embedded in the SRP.

2. **STREAMLINING:** The EU is the point of convergence of many operational and decision elements that support the strategies and tactics that drive the direction and pace of a response. Span of control in an EU can be improved by separation of the two primary functions of: 1) SCAT data collection, interpretation and recommendations, and operations liaison and communications led by the SRP Manager; and 2) the decision-making process supported by a range of Technical Specialists, stakeholders and Technical Working Groups (TWGs) led by the EU Leader or a Deputy EU Leader. An SRP, under the direction of the SRP Manager, can streamline span of control in the EU planning and decision-making processes by providing focused support and encompassing an integrated perspective on all shoreline response issues, including shoreline data collection (SCAT) and STR implementation.
3. **COMMUNICATIONS:** An SRP offers a single point of contact for the wide range of management and operational issues and activities that relate to a shoreline response and, again, provides a direct bridge between the Planning (EU) and Operations Sections to better coordinate and streamline the decision and implementation activities.
4. **OPERATIONS SUPPORT:** No mechanism is in place within the current Incident Management Team (IMT) structure for the EU to provide direct support for Operations shoreline cleanup Task Forces or Strike Teams in the field; the recommendation in this SRP guidance is that this support would be provided from the SRP team through the SCAT-OPS Liaison function.
5. **TRAINING:** Missed opportunities at the outset of a response, which typically is the best time for the maximum gain from shoreline treatment, largely result from the lack of inclusion of an SRP concept or SRP initial response objectives in drills, exercises and preparedness

training. As a consequence the issue and benefits of setting up an SRP prior to shoreline oiling or as soon as the shoreline is oiled by “*getting it right from the start*” typically are not fully appreciated or understood by planners or senior decision makers. This deficiency can be partially addressed by the inclusion of an SRP objective and the stated purpose of SCAT in the Incident Objectives in the first IAP issued by the Incident Command.

SRP ORGANIZATION AND MANAGEMENT

The Shoreline Response Program (SRP) is an innovation to improve the functionality and effectiveness of an Incident Management System (IMS) (IPIECA-IOGP 2014a). Traditionally, the responsibility for shoreline response planning has been assigned to the Environmental Unit Leader (ENVL) and/or a Shoreline Cleanup Assessment Technical Specialist (SCA-TS) in the Environment Unit (EU), whereas the implementation and management of strategies and tactics have been assigned to the Operations Section. The EU is, typically, a large multi-functional group with as many as a dozen or more technical specialists. An SRP program that includes the SCAT program may be a large component of the EU effort and typically requires individual leadership for effective span of control. The modern structure for SRP management still resides within the established EU in the IMT, however, the SRP Manager rather than the ENVL may function as the single point of contact for Incident Command on all shoreline-related issues.

Whereas the EU focuses on environmental issues and achieving consensus within the IMT and with stakeholders regarding decisions that define the shoreline response objectives, priorities, constraints and treatment criteria, the SRP consolidates SCAT and other shoreline oiling data with these decisions to create, implement and manage an SRP through an SRP Plan.

The SRP team and the Operations Section work together to confirm that the Shoreline Treatment Recommendations (STRs) presented in the IAP are practical and are understood and implemented correctly and to determine the effectiveness of the clean-up treatments.

The SRP Manager

The SRP Manager role is structured around three key areas:

- Working with members of the IMT,
- Managing the systematic SCAT process, and
- Recommending strategic plans for the shoreline response.

These key functions of an SRP in the Command Post all may be filled by one person on a small-scale response or by multiple people (Figure 1) as the scale of the response and as the appropriate span of control, expands and contracts.

