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TITLE

Preparing for Subsea Source Control Response: IOGP Reports 592, 594, 595 and Optimising Response Timelines

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ABSTRACT

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In response to the Montara and Macondo subsea well incidents in 2009-10, the industry's knowledge of and ability to respond to a subsea source control (SSC) event has greatly improved. Industry has invested heavily in its response capabilities and established best practices to resolve future incidents that may arise in the offshore oil and gas operations. The investment has driven rapid advancements in science, engineering, and new technological equipment developments to establish a higher standard for SSC preparedness and readiness. The industry now has a high confidence in its ability to deal with a subsea well

release. The growth in capability has led to many variations in equipment and response plans, which has led to complexity in an already highly technical field.

To reduce the complexity, common understanding is required of all the actions that comprise a SSC response, the linkages and dependencies between all the actions, and the critical path items that influence the overall timeframes of regaining control of the well. With a common understanding of the response plan comes enhanced industry, regulator and community confidence in the ability of the oil and gas industry to appropriately manage its environmental and social impacts. To help with this effort, the International Association of Oil and Gas Producers (IOGP) has produced reports 592, 594 and 595. Report 594 is a guideline that can be used to support subsea source control response planning and Report 595 addresses capping stack design and operational reliability.

IOGP Report 592 - *Subsea Capping Response Time Model Toolkit User Guide*, was completed in December 2019. It was jointly developed by IOGP and the Australian National Offshore Petroleum Safety and Environmental Authority (NOPSEMA). This report involved the creation of a digital subsea response time model that is freely available with a number of different software templates. The objective was to create a common standardized document that described the processes for preparing and implementing a subsea well blowout response in a timeline format, and in doing so, identify and communicate critical path activities, areas that can be prioritised pre-response, be easily transferrable to other parties to support mutual aid activities and, should the need arise, be used as an actual response project planning tool.

This paper informs readers of these resources and explains the reasoning behind their creation.

INTRODUCTION

In response to the Montara and Mocondo well control incidents, the member companies of the International Association of Oil and Gas Producers (IOGP) formed the Global Industry Response Group (GIRG), whose remit was to identify, learn from, and apply the lessons of these serious safety and environmental incidents. One of the GIRG's central recommendations was the formation of the IOGP Wells Expert Committee (WEC) to focus on improving operator effectiveness in the prevention and mitigation of high potential well control events.

Meanwhile, offshore petroleum regulators also worked to improve the industry. The Australian National Offshore Petroleum Safety and Environmental Authority (NOPSEMA) was formed following a recommendation by the Australian Royal Commission which investigated the Montara incident. NOPSEMA participates in the International Offshore Petroleum Regulators Forum (IOPER) consisting of member representatives from most offshore petroleum regulatory regions. IOPER works to improve environmental performance in the global offshore petroleum exploration and production industry. Its key objectives are to exchange information on industry environmental performance and best practices and to promote best sustainable environmental performance globally. Mechanisms for IOPER to achieve its objectives include the formation of working groups and the commissioning of other competent stakeholder organizations to advance issues, which led to working with IOGP in the development of Report 592.

Historically, industry has relied on the relief well option for source control in a loss of well control event; however, as incidents have demonstrated, significant volumes of hydrocarbon can be spilled while the relief well is constructed. Though relief wells will always be required as a method of permanently plugging the well, the use of capping stacks can provide a relatively expedient method to stop the flow of hydrocarbons to the environment while a relief well is being drilled. From a regulatory and community perspective, early intervention capability is now expected.

Today, subsea blowout preventer (BOP) intervention, debris clearance, capping stack hardware, and supporting ancillary equipment solutions have been developed and to optimize deployment timeframes have been strategically placed around the world. Various owners or consortiums have been created to collectively own over 18 capping stacks and other ancillary equipment. Through frequent tabletop and full-scale exercises, equipment owners and operating companies have individually developed and evolved an array of workflows and subsea source control (SSC) response plans.

For SSC response, the engineering and deployment considerations are extensive and not necessarily well understood by all participants. To address this gap, in 2017 the WEC formed the Subsea Well Response Subcommittee (SWRSC) to be a centralized source of industry knowledge and shared experience in the subject of SSC. One of the objectives of the SWRSC is to promote standardisation and simplification. This is in recognition that any large scale response will likely require a number of responders from across industry, and integrating into an established and familiar response system is more efficient and effective than learning during crisis.

