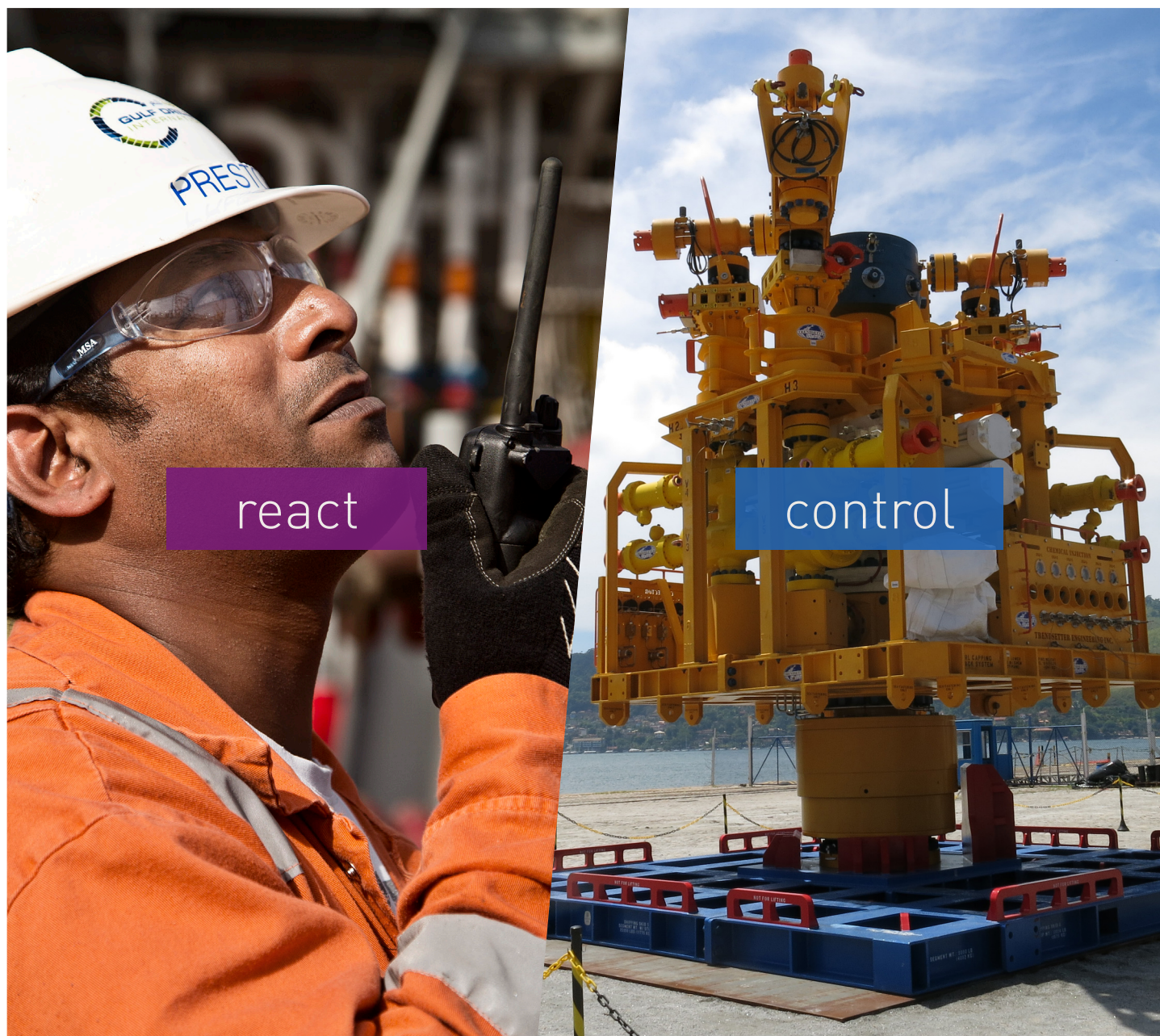


Subsea Capping Response Time Model Toolkit User Guide



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Subsea Capping Response Time Model Toolkit User Guide

Revision history

VERSION	DATE	AMENDMENTS
1.0	December 2019	First release

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Scope

This report provides release notes for how to use the Response Time Model (RTM) Toolkit for subsea capping. The RTM Toolkit consists of two parts: (1) this report and (2) the accompanying RTM schedule, available in two formats. The RTM Toolkit was developed to be used by an Operator to predict an estimated response timeline for capping a subsea well blowout. This report explains the industry's justification for creating a generic RTM that can be used by any operator in any world region, describe the basic operations that the RTM represents, and provide guidance notes and instructions for how to use the RTM schedule.

