The Use and Misuse of SCAT in Spill Response

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ABSTRACT

The Shoreline Clean-up Assessment Technique (SCAT) is a well-tested tool that enables the systematic surveying of shorelines affected by oil spills. Using standardised terminology to document the nature and degree of shoreline oiling, SCAT was designed to support decision-making for shoreline clean-up operations. Formally integrated into the US response structure, this method is increasingly being adopted as a standard response procedure around the world.

Over the years, SCAT has evolved to meet changing expectations of shoreline response into a tool that can formally guide and document decisions from the initial emergency phase of a response through to the termination of activities – which in large, complex cases could be many months or even years after the incident. The framework of developing a shoreline response programme at the beginning of an incident, implemented by SCAT teams providing shoreline treatment recommendations in support of operations throughout the duration of shoreline response was used extensively in DEEPWATER HORIZON.

A properly designed SCAT programme able to gather the necessary relevant shoreline oiling data quickly and accurately for use in addressing immediate response needs can greatly reduce delays in action and the footprint of the response itself. SCAT's core principle of guiding operations can be overlooked in instances with inexperienced personnel or inappropriate competing objectives, resulting inconsiderable effort expended on SCAT surveys with no clear purpose or objective of how the data will be used to support response

operations.

In this paper we review the use and misuse of SCAT in several recent small-scale incidents and discuss the implications for the wider implementation of SCAT moving forward.

INTRODUCTION

Since it was formalised in the late 1980's, Shoreline Clean-up Assessment Technique (SCAT) has become a fundamental component of oil spill response in the United States and Canada, and increasingly, is becoming standard practice in other countries around the world (IPIECA 2014). Systematic surveys of oil exposed shorelines were already an essential tool to oil spill response planning, however, they lacked standard terminology and procedures. As its most basic function, SCAT is meant to document and characterise the appearance of oil on shorelines in support of effective and appropriate treatment methods. Formalisation of SCAT over the years has led to a replicable procedure with standardised terms to describe the nature of stranded oil, a systematic geographical approach, and the joint effort through interagency and RP cooperation. Through continued and repeated use in multiple spills, the SCAT methodology has evolved, incorporating lessons learned through this iterative process to be viewed as international best practice. ASTM International, a standards organisation that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services has formalised the protocol (ASTM 2016). Over time, it became apparent that multiple response-relevant activities could be streamlined and encompassed under one functional cell: the SCAT teams. For a review of the evolution of SCAT up to DEEPWATER HORIZON (DWH), see Parker *et al.* 2011.

The exceptional and specific needs of the DWH incident in terms of scale, duration and that the source was prolonged and uncontrolled led to the development of a series of new tools that were incorporated into the SCAT process. One of the core tenets of SCAT when it was developed was that it had to be flexible and scalable; adaptable to the unique set of circumstances that govern each spill. To reflect this, in 2011 the National Oceanic and Atmospheric Administration (NOAA) undertook an initiative to update and refine the SCAT process, and one of the activities was the development of a process to right-size SCAT programmes relative to the complexity of a spill (Michel *et al.* 2011). While the additional suite of tools and products that were developed during DWH would prove useful in the event of a similar incident, they will not all be applicable in all spill situations and it is important that the use of SCAT remains flexible and readily scalable. This is especially important given that SCAT is increasingly being incorporated into preparedness frameworks globally. Many States seeking to build capacities in the methodology will be limited by resources and the infrastructure to support full-scale SCAT capabilities. Furthermore, since incident management systems (IMS) vary from country to country, it is important for the SCAT process to remain malleable to feed into these various structures to be successful.

Recent experience shows that responders should be careful that SCAT programmes undertaken in relatively small-scale spills adhere to the objectives of SCAT and do not involve complex processes or incorporate unrelated goals that may contribute to an ineffective response. Cases where this is arguably true include MARATHASSA (British Columbia, Canada, 2015), ISTRA ACE (California, US, 2015), and NATHAN E STEWART (British Columbia, Canada, 2016). Secondary reasons for adapting a SCAT programme may, in some cases, serve an important role and not interfere with an effective response and should not be discounted. For example, SCAT may be used as a forum to educate and engage local stakeholders in situations where shoreline clean-up is unlikely or minimal, such as the NATHAN E STEWART diesel oil spill, where SCAT was an opportunity to engage First Nation stakeholders and provide SCAT training and experience. While competing goals may be achieved though the adjustment of SCAT objectives, the main purpose must not be ignored. In other cases, the focus on finding and cleaning any amount of oil no matter how minor may have impeded an effective response in areas requiring clean-up. The risk now exists that for incidents where response organisations and authorities are not supported by a large-scale or experienced preparedness infrastructure, the expectation will remain that SCAT will have to fulfil the same roles and at the same intensity as in the DWH response, even where relatively small-scale incidents are concerned.