In January 2019, the SWRSC published a subsea response planning document: IOGP Report 594 - *Source Control Emergency Response Planning Guide for Subsea Wells*, covering emergency response organizational format, roles and responsibilities, well design considerations, source control options, and implementation considerations for operator's emergency response plans. Report 594 provides a common understanding of the language, considerations, and complexity of the issues for both technical and non-technical readers. It explains the difference between subsea capping and containment and highlights the key considerations in the areas of response organization, engineering design criteria, capping stack selection, installation, and logistics planning.

In February 2020, Report 595 – *Subsea Capping Stack Design and Operability Assessment* was published. This report considers capping stack reliability at a component level, deployment reliability at a system level, and provides guidance on what to do if a proposed well's discharge capacity exceeds the stated design brief of the nominated capping stack.

In December 2019, IOGP Report 592 - *Subsea Capping Response Time Model Toolkit User Guide* was published. Conception of Report 592 started in 2018 when the IOPER Oil Spill Working Group (OSWG) recognized the need to further advance preparedness for timely response to a source control incident and hosted a collaborative 'Source Control Workshop' at the 2019 Spillcon Conference in Australia. The workshop brought together industry's global subsea well response expertise and international regulators to focus on subsea response planning and to define where efforts are best assigned in pre-planning to minimize response times.

An objective of the 2019 workshop was to assist in the production of a SSC response-time-model (RTM) that could identify critical path activities and improvement opportunities to minimize response timelines. Allocation of resources during the preparedness phases of a SSC response plan can be a complex issue and having equipment stored locally does not necessarily result in the most efficient response. Identifying and improving the critical path items provides opportunity to minimize the discharge of hydrocarbons to the environment in an actual response, providing greater safety of operator personnel and the community, and reducing the environmental and social impacts of the incident to as low as reasonably practical (ALARP).

In recognizing the need and the mutual fit in its desire for consistency across industry, the IOGP SWRSC agreed to work with NOPSEMA to develop the RTM. Working together allowed both NOPSEMA and IOGP to recognize the opportunity to increase promotion and uptake of the tool. The combined effort would allow for the establishment of a common planning process for a SSC response that has the potential to increase community confidence in the ability of the oil and gas industry to manage its environmental and social impacts, provide a standardized process for integrating industry mutual aid in a response, and provide consistency, planning credibility, and confidence in regulatory assessment of an offshore petroleum activity.

This paper informs readers of these resources and explains the reasoning behind their creation.

IOGP REPORT 594 – SOURCE CONTROL EMERGENCY RESPONSE PLANNING GUIDE

Subsea well capping is a complex, cross-functional activity with significant logistics and simultaneous operations (SIMOPS) considerations. The activities require the deployment of equipment not normally under contract to the operator and requires specific detailed plans, investments, contracts, and mutual aid agreements not specifically related to normal drilling and completion operations. Further, operator investment of time and resources for planning, preparedness, and the development of response organizational capability is necessary to effectively integrate the operators' response equipment and incident response capabilities. Overall, the operating company needs to own the plan and ensure all assumed interface points are robust.

Report 594 provides standard guidelines that, when followed, should provide consistency between operators and operating regions such that a SCERP from any operator in any operating region adequately addresses the required issues relevant for that specific region. The report provides context in the areas of response organization, engineering design criteria, capping stack selection and installation, and logistics planning.

Report 594 is intended to inform both technical and non-technical stakeholders as to what is meant by source control and presents a holistic picture of what is involved. It provides an overview of the technical activities that should be considered when designing wells and preparing a response plan, and establishes a common workflow and guidelines for industry participants to work from. The use of a standardized common format for the response plan will assist supporting mutual aid to integrate within the response plan and help produce outcomes that reduce impacts to ALARP.

IOGP REPORT 595 – Subsea Capping Stack Design and Operability Assessment

Report 595 was developed to share with industry, regulators, and other stakeholders the design basis of capping stack solutions and provide confidence that capping stacks can be reliably deployed and function as designed.

This report shares a catalogue of practical deployments and provides insights into the technical boundary assumptions, design choices and capabilities. The report also highlights a recommended way forward to provide engineering assurance of steps to be taken when well requirements exceed capping stack designs.