The RTM Toolkit considers the activities identified in IOGP Report 594 - *Source Control Emergency Response Planning Guide for Subsea Wells* and provides the known details of a typical source control incident response. It is intended to provide a base line response plan that can be used by Industry to support Source Control Emergency Response Planning (SCERP) activities. Several factors influence an emergency response timeline, and this report and the RTM do not attempt to justify or provide guidance towards adequate time assumptions. The RTM simply lists the activities and tasks associated with a capping stack installation effort that should be evaluated when attempting to estimate an overall response timeline.

The RTM considers both direct vertical and offset capping stack installation methods; it does not consider Containment operations.

Foreword

Well Source Control is a generic term for all activities related to the direct intervention of a well that has experienced loss of containment with the intent to halt or control the release of hydrocarbons to the environment. Prior to the 2010 *Deepwater Horizon* incident, and for deepwater projects, the primary source control response option for most industry participants was to rely on relief wells. Historically, subsea remedial source control activities were limited due to a lack of specialised equipment tailored for the demanding environment. After *Deepwater Horizon*, that changed, and though a relief well should always be part of the source control response plan, installation of a capping stack is the preferred method to stop the flow.

IOGP Report 594 - *Source Control Emergency Response Planning Guide for Subsea Wells* provides a comprehensive overview of the considerations, influencing factors and tasks that should be addressed to develop a robust Source Control Emergency Response Plan (SCERP). Australia's National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), a government regulatory agency, announced at the 2019 SpillCon conference held in Perth that they would sponsor the development of a generic Response Time Model (RTM) for capping a subsea well blowout. As a member of the International Offshore Petroleum Environmental Regulators (IOPER) group, NOPSEMA also chaired the source control section of the conference. To support that effort, IOGP, in collaboration with NOPSEMA and Oil Spill Response Limited (OSRL), has developed a Response Time Model (RTM) that can be used by Industry to evaluate response options, understand critical path activities and/or the risks to critical path activities, and promote global consistency for subsea well response planning across the industry.

This report provides an overview and instructions on how to populate data, display various levels of detail, add/revise or delete activities and how to link specific activities within the RTM.

In consideration of the many geographical, regulatory, and site-specific factors that affect response times, this body of work does not attempt to provide guidance towards defining a response time, but rather lays out tasks that should be considered. When using the RTM, end users will need to consider which steps would be necessary and which do not require consideration.

Response Time Model Purpose

Released in 2019, IOGP Report 594 describes the elements that form a Source Control Emergency Response Plan (SCERP). Those elements are described in sufficient detail to allow an Operator to prepare an appropriate and valid SCERP. Once developed, an Operating Company should have a good understanding of the conceptual response tools and mechanics of mobilisation. The next step is to translate that work into a response time model (RTM) to be used to calculate an estimated emergency response timeline and identify critical path activities. Once the RTM is developed, the overall response plan and the effectiveness of the RTM can be tested through training and exercises.

In support of IOGP Report 594, this accompanying RTM Toolkit hopes to provide a means for developing an individual RTM for any worldwide location. The RTM Toolkit utilises a globally consistent approach to establish a response timeline that meets all expectations from Operators, Regulators, and the public so everyone can better understand the complexity of a subsea well incident response. Within the source control space, consistency is a key consideration. It is the view of the SWRSC that during an incident of national significance, mutual aid and global expertise would be called upon, and that the process will run smoother if all affected parties have a common understanding of the tools, workflows, and options.

The RTM Toolkit is a detailed tool that has been designed to support response planning and can be used during an actual source control incident response. Because of this functionality, it does get very detailed in places and some tasks may be too detailed to practically complete while planning or undertaking exercises. In this case, leave the default duration setting as (0) hrs or provide a rough time estimate for the highly detailed tasks so they remain as a placeholder within the project timeline. This will allow the tool to provide overall project timeframes that can be refined as more information becomes available.

It is useful for all parties who review the model to have a basic understanding of subsea well incident response operations for assumption, and to that end, users are encouraged to populate the tool with this information.

1. The RTM Tool

The RTM Toolkit consists of this report, accompanied by a detailed schedule utilising one of several commonly used project management scheduling programs available to the industry (Microsoft Project 365 and Primavera). Storage of the files in the proper format for the selected project management scheduling program will be up to the Operator. Operators are free to select any software program of their own choice; the screenshots in this document utilising MS Project 365 are instructional only and IOGP does not recommend or favour one software program versus another.