This paper examines the challenges encountered surrounding SCAT from recent small-scale incident responses from both within and outside the US. It is anticipated that recommendations provided in this paper can improve the process in small-scale incidents, or where authorities and responders have limited experience of SCAT programmes.

SCAT AROUND THE WORLD

Although the volume of oil spilled accidentally into the marine environment by shipping activities has been declining over the last five decades (ITOPF, 2017), the scrutiny and magnitude of the response is increasing. Due to a combination of factors including increased expectations (i.e. total removal of oil from all shoreline types), public awareness and perception, and lack of experience at a local or even regional level, the complexity, manpower, and duration of responses to relatively minor incidents appears to be increasing regardless of carbon footprint implications and knowledge from past spills. In spite of a growing preparedness infrastructure and abundance of experienced oil spill responders, existing knowledge is sometimes discounted in favour of “re-inventing the wheel”.

In light of this trend, and the impossibility of predicting the precise array of circumstances that a response will encounter, it is particularly important that the core tenets of SCAT – namely its flexibility and the ease with which it can be scaled to a response – are retained. Furthermore, SCAT is increasingly becoming formally embedded in national oil spill contingency plans around the world. For example, Australia, New Zealand and the UK have all incorporated SCAT as a shoreline response standard (2003, 2006 and 2007 respectively). In 2009, a joint United Nations Environment Programme (UNEP) and International Maritime Organisation (IMO) publication highlighted the use of SCAT for the assessment of environmental damage following oil spills. Although not widely accepted as the primary objective of SCAT, the methodology has since been promoted through the Secretariats of numerous regional organisations as a best practice tool to include within national and regional contingency plans. For example, the majority of the regional agreements and initiatives that are underpinned by the IMO's Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention have been promoting the integration of SCAT in national and regional systems for preparedness and response since 2009. Examples of this include the HELCOM (2017) and REMPEC (2009) manuals on shoreline response. More recently, the joint IMO/Industry project, the Global Initiative for West and Central Africa (GI WACAF), which has been working towards the full implementation of the OPRC Convention in the region, has planned to include SCAT workshops and training for West African States, with a view to having these fully implemented within response frameworks in the region. A possible driver for this may be the influence of major oil industry organisations and the degree to which they have incorporated SCAT within their internal preparedness and response capabilities. While this practice is a domestic requirement for major oil organisations, it is important that industry's response capabilities are able to integrate with national capabilities.

The i ntegration of SCAT into national and regional response systems can be complicated by the fact that most States outside the US do not formally implement the incident command system (ICS) to manage a response. Whilst IMO guidance on IMSs is based on ICS, the guidance is less prescriptive, leaving individual States to determine the specifics and organisation that will best complement systems already in place for dealing with other emergencies. ICS requires substantial pre-investment and resources, to a scale to which is usually unavailable in many other countries. Therefore IMS's and organisational structures vary considerably from country to country. For SCAT to be successful, the core procedures and protocols cannot be too prescriptive, allowing flexibility of scale while maintaining the core objective of systematic data collection in support of response decisions.

THE ROLE OF SCAT

Since its initial development during the NESTUCCA response in the U.S. state of Washington and southwestern British Columbia, Canada (1988), the objectives of SCAT programmes in an incident have expanded considerably from characterising the extent and nature of oil distribution. The technique is used to fulfil a variety of operational and more general response information requirements, such as treatment prescriptions, endpoint determination and treatment inspection surveys. In theory this avoids duplicated effort between various stakeholders, organisations or sections, and ensures a consensus approach and common understanding of the situation. The relative importance of the various functions of SCAT in a response will vary on a spill by spill basis. Functional roles provided by SCAT can be broadly divided into primary and secondary objectives. In the authors' opinion, primary objectives are those that guide response and clean-up efforts during the active phase of a response (Figure 1).

In some small, fairly straightforward spill scenarios (i.e. limited extent of oil exposure in a port environment where responders are well practiced to respond and are familiar with the properties of the spilled oil), SCAT may not even be required. At the other end of the scale, during the DWH incident, data was required for all the needs highlighted in Figure 1 which were obtained through a single SCAT programme.

