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The risk based alternative to the prescriptive EDRC approach to oil spill preparedness and response.

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ABSTRACT 312693:

Every spill is different. This is the one globally accepted truth of oil spill response, and never more so than when responding on a global scale. The number of potential variables that combine to shape the event and the ensuing response are almost incalculable. Each incident produces a chain of events that must be analysed, assessed and acted on to build the most appropriate response with the effective application of the resources available. The amount, type and availability of such resources depend largely on the rigor and level of preparedness that the responsible party has put in place or that is required by the local regulator based on prescriptive criteria.

This paper explores the risk based approach to the development of oil spill preparedness, allowing mitigating measures to be tailored to the specific risks faced and offering an alternative approach to that offered by the more prescriptive and generic volume based approaches. Advantages and disadvantages of the risk based method are discussed and then anchored to the tiered approach to preparedness. The author draws on first-hand experience of how both approaches translate from the 'page of preparedness' to the 'field of response'. Using international case histories as a reference the author draws conclusions as to whether the inherent variation experienced in spill response should translate to a more flexible, bespoke and risk based approach to the development of a robust and resilient level of preparedness.

1. INTRODUCTION:

Never has the approach to the management and minimisation of oil spill risks been under more scrutiny than in the post-Macondo world we now operate in. The echoes of the 2010 incident continue to reverberate and exert their influence, as Industry, regulators and other stakeholders reflect, revise and reinforce their preventative and preparedness measures based on the lessons learned. History continues to show us that pivotal events such as Macondo drive an evolution; they create a ground-surge of improvements and inspire innovation through a newly reinvigorated necessity. Such events amplify awareness and provide stimulus and context to challenge the status quo and drive improvement for years after the event itself. It is these legacies that catastrophic events such as Macondo leave behind, legacies of improvement, which collectively reduce the risk of such events reoccurring.

This paper explores the risk based approach to preparedness and challenges the alternative prescriptive approach and asks whether the echoes of Macondo will be sufficient to drive the adaptation to adopt one approach or the other.

Oil spill prevention and preparedness is approached in many different ways around the world, from highly prescriptive requirements set by the regulator, to a more inclusive and involved performance based objective approach as defined by the operator. The prescriptive approach can take many guises, and is typically based on laws and regulations which set specific demands for the different elements of preparedness. This approach has been used with varying degrees of success in many countries and continues to be utilised today, such as in the USA which stipulates requirements through the federal regulatory structure. Here, for example, the US Coastguard defines a minimum daily recovery capacity for all oil spill recovery devices listed in the contingency plans of operators. This process is also extended to rate potential oil spill recovery organisation (OSRO) capabilities. In its most extreme form this approach will involve a regulator imposing set requirements based on simple volumetric assessment of spill risk to which the operator must conform. Conversely, the performance based approach, sees the regulator taking a much less directive stance, putting the onus on the operator to assess their own risk and then justify their approach to mitigation. Whatever the approach, the preparedness measures put in place should be grounded in some form of assessment of risk specific to that operation.

The three year joint industry project (JIP) set up between nineteen OGP (International Association of Oil and Gas Producers) and IPIECA (global oil and gas industry association for environmental and social issues) members to address recommendations following the Montara and Macondo incidents included a work stream to develop a risk based approach to response planning. The so called JIP 6 project included the following deliverables:

- Assessing probability (“likelihood”) of an event or multiple events (a scenario-based planning standard) and estimating the associated quantities of spilled oil
- An assessment of environmental/commercial resources at risk
- An assessment of response resource needs and capability and the ability to cascade resources in to the spill area
- Inculcating the above in contingency planning
- “Proving” the response through drills and exercises

(*IPIECA and OGP*, *2013*)

A key deliverable of JIP 6 is the report on ‘Oil spill risk assessment and response planning for offshore installations’ within which the risk assessment and response planning process has been mapped out (Figure 1).