The RTM consists of a generic list of the known activities involved in mobilising and deploying a subsea capping stack, regardless of the location. The tool is intended to help Operators identify all tasks or considerations that factor into a response timeline and present a consistent output. As response durations for a given activity can vary based on circumstance, the RTM tool does not attempt to resolve or pre-populate expected or typical durations. Links between activities are included but can be modified as desired. There is flexibility to order or sort activities to best suit the situation.

1.1 Levels and Roll Ups

The model has been broken down into three levels to simplify presentation. For planning, attempts can be made to pre-populate every low-level (Level 3) activity listed within the model, but an Operator should exercise caution, as some activities may be too detailed to be of practical use in some situations. That is, the planning uncertainty may exceed the resolution of the individual tasks. In populating durations of any of the low-level activities listed within this RTM, an operator should determine the value of investigating time durations based upon the impact that tasks may have on the overall project timeline.

The three levels of this RTM are as follows:

- **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 breaks Level 1 tasks down into key activity tasks. Level 2 activities can be used during table top exercises. The RTM is designed such that the durations for Level 2 tasks will be automatically populated when developing the response time forecast using Level 3 tasks.
- **Level 3** tasks are response activity details that produce timelines when rolled up into Level 2 and Level 1 tasks. Level 3 tasks are where most all estimated durations are entered (refer to Sections 1.2 and 1.8.2 for details about entering durations). Where task durations may not be easily estimated in pre-planning, the level of detail provided in the tasks will provide useful support during an actual response. All Level 3 tasks are colour coded with black and grey text. Depending on circumstance, some activities listed in Level 3 have the potential to significantly affect a response timeline and consideration of these activities is recommended.

Beyond the three levels described above are detailed activities that define commonly known steps of a source control response. Project management software typically provides various means for sorting the detailed activities, and an operator may wish to add other sorting capabilities.

Details below Level 3 tasks have been provided to describe general activities, but there has been no attempt to include every step of a response, especially when considering multiple vessels, aircraft, locations, etc. An attempt was made to try to identify where multiple variations (including duplicate activities of the same nature) should be considered, but the responsibility of defining an accurate response timeline, and an accurate list of the tasks and activities within that timeline, remain with the Operator.

	Ta Mi	Task Name	Duration	Start	Finish	Pred	Successors	Re Ne Ro	Le v 1	Le v 2	Le v 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
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
154		Activation of External Resource Contracts	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
258		Mobilization of Aircraft, Crane and Road Transport for Subsea Response Equipment Packages and Subsea Dispersant supplies, not including the capping stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
304		Mobilization of Subsea Equipment Packages, except capping stack, to Offshore Operations Deployment Site for Subsea Missions	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
355		Mobilization of Sea Vessels for Subsea Missions, except for capping stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
443		Offshore / Subsea Well Incident Response Missions	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
477		Capping Stack - Transport by Sea Vessel to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
512		Capping Stack - Transport by Aircraft to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
617		Capping Stack - Installation by Offset Installation Equipment (OIE) - Offset Installation System (OIS)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
776		Mobilization of Installation Vessels required for OIE Capping Stack Installation	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
777		Anchor Handling Vessel (AHV) for OIS Deployment and Carrier Operations - Two required	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	No	Yes
792		Supply Vessel for OIE Deployment - One required	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	No	Yes
807		Offshore Construction Vessel (OCV) for OIS Carrier Deployment - One required	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	No	Yes
822		Air Supply Vessel for OIS Deployment and Carrier Operations - One required, but may combined with other vessels	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	No	Yes
837		Towing Vessel for OIS Carrier Deployment - One required	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	No	Yes
909		Relief Well / Well Kill Operations	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
911		RWD MODU is selected, notified and suspends any active operations	0 hrs	Sun 10/20/19	Sun 10/20/19	85,35	912,917		No	Yes	No	No