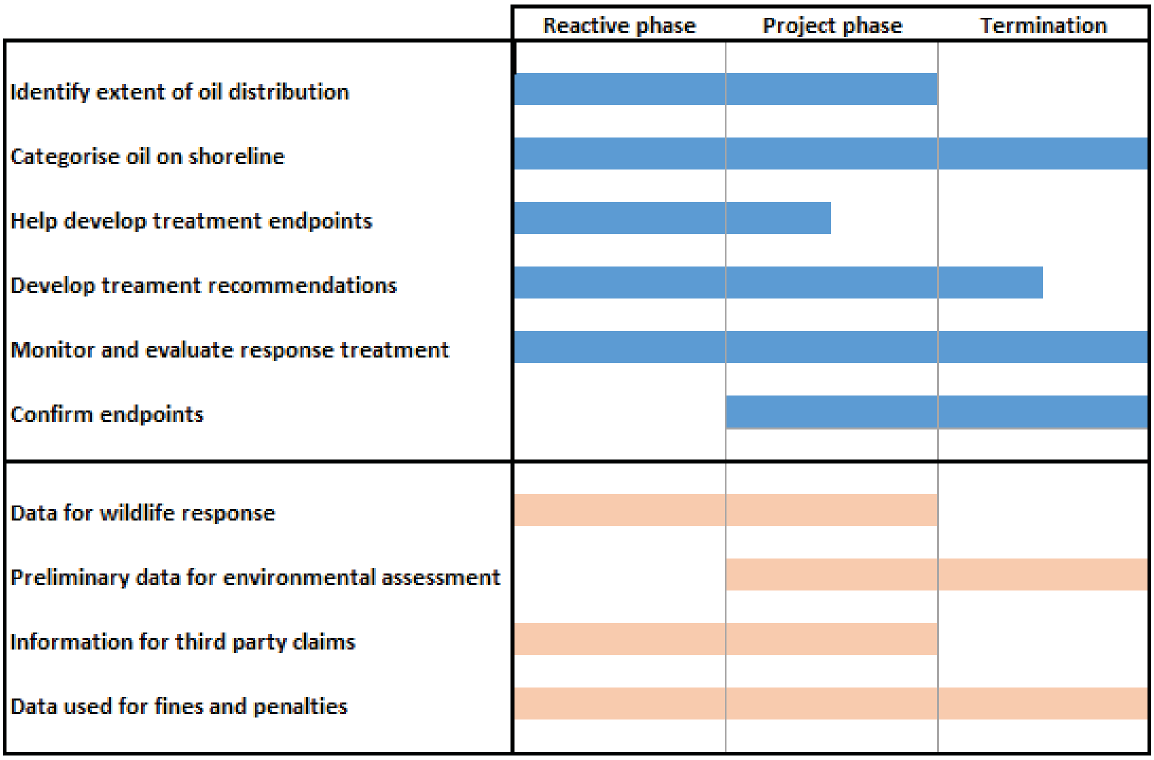

Figure 1 Schematic representation of the relevance of primary (in blue) and secondary (in red) purposes for implementing SCAT programmes at various stages of a response.

In most cases the demands on a SCAT programme fit somewhere between the two extremes. However, with the DWH incident as such a clear reminder and comprehensive case study, there has been a trend in recent years of SCAT diverting its purpose to secondary tasks and potentially hindering the effectiveness of the response when its primary goal is to facilitate operational response through the provision of a common operating picture and full situational awareness to all involved. Noticeable trends have emerged from smaller incidents that attempt to replicate the process of complex large-scale incidents or in regions with limited oil spill response experience and implementing IMS and/or SCAT for the first time.

DISCUSSION

A number of elements have been identified in this paper as important for a successful SCAT programme including focused objectives, scalability, accuracy, systematic approach, standardisation, timeliness, prioritisation, training, and experience. The challenges that continue to face an effective SCAT programme relate to the ability to engage stakeholders early, adherence to goals and objectives, accuracy and legacy of data, prioritization of tasks, proper communication through the chain of command, and agreement on the appropriate termination of a SCAT programme. Observations from recent incidents and recommendations for resolution of challenges are presented.