Topics addressed in the report include:

- Consideration of identified risks, engineering requirements, and functional requirements that went into capping stack basis of design
- Description of key components that constitute a capping stack and its ability to latch onto a BOP or wellhead and be shut-in
- Equipment commonality with other BOP and subsea equipment
- Explanation of the rationale between different capping stack configurations
- Valve sizing and considerations
- The role of CFD (Computational Fluid Dynamics) analysis in the design brief, and understanding landing stability and erosion
- Offset installation methods
- Rigging, equipment and deployment strategies

BACKGROUND AND MANAGING REGULATORY CAPTURE

Before elaborating on the joint initiative between the IOPER via NOPSEMA and IOGP, it is important to ensure readers have a clear understanding of Regulatory Capture.

While the offshore petroleum industry is competitive between operators, the risks and response management solutions are often very similar. Historically, oil spill response capability has been recognized, by both the regulator and the regulated, as a common area providing opportunity for collaborative and cooperative solutions to risk management controls. Many cooperative solutions have emerged on a global and a regional level. Communication and facilitation by the regulators and representative bodies has been key in delivering these cooperative solutions.

The RTM Planning Tool presented in this paper has resulted from a collaborative effort from a petroleum industry representative organisation, IOGP, and the Australian offshore petroleum regulator, NOPSEMA. This section describes the circumstances that led to the collaboration, while at the same time being mindful of potential perceptions of regulatory capture by the industry.

Regulatory capture arises when regulatory decisions advance private interests over the interests of the public, typically generated through relationships between the regulator and the regulated that influence the outcomes of the regulator. Key to managing regulatory capture is having clear vision of outcomes from the onset and ensuring the outcomes do not deviate through to delivery.

With regards to this RTM Planning Tool project, both NOPSEMA and IOGP had a clear vision of their individual objectives and the deliverables required to meet them. Both organizations strive for a safe and reliable offshore petroleum industry, embrace the

continuous improvement cycle, and independently established the needs and benefits that preceded the development of the RTM Planning Tool:

- The Regulator required a method to establish consistency in Source Control Emergency Response Plans (SCERP) that were submitted for assessment and approval. There was a recognized need for a process to help uncover where efforts should be applied in the planning phases to reduce the timeframes of a response, and to provide guidance to all stakeholders on the detailed requirements if a response was required.
- IOGP recognized the need for suitable guidance to aid industry in preparing robust and thorough SCERPs, and developed Report 594. The next phase was the development of a supporting response-time-model to define all the required tasks, plot the tasks against a credible timeline to identify where planning efforts should be focused, and provide a mechanism to help communicate the tasks and processes with all involved.

To avoid regulatory capture with regards to the time allocation of tasks, there are no initial timelines entered into the RTM; this is the responsibility of the individual users and assessed on a case-by-case basis by the responsible regulator. The timelines of tasks has not been subjected to potential regulatory capture in the development of the tool.

To avoid regulatory capture in the nomination of all tasks required, the tool has been thoroughly reviewed by both regulators and industry to represent current knowledge of best-practice at the time of development. It is anticipated that the tool will be modified over time by both the users and developers to capture improvements.

IOGP REPORT 592 – SUBSEA CAPPING RESPONSE TIME MODEL TOOLKIT USER GUIDE

The RTM has been developed by IOGP and NOPSEMA and is available along with IOGP Report 592 - Subsea Capping Response Time Model Toolkit User Guide. The technical objectives of the RTM Toolkit are to assist in identifying the contracts and arrangements required for an effective response, establish critical path activities, and identify which activities need to be prioritized. The non-technical objectives include having a tool that can be commonly used by industry to promote consistency, which benefits mutual aid partners and makes it easier for regulators or other interested parties to review time estimates and identify areas of consistency and opportunities for increased efficiency.

The RTM Toolkit considers the activities identified in IOGP Report 594 and provides details for an expected typical source control incident response. It provides a baseline response plan that can be used by industry to support Source Control Emergency Response Planning (SCERP) activities. It has proven to be a useful resource for explaining response intricacies in a systematic and disciplined way to stakeholders and demonstrating actual verses perceived critical path activities. It has also proven to be a valuable tool for engaging with agencies the importance of their role in response and the need for robust response procedures by all participants.