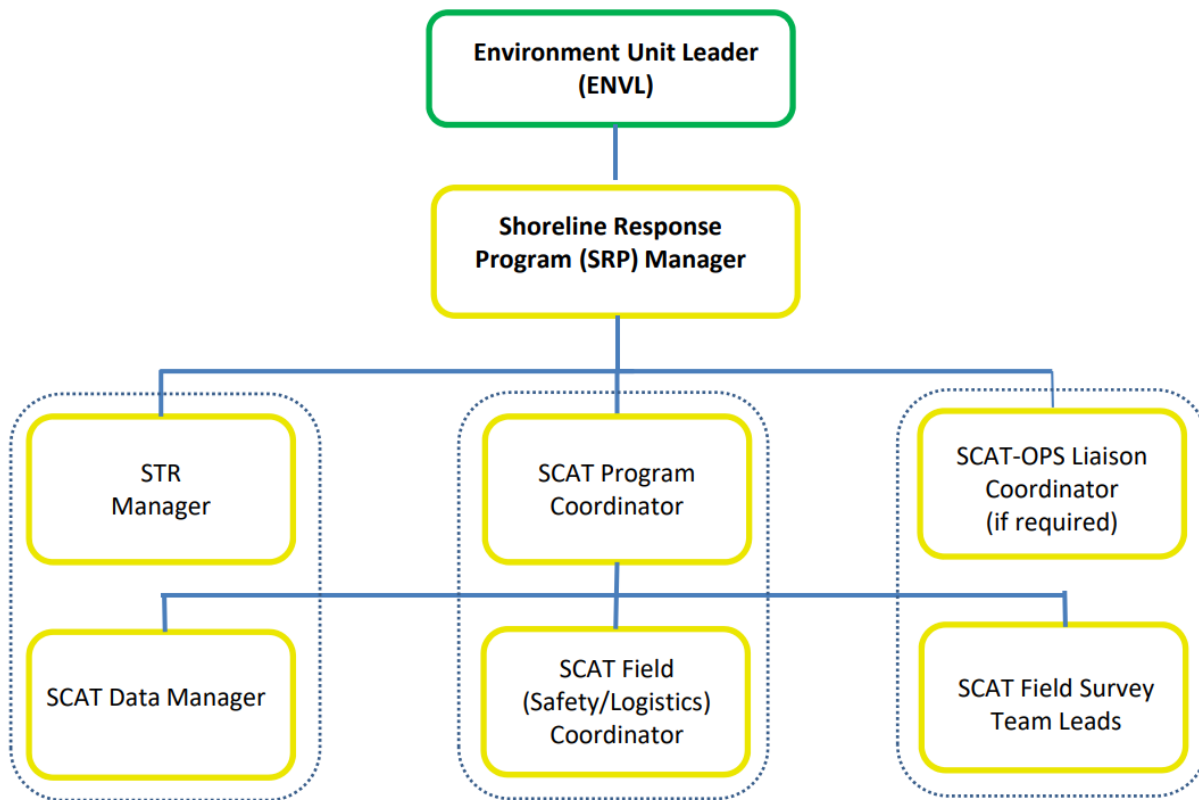


Figure 1 Vertical integration for an intermediate- or large-scale response operation

The SRP is in the EU and the SRP Manager reports directly to the Environmental Unit Leader (ENVL). At a minimum, the SRP would involve the SRP Manager in the Command Post

working with the IMT and a SCAT Team Lead to conduct the field assessment survey. When a response involves the deployment of two or more SCAT Teams it is important to immediately mobilize a SCAT Data Manager in order to ensure rapid processing and turn around (with QA/QC) of the field data and the generation of STRs; data management can quickly become a bottleneck at the outset of a response. The SCAT Data Manager would work with the SCAT Field Team Leads to generate and monitor the STRs. At the days-to-weeks response level the SRP Manager may be supported by a:

- SCAT Program Coordinator who would provide Field Safety and Logistics support for the SCAT Field Survey Teams,
- SCAT Data Manager/Shoreline Treatment Recommendation (STR) Manager,
- SCAT Field Team Leads and, with multiple STRs, a SCAT-OPS Liaison Coordinator.

These roles easily can be further layered for span of control as shown in Figure 1.

During the initial response phase the SRP Manager typically would spend a high proportion of time and effort communicating and working within the IMT to establish the systematic SCAT survey program and generate the SRP, and to ensure that the STR process is understood internally within the IMT and by external stakeholders.

After the transition into the planned response or project implementation phase the emphasis of the SRP Manager changes to greater engagement with the EU Leader and stakeholders to maintain confidence in the program and help them understand how completion and closure can be achieved (Figure 2).

The level of engagement with stakeholders increases further in the transition to the completion phase as STR Inspection Reports (SIRs) often recommend that oil concentrations below the treatment criteria are better left for natural attenuation or for reasons associated with

Spill Impact Mitigation Assessment or Net Environmental Benefit Analysis concepts

(SIMA/NEBA; IPIECA-IOGP 2018).