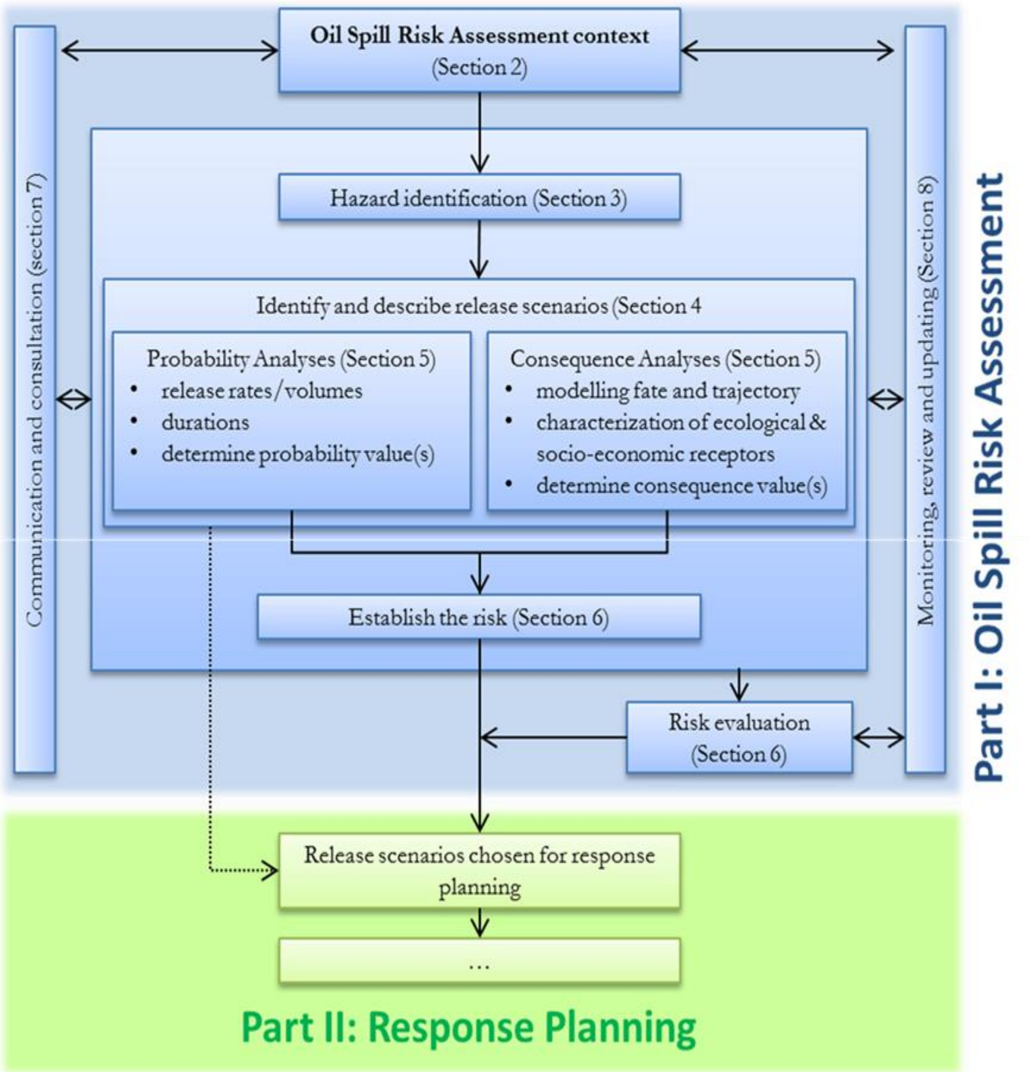

Fig 1. Overview of the oil spill risk assessment and response planning process (IPIECA and OGP, 2013)

The exact process of oil spill risk assessment (OSRA) is beyond the scope of this paper, but understanding the underlying concept of risk is a central theme which will be explored further as a context to challenge the prescriptive based approach to oil spill preparedness.

1.1 What is Risk?

Risk is a broadly used term that defines the potential for damage to occur and is commonly expressed in terms of likelihood and consequence.

$$Risk = Likelihood \times Consequence$$

When defining oil spill risk, the planner must consider both of these elements that are influenced by a large number of interacting variables, which together create the risk profile for that operation or location.

1.2 Risk Assessment

Defining and understanding the risk through a process of risk assessment is the first essential step in engineering an effective and appropriate risk management strategy. The main focus of risk assessments is to provide broad indications of suitable response strategies, levels of tiered response capability and prioritization of sensitive receptors (IMO, 2010). To assess risk the planner must first identify hazards through a set of planning scenarios. The planner must include more conventional or well understood hazardous events, but should also be encouraged to explore more complex potential scenarios.