Several factors influence an emergency response timeline, and it is the responsibility of the user to define task timelines based on their well or project characteristics and their level of preparedness. The RTM does not attempt to justify or provide guidance towards adequate time assumption; it simply provides a checklist, in a common format, of the

activities and tasks associated with a capping stack installation and relief well drilling effort that should be evaluated when attempting to estimate an overall response timeline.

The mechanics of the RTM are described in Reference 6, but in summary, can be broken down into three levels.

Level 1 tasks provide a one-page list of headline activities which can be presented in a single page or slide. The activities listed in Level 1 are rollups of lower level activity groups and are intended to give the viewer a high level but clear and concise summary of the response timeline.

Level 2 tasks show intermediate details and break Level 1 tasks down into key activity tasks. Level 2 activities can be used during tabletop exercises. The RTM is designed so that the durations for Level 2 tasks will be automatically populated when developing the response time forecast using Level 3 and below tasks.

Level 3 and below tasks are response activity details that produce timelines when rolled up into Level 2 and Level 1 tasks. Level 3 and below tasks are where estimated durations are entered (refer to Sections 1.2 and 1.8.2 of Report 592 for details about entering durations). In developing the tool, careful thought was given toward providing flexibility to support an actual response, which users will find apparent when reviewing the detail within Level 3 and beyond. During pre-response work, users apply a sensible and defendable judgment and review the fields to verify there is not a unique element contained within that can adversely affect their response time estimate.

GANTT CHART

	Ta Mi	Task Name	Duration	Start	Finish	Pred	Successors	Re Na	Ro	Lev 1	Le 2	Le 3	Justification for Time Estimates
1		Response Planning Activities, SCERP Preparation	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
2		Written response plan documents completed	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
11		Well design checks and analyses, BOP interface checks	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
18		Capping stack installation support activities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
27		Dispersant Approvals and Application Capability	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
34		External Mutual Aid Contracts in place	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
36		Logistics/Installation Analyses and Plans completed	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
43		Transportation Tracking Services	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
46		Transportation - Support Services/Facilities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
52		Equipment storage/deployment sites - lifting/loadout capability	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
57		Customs clearance processes, visa/immigration/work permit processes	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
60		For onshore/offshore work activities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
65		For Offset Installation Planning (if not members of OSRL/SWIS and/or alternate installation method to OIE is proposed)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
71		For Offset Installation Equipment (OIE) Planning - if required. (Assumes the OSRL OIE option)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
84		For Relief Well Planning	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
97		Incident Occurs	0 hrs	Sun 10/20/19	Sun 10/20/19		6,5,7,12,13,1		Yes	Yes	Yes	Yes	
98		RESPONSE - notifications, activations and mobilizations	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
99		Initial Notifications	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
105		Mobilization of Company Internal Resources	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
106		Incident Command Team is established	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
134		Command Center Site is established	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
144		Offshore Operations Deployment Site is established	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
154		Activation of External Resource Contracts	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
155		Sea Vessel tracking service or vessel agent (identified by organization) is notified to locate available required vessels	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
158		Aircraft tracking service (identified by organization) is notified to locate available required aircraft	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
161		Well Control Response Contractor (WCRC)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
171		Relief Well Drilling Contractor (RWDC) - 2nd or 3rd MODU	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
183		Subsea Response Organization (identified by organization) - capping stack and response equipment	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
193		ROV Contractor	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
204		Water Column Monitoring Service supplier	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
210		Subsea Dispersant Approvals and Supply Source	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
217		Subsea Dispersant Conveyance System Contractor (surface to mudline)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
225		Mutual Aid entities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	

Figure 1: Level 1 and 2 activities are in blue, rolled up Level 3 activities in black/grey, and response planning activities in green.

Within the tool, each pre-incident activity is linked to a dependent response activity (or activities) that will be affected if the pre-incident preparedness work has not been completed. The model has been constructed to recognize that if it is not possible to complete a response planning activity, the impact on the response timeline will be shown.

Some planning activities may not impact critical path response activities. These activities can be designated as a lesser priority to those activities that do. Or, if for some reason an activity is omitted, the model can estimate the impact of that omission. In situations where the activity is not completed in the planning phase, users are advised to estimate a time duration to complete the task in the response phase. Partial completion of any of these pre-incident planning activities can also be accommodated by adjusting the 'duration' accordingly - based upon the operator's determination.