PLANNED PHASE - DECISION PROCESS	PLANNED PHASE - IMPLEMENTATION	COMPLETION PHASE
<ul style="list-style-type: none"> • Engagement with the IMT as this is critical to ensure that the SRP process is working properly • Oversee the SCAT process to ensure that it settles into a steady rhythm • Encourage stakeholders to recognize that a systematic process is emerging; they may be understandably concerned so provide reassurance about committing to the STRs and how future activities will unfold 	<ul style="list-style-type: none"> • Manage pressure from the IMT to “go faster” and get things done more quickly • Once the systematic SCAT process is in place and running well, requires little attention other than dealing with unexpected events • As stakeholders become more confident and start to see results, engage with them and look ahead to the next phase 	<ul style="list-style-type: none"> • Work with the IMT to reorganize and downsize as shoreline targets are achieved and the program moves towards closure • Ensure that SCAT is focused on the treatment end point criteria and recognize when sufficient treatment has been completed for each STR • Stakeholders may become concerned as some segments are not fully clean; work with them to understand NEBA/SIMA and to accept that natural recovery may be the best option

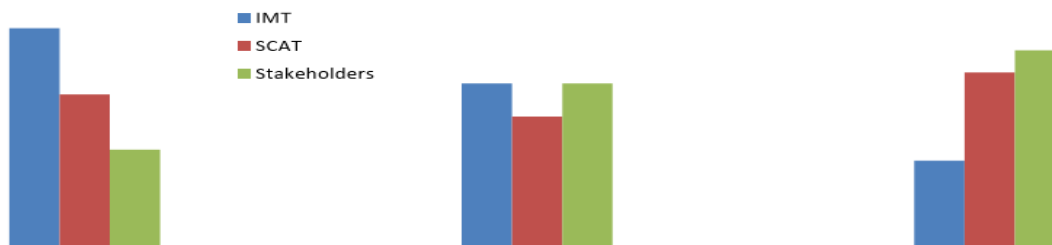


Figure 2 The engagement of the SRP Manager changes after the transition from the initial response

SCAT-OPS Liaison

SCAT has typically supported the Operations Section during a response but a critical lesson learned from the Macondo response in 2010 and the following years was the need for dedicated efforts (SCAT-OPS Liaison) to ensure that the communication and support between the two groups could be maintained as the scale of the operation expanded (Santner *et al.* 2011).

SCAT-OPS Liaison is a separate function from the SCAT field surveys missions and is carried out either by SCAT Field Team Leads or by a separate person, depending on the size and scale of the response. SCAT-OPS Liaison supports the Operations Section in the field to ensure that the Operations supervisors understand the treatment criteria (end points), constraints, and Best Management Practices (BMPs) described in the STRs. In effect the SCAT-OPS Liaison function wears two hats to ensure alignment between the intent of an STR and the field activities and to ensure that the Operations supervisors understand the treatment criteria, constraints, and Best Management Practices (BMPs) described in the STRs. In Figure 3, a red “Operations Hat” and a blue “SRP/SCAT Hat” represent the bridge between the different but overlapping and synergistic Operations and SRP perspectives (Table 1).

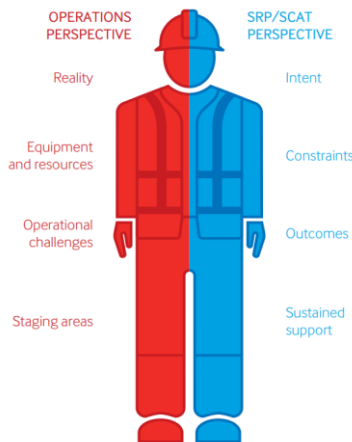


Figure 3 The SCAT-OPS Liaison function (Table 1)

Table 1 The SCAT-OPS Liaison Function seen from Operations and SRP/SCAT Perspectives

The Operations Perspective	The SRP/SCAT Perspective
<ul style="list-style-type: none"> • Evaluates the reality of the activities that are taking place to achieve the STR requirements • Provides advice on the equipment and resources required for the job 	<ul style="list-style-type: none"> • Ensures that the intent behind the STR is understood • Ensures that any constraints and BMPs are understood and respected

<ul style="list-style-type: none"> • Helps to address any concerns and overcome any operational challenges on-site • Ensures that staging areas are set up and operating correctly within the BMPs 	<ul style="list-style-type: none"> • Ensures that the outcomes of what need to be achieved in the STR (treatment completion criteria) are understood • Provides sustained support to Operations teams as they work at different sites
---	---