In determining the level of risk associated with an operation one can utilise either a qualitative or quantitative approach, or a combination thereof. The quantitative approach uses mathematical data to produce a numerical scoring of risk with a probabilistic or frequency based expression of likelihood. The quantitative expression of consequence, however, is a much more contentious exercise and often results in assigning an economic value to the impacted resource. Care needs to be taken so that the outputs do not result from overly prescriptive or formulaic approaches that do not take into consideration the real-world practicalities of oil spill response. An alternative approach is the qualitative approach which uses descriptive terms or ranges, but this approach can be much more subjective and so must be clearly defined for it to be of any value.

1.3 Risk Management

The assessment of risk is of little use unless the information is used to enable the planner to implement measures which reduce that risk, either through a reduction in likelihood (prevention) or through impact mitigation (preparedness). Reducing the probability of a spill occurring through prevention is the primary aim of any operator, yet despite best intentions a residual risk always remains. Preparedness measures then aim to further reduce the risk through a reduction of the severity of impact. In this way, risk can be managed to a level which is as low as is reasonably practicable (ALARP). This approach helps to offset the challenges associated with the differing perceptions of risk that are often encountered when balancing the expectations of the various stakeholders. The preparedness measures must be both technically feasible and the cost or effort to implement them should be proportionate to the benefits gained. The ALARP principle is possible only where the regulatory framework drives the operator to define and justify their measures as part of a preparedness partnership.

1.4 Reducing Consequence through Preparedness

The commonly accepted elements of preparedness include legislation and regulation, contingency planning, combating resources, training and exercises. Around the world there are many different approaches to providing a robust preparedness framework, but the key element in the ability to respond to a marine oil spill, is the existence of an exercised and tested contingency plan that links the risk of a spill with the ability to respond while taking into consideration the threat to the environment (IMO, 2010).

The response techniques and combating resources identified within the oil spill contingency plan constitute risk controls which should be appropriate to, and commensurate with, the requirements identified in the risk assessment (IMO, 2010). Each and every spill is different; a unique event shaped by variables such as oil type, volume, mode of release, location, time, season, weather conditions and many other contributing factors. This inherent variation is seen from location to location, between different operations and even within each event as conditions evolve. For this reason there is no single magic-wand approach that can be championed as the best solution for the risk controls provided through oil spill response. Net Environmental Benefit Analysis (NEBA) is a tool used by the planner to assess the most appropriate response strategy as part of the overall preparedness development. The process takes into account the priorities for protection and various stakeholder views for a set of planning scenarios. In this way the risk controls which are developed can be pre-agreed by all stakeholders to help facilitate the decision making process and thus reduce time delays during a response. NEBA can also be utilised during a response to help justify response decisions. This is often necessary when the actual spill scenario cannot be mapped closely to a planning scenario, or where planning has not been conducted at all.

The challenge for the planner is, therefore, to develop a robust risk management strategy that keeps the full response toolbox at the responder's disposal as primary strike options; thus enabling the most appropriate tools to be utilised wherever safe and environmentally beneficial to do so. Working back from this position we must assume that to maximise the effectiveness of the response, the preparedness framework should support and enable the most appropriate resources to be fluidly cascaded as driven by the scenario and not restricted by regulatory defined limitations.

2. THE TIERED APPROACH:

A well understood and widely accepted practice for building a robust preparedness framework is the tiered approach to oil spill preparedness and response. This approach is consistent with the International Convention on Oil Pollution Preparedness and Response and Cooperation (OPRC) and has been broadly adopted as international best practice. The application of the tiered approach during planning enables resources to be cascaded into the theatre of response in a proportionate and targeted fashion depending on the requirements of that specific scenario. Three tiers are categorised for planning purposes using an assessment of potential severity and requisite complexity and scale of required response.

- **Tier 1** scenarios are likely to be relatively small and/or affect a localised area. They may be dealt with using local resources, often pre-positioned close by and managed by the operator.
- **Tier 2** scenarios are more diverse in their scale and by their nature involve a potentially broad range of impacts and stakeholders. Correspondingly, Tier 2 response resources are also varied in their provision and application, and may come from a number of sources.
- **Tier 3** scenarios are rare but have the potential to cause widespread impacts, affecting many people and overwhelming the capabilities of local, regional and even national resources. Tier 3 response resources are concentrated in a small number of locations, held in readiness to be transported to the respective country when needed.