Reactive/Emergency Phase

Absence of Case-specific SCAT Plans

In the early phase of a response, local authorities are typically first on site with the responsibility to initiate the response and determine whether its management will require intervention at a higher level. Where a joint polluter and government approach is favoured (regardless of whether ICS or an alternative IMS is in use), it is important for both the polluter (where relevant) and government representatives to agree at an early stage on a plan for SCAT that identifies the:

1. G oals of a SCAT programme;
2. T eam composition and coordination, and;
3. M echanism by which SCAT data will feed into the command centre and ultimately, the operational personnel addressing shoreline treatment.

During the recent small-scale incidents in Canada and the US, cited in the introduction, SCAT priorities were not agreed to by all stakeholders from the beginning, which led to considerable confusion over the objectives of SCAT- i.e. was the priority to undertake SCAT to guide clean-up operations or to identify every instance of exposure to inform the environmental impact assessment, human use and third party concerns?

Ownership of SCAT Coordination and Teams

The initial stages of a response are often dynamic in terms of the composition of the command centre. The first people on the scene will not necessarily be those most experienced to oversee a response. In fact, for many people at this stage (from both the government and polluter sides), it may be their first experience of an oil spill and frequently are unaware of what SCAT is. The staffing within an incident command post can change rapidly as the trained response personnel arrive on site and replace first responders. During this transition phase, the various members of the unified command (UC) can omit to make an explicit agreement on how SCAT will feed into the UC. For example, the MARATHASSA spill was a relatively small spill of HFO in Vancouver, Canada in 2015. The Environment Unit (EU) was established a few days after the initial incident, by the time which response objectives had already moved from the removal of bulk oil to the final "polishing" and environmental assessment stage. Upon the initial response, the UC and response contractors had established and overseen SCAT activities to guide response priorities according to a SCAT Plan approved by UC. However, upon formation of the EU, its municipality and provincial representatives felt that the approach and purpose of SCAT had not previously taken into account their opinion as to how the data were collected, that the data were now unreliable to inform secondary SCAT goals and appropriate end- points. Based on this, the local authorities determined that the formally approved endpoints were not sufficient, despite them having been formally signed off by all members of the UC (CCG, 2015). As a result, the municipal and provincial authorities felt the need to engage their own technical experts to join the SCAT teams and verify the process- after it had already been largely completed. This resulted in replication of effort in areas with trace oiling and no response actions, delay in termination of the response and treatment options that increased the human footprint and may have caused more harm to the environment, counter to what was explicitly excluded in the Canadian shoreline response manual. A way to avoid this confusion would have been for the initial on scene commander to decide who in the command centre would oversee the SCAT programme and clarify the primary role of SCAT to support the identification and recommendation of shorelines requiring treatment for Operations based on approved endpoints. The aim of documenting the extent of trace and unactionable oil for determining the spatial scope of an environmental sampling programme should not be viewed as priority for SCAT. This aim can ultimately detract focus and resources from clean-up operations, which are the primary impact reduction measure. It can also, inadvertently result in a net environmental damage by increasing the footprint of a response (e.g. waste and carbon emissions), or by neglecting to consider whether further treatment will result in a net environmental benefit.

As the response evolves and different personnel become involved, it is important to maintain consistency of SCAT's primary priorities, goals and objectives regardless of the organisational structure. Having a pre-agreed chain of command that changes at a later stage is preferable to having no established span of control.

Project Phase

Documentation

The SCAT programme is supported by a number of standardised forms. Standardisation ensures language and data consistency and provides a documentary legacy from which data can be reviewed. Decisions made during a response may be evaluated against these data. This enables the planning process to remain iterative as a response progresses. Private contractors called in to coordinate and manage the SCAT teams must, in order to maintain credibility, be consistent in their documentation. The data recorded on these forms, following QA/QC, also go towards maintaining the Common Operating Picture (COP). Based on the authors' recent experiences from small- scale cases that have used formal SCAT service providers, data forms may not always be filled out by the authority representatives who form part of the SCAT teams. Observations and opinions within the SCAT teams were therefore uncalibrated, unqualified and undocumented, but were however used as a basis for disagreement within SCAT team members regarding endpoints. By having SCAT providers ensure that all members of the SCAT team have the opportunity to agree to the data that is recorded on the various SCAT forms whilst in the field, it should be possible to save a large amount of time.