The SCAT-OPS Liaison function is a fundamental component of the SRP process to support the implementation of the STRs and assess the effectiveness of the treatment activities. The SRP and Operations look towards each other for implementation of the shoreline treatment decisions from different perspectives. The Operations side recognizes that SCAT-OPS Liaison provides an explanation and interpretation of the intent of the STRs and acts as a communication bridge between the decision-makers, planners, and stakeholders in the IMT Command Post and the field Operations. The SRP side relies on Operations to provide a reality check on the recommended cleanup activities in the STRs and to implement them appropriately. Operations continuously monitors the effectiveness of the treatment activities and any operational concerns or challenges during the implementation of the STRs and advises and recommends, through the SCAT-OPS Liaison, appropriate adjustments or reassessments to ensure that the treatment criteria can be achieved within the BMPs. This synergistic consultation between Operations and SCAT provides a mechanism by which modifications to an STR can be recommended to the EU.

BENEFITS OF AN SRP – “GETTING IT RIGHT FROM THE START”

The SRP has numerous benefits and advantages:

- Elevates shoreline response activities to a higher level of recognition within the IMT prior to shoreline oiling and during the initial assessment and response phase so that SRP efforts are initiated to address immediate shoreline response needs and receive an appropriate level of management and operational support.

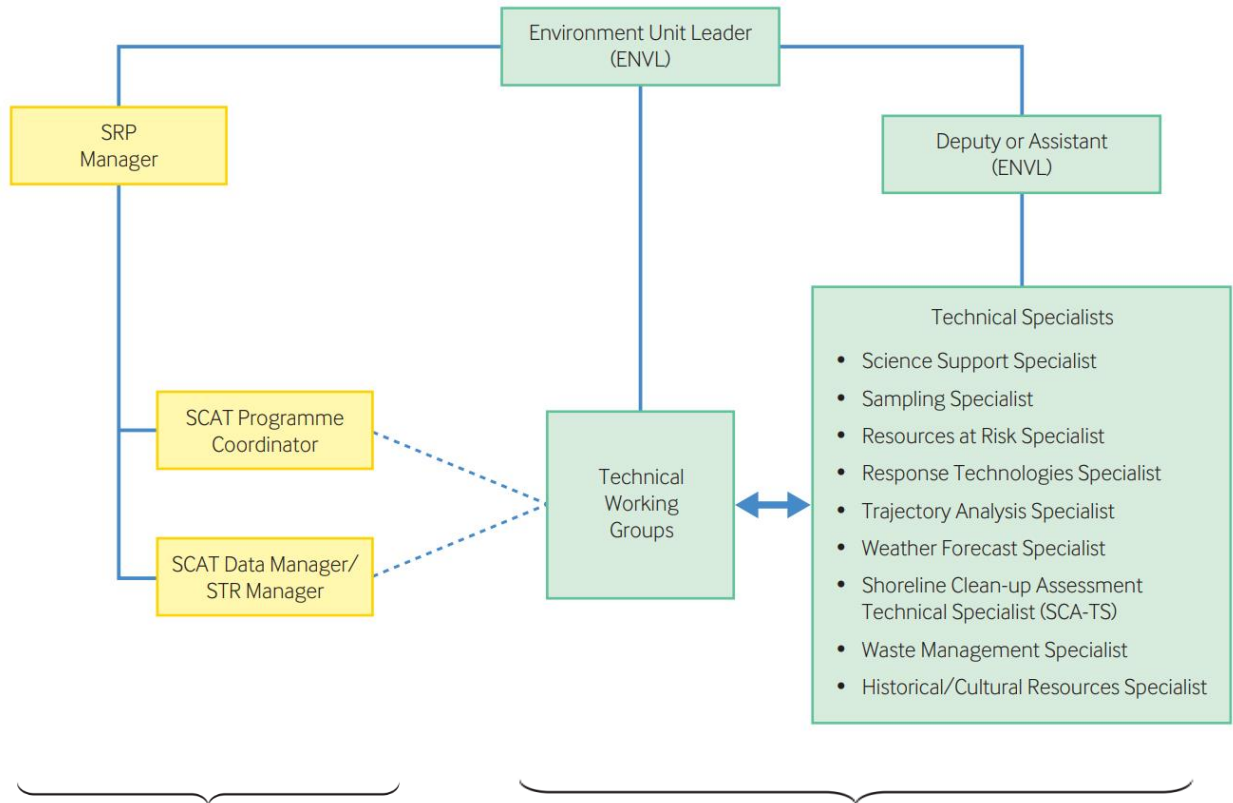
- An SRP enables a more rapid shoreline response following the initial impacts to recover bulk or mobile oil before it is reworked, buried or remobilized through natural processes. This quick action reduces delays in action and minimizes the footprint and long term impacts to shorelines as well as significantly reducing waste generation and post-operations restoration efforts.
- As a functional cell within the EU, an SRP provides a single point of contact on all shoreline-related issues; improving communication, decision-making, consistency and accountability.
- Develops objectives and criteria for the initial response and for SCAT missions when shoreline response actions can be most effective and maintains a sustained shoreline response effort with span of control as the effort expands and contracts through to the completion of operations.
- Saves time and effort by streamlining the EU which is the point of convergence of many operational and decision elements that support the strategies and tactics that drive the direction and pace of a response.
- Creates a “*getting it right from the start*” vehicle for medium- and long-range strategic planning during the initial response when the focus and decision-making is typically concentrated on the short-term, on-water response.