(Adapted from IPIECA and OGP, 2013)

Caution must be advised when contrasting how similar operations in different locations or even different operations in proximate locations apply the tiered approach. It is entirely feasible that contrasting tier definitions could be established for different operations in the same locality as well as for the same type of operation in different localities. Influencing factors will vary between different locations and operations, and their importance may be perceived differently by operators, governmental authorities and other stakeholders (JIP 6). The application of the tiered concept is entirely flexible, in many cases driven by the logistical constraints created by geographical or bureaucratic barriers. For example in a location with restricted access the level of prepositioned capability will need to be greater than in areas that are easier to access.

3. PITFALLS OF A PRESCRIPTIVE APPROACH:

The structured framework implied by the three tiers can, and has been, misconstrued as a definitive linear progression, often incorrectly based on volume. Developing a preparedness framework based on a volume derived tiered structure is superficially attractive in that it provides a clear, unambiguous planning target, however it falls foul of several unintended consequences.

3.1 The All Important Number

The spill volume is probably the single most desired piece of information that stakeholders hunger for as an incident unfolds. The quantification of spill size, however, is typically at best an educated estimation, albeit based on sound science. This is especially the case in the initial throes of an incident when quantification can be undertaken by untrained personnel, using suboptimal equipment and often in the face of conflicting priorities. This initial subjectivity understandably drives a reluctance to commit to a reported spill size until the full facts are understood. If the spiller under-reports, then their credibility and trust is jeopardised, but if caution is thrown to the wind and they inadvertently over-report they risk being perceived as incompetent.

In the early stages of a spill there is therefore a disproportionate emphasis on the spill volume, only exacerbated in some cases by the extra importance attributed by tying the volume to the tier level. The assignment of volumetric limits to the tiers imposes a perceived requirement to define the volume of an incident before valuable response resources are mobilised. This approach incorrectly implies that those resources identified as Tier 2 or Tier 3 can only be accessed when a certain volumetric threshold has been reached. Instead, the spiller should feel able to access the required resources from wherever they feel necessary, despite the size of the spill.

One of the potential advantages of a defined volumetric boundary between the three tiers is clarity. With the equivocal nature of quantification aside, a clearly stated definition of the tiers based on volume can, in practice facilitate the decision to mobilise additional resources from the higher tier levels. The application of volumes to define the three tiers is just one way in which a prescriptive approach can be used in building a preparedness framework, however, such fixed lines of definition between the tiers is not a recommended practice. Indeed, good practice is shifting towards a proactive mobilisation of additional resources as a contingency against an event's potential severity, not simply the scenario being expressed at that point in time.

3.2 Cascading Resources

As mentioned, there can be a reluctance to activate support from other sources, be it regional support through Tier 2 mutual aid arrangement or via international Tier 3 assistance. In reality there can be a major, if sometimes misunderstood, reticence to call for help when local resources prove insufficient to cope with the scenario. In many cases there is a natural tendency to want to manage the incident using in-house or national resources. Any deviation from this can, and has, been seen as a sign of failure of domestic capability and all efforts are made to deal with it internally before pressing the 'big red' Tier 3 button and admitting 'failure'. Such perceptions should be challenged as incorrect and in direct conflict with the internationally accepted tiered concept. This is one of the reasons that international Tier 3 organisation, Oil Spill Response Ltd. (OSRL) developed the concept of the Technical

Advisor. This service, offered to member organisations, strives to break the barriers that traditionally slow the activation of international support by allowing expert services to be deployed early, without financial implication to assist with the assessment of the incident's potential severity and to provide oil spill response advice. It has shown to be a highly effective strategy, but still an underlying resistance exists in the utilisation of international support. Of course, any delay in mobilisation should be discouraged where possible and so the unequivocal definition of the boundaries between the tiers can help overcome such incidence of national pride or saving face.

3. 3 Over Proliferation of Equipment

One of the key concepts of the tiered approach is the avoidance of an over proliferation of response resources around the world. This is avoided through access to strategically positioned resources which can be escalated and cascaded to the theatre of response when needed. This not only avoids unnecessary investment to build equipment stockpiles in every country, but enables a more efficient approach to maintaining the response readiness of these key stockpiles including the competence of personnel to utilise such specialised equipment.