Prioritisation

As discussed, there is frequently a degree of misunderstanding between the various contractors involved in a response as to what the primary purpose of SCAT is. Although as part of the response to an oil spill, a SCAT programme may have the secondary goal of collecting data to assist in follow-up environmental assessment (EA), its primary goal should always be to mitigate the impacts of the remaining oil by characterising the oil, determining the possible treatment options, as well as monitoring their success and net environmental benefit compared to no action. However, the primary purpose of SCAT is frequently misunderstood to be to support an EA, or finding all the oil regardless of whether it is actionable. Given that the EA will usually be a separate contract or task with work undertaken in coordination with, but outside of the response, it should never drive the information SCAT teams are seeking to collect, but rather, the EA teams should seek to use SCAT data to inform their work. By having SCAT's focus diverted from response and clean- up specific goals, delays in implementing appropriate treatment techniques, mitigation measures and evaluation and termination of the response can occur, having the potential to worsen adverse effects to ecology, human use, carbon footprint and other aspects of the environment.

For these reasons, the focus on prioritisation is a critical recommendation to the SCAT programme. If there are operations personnel looking for tasks and have no direction from SCAT and the UC, then there is a problem regardless of the quality of the SCAT data collected.

Chain of Command Complexity

In countries where ICS is formally implemented, the chain of command is one aspect of a SCAT programme that is at least partly inflexible. SCAT should always be a planning function within the Environmental Unit. Consensus building takes place among the scientists in the EU and recommendations for UC are generated based on the SCAT data. Although SCAT and Operations should be inextricably linked, there is the concern that SCAT field data collected as an Operations function may be used directly by Operations to make decisions in the field without the proper review in the structural organization of the UC. This can endanger the trust between stakeholders. Trust is a critical component of a successful response that a clear chain of command will help to establish.

Even where a response structure is familiar and well defined (e.g. ICS), the chain of command for decision making can become influenced and dynamic in the face of political pressures of an unfolding incident. This is true for the entire UC as well as within the SCAT programme. As a spill-specific “add-on” to ICS, the formal command can often remain undefined at the point a response is becoming established (as has already been highlighted above). What is important for the SCAT programme is that the chain of command does not become overly complex and result in delays in treatment implementation. Flexibility in chain of command can occur in terms of the scale of the programme. For example, in a small incident, a single person can fulfil multiple functions, and therefore there may be no need for SCAT specific logistics coordinators, data managers and liaison officers, but rather, one person familiar with SCAT might be able to fulfil all these roles and report to the EU or Planning Section directly, thereby streamlining the chain of command. In larger incidents, review of proposed SCAT actions may have many layers including historic, cultural, archaeological and ecological review. A clear and concise chain of command associated with a process for timely review will help reduce delays.

Termination Phase

Fear of Being Left Alone- "what next?"

Fear is an influencing factor that is not to be underestimated in all aspects of a spill response. The closer operations are to achieving their objectives, the greater the fear that resources will be demobilised and that local authorities will be left to deal with any outstanding matters. This can often lead to greater disagreement over the SCAT data within the command centre, and to requests that the process be revised to account for all possibilities (e.g. that some oil has sunk, that oil went to areas previously discounted as being unaffected). One way to resolve this on smaller scale spills is, once the workload within the command centre begins to diminish, to have the unified command join SCAT surveys of the most contentious sites. This can ensure that everyone has viewed the situation *in situ* leading to greater trust in the results of the SCAT data.

Shifting Endpoints

In a similar vein to the NIMBY[1] phenomenon that is encountered across the all fields of environmental management, the expectation of different standards than a national norm by local authorities has become increasingly apparent from the small-scale incidents

[1] Not in my backyard: A person or group of people who object/s to something perceived as unpleasant or environmentally hazardous in their own neighbourhood, especially while raising no such objections to similar developments/ standards elsewhere.

used in the writing of this paper. Where endpoints were discussed and agreed early on in the response, as termination approaches, it has been common for local authorities to question the originally agreed upon endpoints. It is commonly believed that a particular area affected by an incident is more economically productive, ecologically sensitive, or generally adheres to higher standards and that therefore national and international guidance on shoreline response, endpoints, or mandated legislation is not appropriate. In terms of SCAT, this has the impact of protracted debate and/or revisions to the terminology and standard oil characterisation (i.e. oil is mapped to an ever finer and operationally irrelevant scale) in spite of training and calibration exercises with team members in the standard approach. This may prolong the process and hinder the transition to SCAT inspection surveys having the goal of preserving Net Environmental Benefit by ending the response before it becomes part of the problem in terms of the human “footprint”. For example, if national guidance and previous experience highlights that an appropriate treatment end-point for oiled port structures that are hidden from view is that no sheen is released, local authorities may instead request that all visible traces of oil be removed, even though there may be no Net Environmental Benefit in doing so. Frequently local authorities have argued that it doesn’t matter what was previously agreed when the focus should be on the Net Benefit. Nonetheless, consensus determination of endpoints should begin early in a response and not when the endpoints are approaching in hopes of avoiding protracted debate.