It is recommended that operators maintain notes or comments for the basis of their assumptions. A ‘Justification for Time Estimates’ column is included in the model where commentary text can be added. This function will assist company personnel and regulators in understanding the reasoning behind allocated durations and included/excluded tasks.

Understanding and estimating logistical timeframes is a significant factor in all response time estimates. To help users, activities that involve transportation of personnel, trucks, sea vessels or aircraft equipment, and those that involve fabrication, have been highlighted in yellow.

There are numerous activities that depict an approval process or specific approvals from specific governmental or regulatory entities. Governmental/regulatory agency processes for personnel visa, immigration, and security approvals are highlighted in orange. Governmental/regulatory agency approval processes for equipment, truck, vessel, aircraft, and customs approvals are highlight in peach.

GANTT CHART

	Ta M	Task Name	Duration	Start	Finish	Pred	Successors	Re Na	Ro	Lev 1	Le 2	Le 3	Justification for Time Estimates
105		Mobilization of Company Internal Resources	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
154		Activation of External Resource Contracts	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
155		Sea Vessel tracking service or vessel agent (identified by organization) is notified to locate available required vessels	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
158		Aircraft tracking service (identified by organization) is notified to locate available required aircraft	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
161		Well Control Response Contractor (WCRC)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
162		WCRC is notified and required documentation is submitted for equipment and personnel	0 hrs	Sun 10/20/19	Sun 10/20/19	133,7	163	Cor	No	No	No	No	
163		WCRC confirms activation of contract and begins mobilization of required personnel	0 hrs	Sun 10/20/19	Sun 10/20/19	162	164,165,166,	WC	No	No	No	No	
164		WCRC identifies personnel, personnel transit to Incident Command Center Site	0 hrs	Sun 10/20/19	Sun 10/20/19	163,1	169,445,453,	WC	No	No	No	No	
165		WCRC identifies personnel, personnel transit to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19	163,1	169	WC	No	No	No	No	
166		WCRC identifies equipment needs and begins mobilization of required equipment	0 hrs	Sun 10/20/19	Sun 10/20/19	163,1	167	WC	No	No	No	No	
167		WCRC Equipment transits to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19	166	168	WC	No	No	No	No	
168		WCRC Equipment completes Customs approval process	0 hrs	Sun 10/20/19	Sun 10/20/19	167,5		WC	No	No	No	No	
169		WCRC Personnel complete visa/immigration approval process	0 hrs	Sun 10/20/19	Sun 10/20/19	164,1	170	WC	No	No	No	No	
170		WCRC personnel complete Security Clearance process at Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19	169	445,453,460,	WC	No	No	No	No	
171		Relief Well Drilling Contractor (RWDC) - 2nd or 3rd MODU	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
172		RWDC is notified and required authorization documentation is submitted for equipment and personnel	0 hrs	Sun 10/20/19	Sun 10/20/19	133,7	173,619		No	No	No	No	
173		RWDC confirms activation of contract(s), cancels existing contract(s), ceases all current operations	0 hrs	Sun 10/20/19	Sun 10/20/19	172	174,175,177,	RW MO	No	No	No	No	
174		RWDC performs any required MODU equipment refurbishment and begins mobilizing for relief well drilling activities	0 hrs	Sun 10/20/19	Sun 10/20/19	173	178	RW MO	No	No	No	No	
175		RWDC identifies required personnel, personnel transit to Incident Command Center Site	0 hrs	Sun 10/20/19	Sun 10/20/19	173,1	176	RW MO	No	No	No	No	
176		RWDC MODU company personnel complete visa/immigration approval process	0 hrs	Sun 10/20/19	Sun 10/20/19	175,5	914	RW	No	No	No	No	
177		RWDC identifies required drilling equipment and begins mobilization of required drilling equipment	0 hrs	Sun 10/20/19	Sun 10/20/19	173,1	178	RW MO	No	No	No	No	
178		RWDC transits required drilling equipment to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19	177,1	179	RW MO	No	No	No	No	
179		RWDC MODU company drilling equipment completes Customs approval process	0 hrs	Sun 10/20/19	Sun 10/20/19	178,5	601	RW	No	No	No	No	
180		RWDC identifies supply vessels and facilities base support organization	0 hrs	Sun 10/20/19	Sun 10/20/19	173	181	RW	No	No	No	No	
181		RWDC contracts supply vessels and facilities support base organization for RWDC MODU	0 hrs	Sun 10/20/19	Sun 10/20/19	180	182	Cor Rep	No	No	No	No	
182		RWDC support vessels transit drilling equipment and facility supplies to RWDC MODU at incident site	0 hrs	Sun 10/20/19	Sun 10/20/19	181	923	RW MO	No	No	No	No	
183		Subsea Response Organization (identified by organization) - capping stack and response equipment	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
193		ROV Contractor	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
204		Water Column Monitoring Service supplier	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
210		Subsea Dispersant Approvals and Supply Source	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
211		Subsea Dispersant documentation submitted to Local Authorities (identified by organization) for permission to inject dispersant subsea at incident site	0 hrs	Sun 10/20/19	Sun 10/20/19	133,2	212	Cor Rep	No	No	No	No	
212		Subsea Dispersant Injection application is approved by Local authority	0 hrs	Sun 10/20/19	Sun 10/20/19	211	213,214,341	Gov	No	No	No	No	
213		Subsea Dispersant Supplier is contracted to source and maintain sufficient quantities of dispersant, as needed, in addition to any stockpiled supplies	0 hrs	Sun 10/20/19	Sun 10/20/19	212,5		Cor Rep	No	No	No	No	
214		Subsea Dispersant Supplier (identified by organization) is notified to activate contract	0 hrs	Sun 10/20/19	Sun 10/20/19	212,5	215,216	Cor	No	No	No	No	