The prescriptive approach leads to a higher potential of over-proliferation if the regulatory authority impose excessive expectations on the operator to 'prove' they have the required capacity. This often becomes a simple procurement exercise for the operator to purchase sufficient equipment that can, on paper, collect or treat the required volume of oil as defined by the regulator. Of course, such an approach in the USA led to the development of the Effective Daily Recovery Capacity (EDRC) planning standard as an attempt to provide a fair and transparent method of quantifying skimmer performance in terms of the volume of oil recovered per day. The specific mechanics of how EDRC is calculated is beyond the scope of this paper, but the culture, philosophy and consequences of such an approach are the subject of a recent report by Genwest for the Bureau of Safety and Environmental Performance (BSEE) which challenges the EDRC concept. As an improved method of quantifying recovery capacity the report makes a case for the Estimated Recovery System Potential (ERSP). This approach is a step change improvement in the methodology of assessing equipment performance in the field of offshore containment and recovery, however, such a sophisticated method can bring the associated higher expectations of being infallible.

Provision of response resources which have been endorsed by a quantitative measure of effectiveness engenders confidence, rigor and indeed science to a previously artful or skill based assessment of preparedness requirements. There remains something enticingly simple about a mathematical model that pumps out the required number of skimmers, length of boom and waste storage capacity and indeed this approach provides a robust justification for the size and shape of a response capability. However, caution must be exercised when using such an approach so that confidence in the numbers does not replace the critical assessment of sufficiency that the experienced planner can impart. The application of such models should be part of a holistic approach to preparedness including all elements as previously mentioned.

3.4 False Sense of Security

The identification and procurement of equipment is an important part of the preparedness picture, but when this process is driven by compliance to a prescribed minimum volumetric capacity there may be a tendency for stakeholders to feel undue confidence that the picture is complete and the preparedness box ticked. First-hand examples of this have been witnessed, where equipment has been purchased, then left to languish in a forgotten warehouse gathering dust without even being commissioned or tested. The most extreme example witnessed by the author involved an unused high performance skimming vessel, which had been purchased, stored, then a permanent fixture built around it, making it impossible to launch. To ensure that the equipment can perform to its fullest potential it must be regularly maintained and exercised, be operated by competent personnel, be correctly staged and accessible and form part of the overall response system. The response system should also be accompanied by supporting services to maximise efficiency. For an offshore containment and recovery system, support would be required from a suitable surveillance system with a communications linkage to the operational asset.

3.5 Compliance: enough is enough – or is it?

A prescriptive regulatory framework which stipulates compliance to a certain set of requirements can also have the unintended consequence of stifling the natural proactive improvement process which is encouraged by a performance based framework. This is because the prescriptive approach has often encouraged a passive attitude among the companies. They wait for the regulator to inspect, identify errors or deficiencies and explain how these are to be corrected (PSA, 2010). This, at best generates a lagging reactive culture where issues have to be discovered before changes are enforced. There is a belief or perception that the rules or requirements set out by the regulator are sufficient, if met, to safeguard from incident. This again adds to a false sense of security, but also disincentivizes the operator from challenging assumptions and existing norms of design to determine potential areas of weakness.

Simply conforming to a minimum standard can remove one of the key drivers to improvement, necessity. With an artificially enforced requirement based on generic guidelines the operator can become divorced from the imaginative problem solving and adaptive process required in a competitive world. In short, the compliance becomes a tick box exercise which allows the operator to switch off the natural desire to improve. In the evolutionary terms used earlier, this state of compliance is analogous to a species that does not need to adapt because it is not threatened by competition or environmental change; a status quo is reached.

Of course, there are operators who, despite regulatory requirements, operate under an internally defined corporate good practice, which may override and surpass the requirements set out in the domestic regulatory framework in which they are operating. In some cases, however, the pattern of prescription-compliance-approval generates a relationship of devolved responsibility. In essence, regulators become guarantors of an operator's adequacy to operate; a responsibility which should sit firmly with the operator themselves.

During the wake of the loss of the Alexander Kielland platform in 1980, in which 123 people lost their lives, the Norwegian regulatory approach was transformed and the operators were required to demonstrate their preparedness measures. The regulator no longer 'approved' operations. Shifting the burden of demonstrating safety to the operator, the regulator would instead now 'consent' to development activity proceeding only upon the operator's demonstration that sufficient safety and risk management systems were in place (Deepwater , 2011).