CONCLUSION

The issues highlighted by this paper are underpinned by an understandable lack of spill- specific training or experience at a more local or provincial level, where the likelihood of experiencing a spill is low. Knowledge will most likely reside at a centralised level and therefore, the way this knowledge and experience is accessed in smaller scale spills needs to be clarified from the outset. For example, in Canada, SCAT knowledge is primarily in the realm of the Federal Environment and Climate Change Canada (ECCC), under the National Environmental Emergency Centre (NEEC), who may not be on site and only join relevant meetings remotely. It should be noted that this gap in knowledge may be more pronounced in countries outside the US that are unsupported by the rigour and resources of the ICS structure. This is of particular concern in countries that are in the process of incorporating an ICS style of management as well as basic SCAT methodologies. A way to resolve this is to ensure preparedness plans allow for someone from central government who is likely to have more training and experience to attend on site to provide guidance where it is required, even if the volume of oil spilled is small. Guidance originating from experienced contractors for the polluter may be viewed with caution by local authorities.

Within the three stages of an oil spill response, the reactive, project and termination phases, the challenges encountered in the review of cases for this paper fell within the following themes:

- Competing objectives of various stakeholders within UC;
- Prioritisation of secondary goals;
- Late engagement of key stakeholders, and;
- Disregarding signed documentation, as an effect of the three points above.

To overcome these issues, the authors offer the following recommendations:

- **Pre-spill exercises and drills with local authorities in high-risk areas**

Trust and communication have been identified as two components that are critical to an effective response (Purnell and Zhang, 2014). The lack of trust and effective communication has been a factor in all the spills used to compile this paper, and may have been a driver of many of the challenges encountered. In most incidents, trained and experienced people are contracted and on-scene, but local authorities without experience are sometimes reluctant to accept the knowledge of contract personnel. Working together to drill and exercise spill scenarios in the absence of a spill is one solution to the barriers in trust between authorities and other experts.

- **Early engagement of all key stakeholders**

Those tasked with being involved in the SCAT programme need to be involved with SCAT planning at the outset to avoid replication and delays caused by the lack of experience and SCAT expertise. What few people in the UC realise early in a response is that at some point SCAT will be “driving the bus” when it comes to getting to the end; hence, the importance of involving relevant entities early in the process to avoid some of the above concerns. The shoreline program, from approval of a SCAT plan to endpoint assessment, should be a priority and will define the beginning of the structured path to the end of most responses.

- **Forceful chain of command with clear priorities**

Where ICS is well practiced and known to those involved in a response, there is a clear chain of command. This can ensure that SCAT priorities have been discussed, prior to sign-off of documentation, and most importantly, the UC has the confidence to ensure these are adhered to. Cases where stakeholders have later disagreed with decisions that had previously been signed have been characterised by a lack of familiarity with the IMS (in these cases ICS). The incident commander/s should provide clarity that without supported justification, decisions that were previously signed off, cannot be altered later in the response. The need for clear leadership in SCAT decision-making is especially important in countries where the IMS in use remains unclear or undefined, but where the integration of SCAT into a response is now being developed (i.e. West

Africa). In countries or regions where the IMS in use is not ICS, but where the use of SCAT is now being implemented, particular attention should be devoted to: 1. formulating the goals SCAT in that particular country or region is required to fulfill and 2. tailoring the mechanism by which it will integrate to the response decision making process. Furthermore, in order to be locally practicable and realistic, specific processes should reflect the varying capabilities, infrastructure and funding that underpins oil response in those regions.

In the authors' opinion, the role of SCAT is to promote effective treatment and end point determination efficiently. Given the lack of trust, understanding and fear of the unknown that is continually encountered, this is difficult. The lack of standardisation in the primary goal of integrating SCAT into the response results in the lack of understanding of SCAT's role, and the potential for SCAT to take on research, political or punitive goals. Education, training and clarification of the roles of the SCAT process from the onset will result in clear and effective communication with Operations and Command and create a "structured and technically appropriate path to the end".

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