THE ENVIRONMENTAL UNIT AND THE SRP

The EU and SRP work together to develop the decisions that define the strategy and pace of a shoreline response. Recommendations from the SRP are provided to the EU Leader, who typically consults with Technical Working Groups (TWGs) or Technical Advisory Groups (TAGs), and then upward through the Planning Section Chief (PSC) for Incident Command approval on treatment objectives, priorities, clean-up options, BMPs and treatment criteria.

At the intermediate- or medium-scale, span of control for the EU Leader may involve the creation of one or more Deputy EU Leaders. Logically, one or more Deputy EU Leaders could be assigned to manage the numerous Technical Specialists within the EU as these collectively provide specific individual technical and scientific functions and subject matter expertise. A separate Deputy EU Leader also could be assigned to manage the SRP. This arrangement separates and streamlines two distinctly different functions of the EU (Figure 4):

- the shoreline response decision process that evaluates data collected by SCAT and other field teams, along with data generated by technical teams, to reach consensus within the TWGs on response priorities, strategies and tactics, and completion criteria
- the SRP which collects and processes the SCAT field data, generates STRs based on the treatment criteria established by the EU/TWGs, and works with the Operations Section to implement the STRs and BMPs.



STR GENERATION AND IMPLEMENTATION

SHORELINE RESPONSE DECISIONS

Figure 4 Example of the potential horizontal integration of the EU and an SRP on intermediate- and large-scale responses

OPERATIONS AND THE SRP

The SRP works closely with the Operations Section at different levels in the Command Post and in the field (Figure 5). The SCAT-OPS Liaisons are SRP representatives who may be embedded full- or part-time in Operations at the Command Post or in field shoreline response task forces or strike teams. These Liaisons provide direct field support to Operations to interpret and explain the STRs and other EU decisions, constraints, or guidelines (BMPs).