4. Translating the page of Preparedness to the Field of Response

Whatever system is used, the resulting preparedness framework must translate from the page of preparedness to the field of response. Any plan, be it developed as a result of compliance to a prescriptive regime, or as a result of risk based assessment, must undergo a process of testing through drills and exercises to expose any inherent weaknesses. It must, however, be remembered that one successfully completed drill does not secure future performance under-fire. Scenario based drills should be as realistic as possible to maximise value, but again, the true value comes not from the doing, though this helps build awareness and competence, but through the process of closeout and conversion of lessons identified to lessons learned expressed as a modified, ever evolving plan.

As a company with a global remit, OSRL has developed a significant body of experience in dealing with incidents from the full spectrum of preparedness structures; ranging from cases where no apparent preparedness exists through to incidents within well-defined mature frameworks. In each case there has been a need for an adaptive flexible approach to the response and in no case have the preparedness measures acted as a true blueprint for response.

The most startling examples that illustrate the value of a preparedness framework can be seen when responding to a spill in a location without one at all. Exposure to this extreme is afforded by OSRL's ability to occasionally respond to third party (non-member) incidents, where isolated pockets of activity allow small operators to have big spills. Here, the subtle nuances brought about by the degree of prescription are overshadowed by the lack of any sort of structure whatsoever. Observations from such incidents include;

- the absence of trained personnel or dedicated oil spill equipment
- the exacerbation of environmental impacts by incorrect initial response decisions by the operator
- a delayed mobilisation of Tier 3 support
- the non-existence of any form of incident management structure
- confused and unclear end points

Response to such incidents is, thankfully, infrequent and typically OSRL will act as the Tier 3 oil spill response provider as detailed in the operators oil spill contingency plan. In these cases the operator has had the opportunity to integrate OSRL into their response procedures and the support linkages tested.

In each and every incident response OSRL has been involved in there has been a requirement to adapt, innovate or modify within the existing preparedness framework. Very rarely are the preparedness measures completely sufficient to mitigate the impact of the spill without some degree of amendment. The realities of response dictate that no matter how robust the prescriptive measures, how detailed the quantitative risk assessment, how many exercises have been conducted; the real event will require a flexible reaction to maximise effectiveness. In this way, the process of NEBA helps the responder to select and justify the most appropriate technique, as shaped by the prevailing conditions. Justification of a response technique during the heat of a response is at best challenging. It can be said, however, that on occasions, the rigid preparedness frameworks that one may encounter during peace time can dissolve during a spill of national significance. For smaller, less headline-grabbing releases, the prescriptive frameworks can be steadfast and hold the responder to a predetermined and sometimes limited toolbox of options. In this way any preparedness framework which supports an open dialogue between operator and regulator in a collaborative peacetime partnership will facilitate this required flexibility during the response itself.

5. CONCLUSIONS:

Prevention remains the primary focus for the reduction of risk for Industry, yet preparedness activities continue to provide an essential way to further reduce risk to levels that are as low as reasonably practicable. Moving away from a prescriptive volumetric based approach in which compliance is the key driver will stimulate a culture of improvement through open dialogue and honest assessment of risk. The evolution of the tiered preparedness approach away from defined volumetric limits is a key step in generating such a cultural shift. Recognition that resources of various types can be cascaded according to the requirement of the incident, not as a function of volume released, will be a catalyst in the improvement of how resources are accessed. Entwined within this evolutionary process is the incorporation of NEBA into both preparedness development and operational effectiveness.

When analysing potential impacts of a prescriptive preparedness framework one can start to form an argument for an alternative globally adopted approach based on collaboration and partnership between operator, regulator and other stakeholders. The OSRA process as defined in the JIP 6 document 'Oil spill risk assessment and response planning for offshore installations' represents current good practice and will provide a benchmark standard for improving this important element of preparedness. The incumbent regulatory framework will, of course, continue to formally drive the requirements of the operator. However, initiating an OSRA process and entering dialogue with stakeholders will facilitate the future ability to flex the prescriptive bounds put in place in some locations.

Every spill is different. This is the one globally accepted truth of oil spill response, and never more so than when responding on a global scale. The number of potential variables that combine to shape the event and the ensuing response are almost incalculable. Each incident produces a chain of events that must be analysed, assessed and acted on to build the most appropriate response with the effective application of the resources available. Building on experience gained on the global stage, it can be concluded that any approach to building preparedness should compel the operator to understand and ultimately own the risks associated with their operation. Such ownership could drive improvement in preparedness, yet also facilitate the inherent flexibility required during response by fostering and nurturing a collaborative relationship between stakeholders.

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