Figure 2: The highlighted yellow rows are associated with transportation; orange and peach rows are associated with governmental or regulatory approval.

A generic list of resources that are commonly used in a source control emergency response is provided within the tool. Operators should review and revise this resource list to reflect the operator's own internal organization, nominated contractors, and local governmental/regulatory organizations. For display purposes only, some of these example resources have been assigned to specific activities. This was not intended to represent an actual requirement but may be helpful to understand resource requirements when considering response organisation size. Additional value can be gained by assigning a cost per resource, which will enable financial planning associated with preparing for and implementing the response.

After all task durations have been entered, an operator can quickly and easily identify those activities and tasks which, if the duration is shortened or lengthened, will affect the overall schedule. Those activities and tasks represent the "critical path" of the response schedule. With the critical path identified, an operator can concentrate efforts to shorten the duration of those specific activities and tasks on the critical path and can avoid spending time and effort to shorten activities and tasks that will have little or no effect on the overall response timeline. An example of this would be the positioning of a capping stack close to the well location to minimise transit time to the well, however preparedness tasks at the well following an incident would exceed the timelines of the capping stack transport, precluding the installation until the preparedness tasks are completed.

CONCLUSIONS

Subsea well response is a specialized subject in which all stakeholders benefit from having a common understanding of the considerations and activities involved and how they come together to prepare a robust source control emergency response plan and expedient response. IOGP Reports 592, 594 and 595 have been prepared to facilitate such understanding, aid in the preparation of robust response plans and provide confidence in equipment reliability, deployment reliability and residual risks.

The RTM Tool, as presented in IOGP Report 592, supports the work of Report 594 and presents a detailed list of tasks required in planning for a response to a loss of well control event. It furthers understanding of the how to construct a detailed and credible response plan, and the steps that need to be completed before drilling activities commence in order to achieve the highest possible reductions of environmental impact in the event of an incident occurring. When completed with task durations, the linkages between tasks present an overall timeline that can be used to identify the critical task items that if improved can decrease the

timelines of the overall response. The level of detail provided in the tool will also serve as a very useful guide in an actual response.

The RTM Planning Tool has been developed by both industry and regulator, and in its use offers the potential to improve the communication process between operators and regulators in the activity assessment and approval processes. It also provides a platform to increase community confidence in the ability of the oil and gas industry to manage the environmental and social impacts of its activities.

While the RTM Planning Tool was assembled with the best industry and regulator knowledge available at the time, it will be refined through use and updated as new information and improvements in subsea well source control emergency response processes emerge.

REFERENCES

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