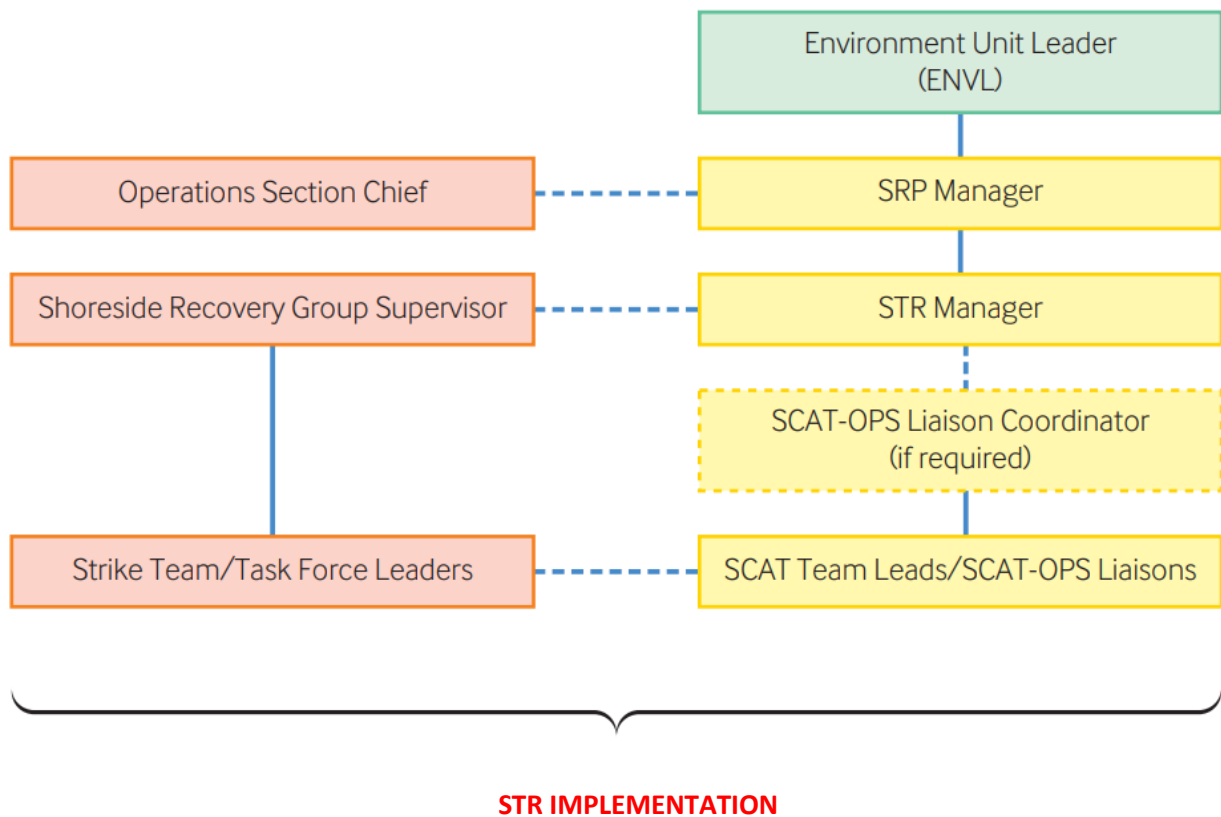


Figure 5 Example of the potential horizontal integration of Operations and an SRP on intermediate- and large-scale responses

Often times, the SCAT-OPS Liaisons are the SCAT Field Team Leads that initiated the STRs and are well suited to explain the various aspects and nuances of the STRs to the cleanup teams. As the response scale increases these SCAT Field Team Leads often do not have the time available or the spatial capability to complete their primary survey missions and also serve as SCAT-OPS Liaisons, in which case shoreline cleanup technical specialists can be brought in to fill the liaison role(s) (Santner *et al.* 2011).

SCAT-OPS Liaison field representatives should have a full- or part-time single-point of contact in Operations task forces or strike teams to ensure and maintain effective and consistent communications. The SRP and Operations look towards each other for implementation of the shoreline treatment decisions from different, but synergistic, perspectives (Figure 4, Table 1).

SRP/SCAT activities and deliverables may not follow the same pace or time schedule as operations activities or other field components assigned in the work orders in an Incident Action Plan (IAP). Frequently, SCAT field information collected on one day is not available, or necessary, for planning the Operations field activities for the following day or next operational period. SCAT surveys quickly outpace the ability of Operations to complete the assigned STRs so that the SRP/SCAT rhythm may appear to be out of synchronization with the IAP. In reality, oiling conditions typically change with time due to shoreline processes so that the SRP Manager and/or SCAT Coordinator rely on SCAT-OPS Liaison to continuously update the short-term (days) and medium-term (weeks) SCAT surveys missions schedule to provide up-to-date oiling information and to recommend updates to pending or current STRs.

PREPARATION AND PREPAREDNESS: THE SRP IN TRAINING AND DRILLS

With a few exceptions, exercises and drills rarely have a realistic shoreline response component typically due to the emphasis in the design on the initial organizational setup of an IMT and a focus on on-water activities. An SRP typically is not considered in the first set of

objectives on any spill or drill beyond general statements that relate to minimizing the effects of the release. As a consequence an SRP typically is not part of a preparedness training program and is not fully appreciated and often little understood by response managers and senior decision makers, and therefore not engrained sufficiently in order to “get it right from the start” on the a response to a spill incident (Owens *et al.*, 2020). This lack of preparedness may have significant long-term consequences regarding the effects of the spilled oil on shorelines as well as the time and level of effort required for a shoreline treatment program and the amounts of waste that would be generated.

A programed paradigm shift in spill preparedness is necessary before the culture of an SRP can be successfully integrated into an IMT system. Once the benefits and value of an SRP are recognized and accepted, the effective implementation of the concept requires regular training and exercising within the overall preparedness program.

Drill design options should include imminent and actual shoreline oiling scenarios to ensure that IMTs practice the execution of the SRP function to reinforce the strategic importance of establishing a shoreline response program prior to, or immediately following, oil impacting a shoreline. In particular, drill designers should be encouraged to include an SRP objective in the first set of incident objectives in the IAP to ensure that the importance of an SRP at the very start of an incident response is recognized by the IMT, even if an SRP may not be implemented in the scenario. Importantly, the Operations Section always should include a Shoreline Clean-Up Branch (IPIECA-IOGP 2014a) or Shoreside Recovery Group (USCG 2014) during a drill or exercise to gain acceptance of the SRP concept.

CONCLUSIONS

Shoreline response has been a critical and time-consuming element of all modern coastal oil spills and Shoreline Cleanup Assessment Techniques (SCAT) have evolved since their

introduction 30 years ago to support the decision process and the operations activities. Critical lessons learned during the shoreline response to the Macondo incident in the Gulf of Mexico included realizing the importance of: 1) bridging between the data and information collected by a SCAT program and the decision-making process in the general staff, particularly in the Planning Section and the Environmental Unit (EU); and 2) SCAT support to the Operations Section during the implementation of the shoreline response decisions (Owens *et al.* 2011; Santner *et al.* 2011).

The concept developed since 2010 to better address these issues is a formal Shoreline Response Program (SRP) within the EU that integrates the three steps of: a) SCAT data collection, b) EU decision-making, and c) Operations implementation with SCAT support. Importantly, an SRP enables the initial response efforts to focus on “*getting it right from the start*” during the narrow window of opportunity when a shoreline response can be most effective as oil first reaches the shoreline before it is reworked, buried or remobilized by natural processes (Owens *et al.* 2014). In most instances at the start of a response the management, personnel, and equipment resources focus on, and are largely dedicated to, the on-water response so that this window of opportunity is missed. Shifting an emphasis and management and physical resources from, often only partially successful, on-water activities to onshore shoreline activities when oil can be picked up more rapidly and effectively can significantly reduce i) the footprint of the response, ii) the duration and scale of the shoreline operation, iii) the exposure of shore zone resources to the oil, and so accelerate environmental recovery, and iv) waste generation.

An on-water response demobilizes once there is no longer recoverable or treatable oil on the water, or because of safety issues. For these reasons, this is largely a decision that is developed at a practical level by Planning and Operations. By contrast, on shore or on-land treatment directly involves the Incident Command as this is a consensus decision in which some or all of the oil may be left to naturally attenuate at the completion of the program. This decision is more of a

closure process that begins early in the response to provide treatment criteria, or target endpoint for Operations through the STR process. When a SCAT team surveys a location and that area meets the criteria, then no further activities are recommended; if the location does not meet the criteria then an STR is generated. The SRP Manager works with the EU, which in turn involves the stakeholders, to develop the criteria.

An SRP should be included in the initial objectives established at the very start of an incident to ensure that an SRP is supported to an appropriate level and that the role of SCAT is understood, particularly by those involved in the initial response who may not be familiar with the purpose of SCAT (Cariglia *et al.* 2017). An SRP can elevate the significance and importance of shoreline response when included in training, drills and exercises so that an SRP is part of that initial response rather than evolving during the transition from on-water to onshore operations. Shoreline response typically is not a point of focus in an exercise or drill and is rarely part of a preparedness training program; although SCAT training is common, this is only one element of an SRP. The inclusion of the concept of an SRP as a functional cell within the EU in drills, exercises and preparedness training, as well as in the first set of response objectives, can directly improve the ability to respond quickly and effectively during the initial response phase, which can have long-term significant environmental and operational consequences.

In a manner reflecting the paradigm shift associated with the NEBA concept in the mid-1990s (Baker 1995), an SRP is a similar adjustment for the 2020s. In themselves, NEBA and an SRP are not organizational or management changes, but rather relate to a re-focus on long-term high level response objectives and strategies. The NEBA concept evolved as a high level management change in the culture of setting spill response objectives and strategies. An SRP is an extension of this internationally accepted concept, coupled with SCAT, and extends strategic

thinking to refocus management and resources based on lessons learned during shoreline responses over the past two decades.

ACKNOWLEDGEMENTS

Thanks (alphabetically) go to Bob Castle (RCE), Marty Cramer (CPR, formerly with ConocoPhillips), Helen Dubach (CTEH, formerly with OCC), Lauren Glushik (ExxonMobil, formerly with OCC), Judy Kitagawa (formerly with BP), Scott Neuhauser (BP), Andy Nicoll (IPIECA), Bob Pfannstiel (formerly with BP), and Andrew Tucker (BP) for their numerous past and recent contributions during the development of the SRP concept.

REFERENCES

- Baker, J.M., 1995. Net Environmental Benefit Analysis for Oil Spill Response. In: International Oil Spill Conference Proceedings. In: *Proceedings International Oil Spill Conference*, Amer. Petr. Institute, Pub. No. 4620: Washington, DC: 611–614.
<https://ioscproceedings.org/doi/abs/10.7901/2169-3358-1995-1-611>
- Cariglia, N., Challenger, G. and Beer, N., 2017. The Use and Misuse of SCAT in Spill Response. In: International Oil Spill Conference Proceedings, Amer. Petr. Institute, Washington, DC: 2642-2659. <https://ioscproceedings.org/doi/abs/10.7901/2169-3358-2017.1.2642>
- IPIECA-IOGP, 2014a. Incident management system for the oil and gas industry. Good practice guidelines for incident management and emergency response personnel. OGP Report 517, London UK, 51pp. <http://www.ipieca.org/resources/good-practice/incident-management-system-ims/>
- IPIECA-IOGP, 2014b . A guide to oiled shoreline assessment (SCAT) surveys. Good practice guidelines for incident management and emergency response personnel. IOGP Report 504, London UK, 37pp. (revised 2016) <http://www.ipieca.org/resources/good-practice/a-guide-to-oiled-shoreline-assessment-scat-surveys/>
- IPIECA-IOGP, 2015. A guide to shoreline clean-up techniques. Good practice guidelines for incident management and emergency response personnel. IOGP Report 521, London UK, 65pp. (revised 2016) <http://www.ipieca.org/resources/good-practice/a-guide-to-oiled-shoreline-clean-up-techniques/>
- IPIECA-IOGP, 2018. Guidelines on implementing spill impact mitigation assessment (SIMA). A technical support document to accompany the IPIECA-IOGP guidance on net environmental

benefit analysis (NEBA). IOGP Report 593, London UK, 42pp.

<http://www.iecea.org/resources/awareness-briefing/guidelines-on-implementing-spill-impact-mitigation-assessment-sima/>

IPIECA-IOGP, 2020a. Oil spill response resources. <http://www.iecea.org/our-work/oil-spill/oil-spill-response-resources/>

IPIECA-IOGP, 2020b. Shoreline Response Programme Guidance. A technical support document to accompany the IPIECA-IOGP guidance on oiled shoreline assessment and shoreline clean-up techniques. IOGP Report 635, IPIECA and IOGP, London, UK, 74 pp.

<https://www.iecea.org/resources/good-practice/shoreline-response-programme-guidance/>

Owens, E.H., Dubach, H.C. and Castle, R.W., 2014. Shoreline Response - A Paradigm Shift. In: International Oil Spill Conference Proceedings, Amer. Petr. Institute, Washington DC: 1315-1328. <http://ioscproceedings.org/doi/pdf/10.7901/2169-3358-2014.1.1315>

Owens, E.H., Kitagawa, J.S. and Neuhauser, S.A., 2021. The Mobilization and Activation of a Shoreline Response Program (SRP) and SCAT in the Incident Command System. In: *43rd AMOP Technical Seminar Proceedings: Environment and Climate Change Canada, Ottawa ON*.

Owens, E.H., Santner, R., Cocklan-Vendl, M., Michel, J., Reimer, P.D. and Stong, B., 2011. Shoreline Treatment during the Deep Water Horizon-Macondo Response. In: International Oil Spill Conference Proceedings, Amer. Petr. Institute, Washington DC.

<http://ioscproceedings.org/doi/pdf/10.7901/2169-3358-2011-1-271>

Santner, R., Cocklan-Vendl, M., Stong, B., Michel, J., Owens, E.H. and Taylor E., 2011. The Deepwater Horizon MC252-Macondo Shoreline Cleanup Assessment Technique (SCAT) Program. In: International Oil Spill Conference Proceedings, Amer. Petr. Institute, Washington DC. <http://ioscproceedings.org/doi/pdf/10.7901/2169-3358-2011-1-270>

USCG, 2014. *U.S. Coast Guard Incident Management Handbook*. U.S. Coast Guard, Pub. COMDTPUB P3120.17B, U.S. Dept. of Homeland Security, Washington DC.

https://www.atlanticarea.uscg.mil/Portals/7/Ninth%20District/Documents/USCG_IMH_2014_COMDTPUB_P3120.17B.pdf?ver=2017-06-14-122531-930