Figure 1: Level 1 Viewing

	Task Name	Duration	Start	Finish	Pred	Successors	Re No	Lev 1	Lev 2	Lev 3	Justification for Time Estimates
1	Response Planning Activities, SCERP Preparation	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	
2	Written response plan documents completed	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
11	Well design checks and analyses, BOP interface checks	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
18	Capping stack installation support activities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
27	Dispersant Approvals and Application Capability	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
34	External Mutual Aid Contracts in place	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
36	Logistics/Installation Analyses and Plans completed	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
43	Transportation Tracking Services	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
46	Transportation - Support Services/Facilities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
52	Equipment storage/deployment sites - lifting/loadout capability	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
57	Customs clearance processes, visa/immigration/work permit processes	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
60	For onshore/offshore work activities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	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	
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	
84	For Relief Well Planning	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
97	Incident Occurs	0 hrs	Sun 10/20/19	Sun 10/20/19		6,5,7,12,13,1		Yes	Yes	Yes	
98	RESPONSE - notifications, activations and mobilizations	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	
99	Initial Notifications	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	
105	Mobilization of Company Internal Resources	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	
106	Incident Command Team is established	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
134	Command Center Site is established	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
144	Offshore Operations Deployment Site is established	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
154	Activation of External Resource Contracts	0 hrs	Sun 10/20/19	Sun 10/20/19				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	
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	
161	Well Control Response Contractor (WCRC)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
171	Relief Well Drilling Contractor (RWDC) - 2nd or 3rd MOOU	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	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	
193	ROV Contractor	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
204	Water Column Monitoring Service supplier	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
210	Subsea Dispersant Approvals and Supply Source	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
217	Subsea Dispersant Conveyance System Contractor (surface to mudline)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	
225	Mutual Aid entities	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	

Figure 2: Level 2 Viewing. This screenshot captures Level 2 Activities in colour and rolled up Level 3 activities in black and grey.

Tasks and activities can easily and simply be added to this RTM if needed, but the consensus of the WEC Source Control Subcommittee was that:

- This list as shown allows an Operator to present a consistent and accurate RTM
- The Level 1 and Level 2 rollups are acceptable to display the response timeline without needing to include all the detailed tasks in the display
- This RTM is sufficiently generic to allow any operator in any region of the world to present a thorough description of the response activities required to mobilise, deploy and install a capping stack on a subsea well blowout.

1.2 Model Logic

The response timeline was prepared in the following manner:

- a) It utilises one of several industry-recognised project management scheduling software programs. MS Project was selected for its simplicity and for its variable font and color-coding features; no recommendation or preference is intended. There are several other commonly used software programs (e.g., Primavera) that have similar capabilities. An operator should select the software based on its own Company internal guidelines and/or any regional requirements.
- b) The scheduling of all tasks is set on a 24 hr/day and 7 days/week basis.
- c) No provision was made for any holidays.
- d) No provision was made for Waiting-on-Weather (WOW) delays.
- e) All task durations are based on an hourly scale; fractions of an hour can be used (e.g., 0.1 hr, 0.5 hr, etc.).
- f) All task durations have been defaulted to “0” hrs.
- g) Task durations are the responsibility of the Operator in preparing the RTM. The RTM is designed to accept manual entry of task durations for the lowest level tasks (e.g., those which are not rollups), which will be Level 3 tasks or lower.
- h) After manually entering task durations for the lowest level tasks, the RTM is designed to automatically schedule the tasks and to automatically populate all the summary tasks for Levels 1, 2 and 3. NOTE - Attempting to manually enter durations for any of the rollup tasks will cancel the automatic features and may distort the displayed timeline.
- i) For Regulatory and response utilisation purposes, it is recommended that Operators maintain notes or comments for the basis of their assumptions. A *‘Justification for Time Estimates’* column has been included in the model where commentary text can be added.
- j) Links between activities have been established to accurately display the schedule and efforts were made to keep the links simple in a finish-to-start mode, meaning one activity must finish before the next activity starts.
 - More complex activity links can be used by an operator as necessary.
 - The schedule dates hang on the start date that is manually defined in the highlighted red row that states “Incident Occurs”. It is set to begin on “today’s date”, which will continue to be updated every time you open the schedule, until an actual start date is entered in the correct column.

	Task Name	Duration	Start	Finish	Pred	Successors	Re Ne	Ro	Le 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	
154	Activation of External Resource Contracts	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
258	Mobilization of Aircraft, Crane and Road Transport for Subsea Response Equipment Packages and Subsea Dispersant supplies, not including the capping stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
304	Mobilization of Subsea Equipment Packages, except capping stack, to Offshore Operations Deployment Site for Subsea Missions	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
355	Mobilization of Sea Vessels for Subsea Missions, except for capping stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
443	Offshore / Subsea Well Incident Response Missions	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
477	Capping Stack - Transport by Sea Vessel to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
512	Capping Stack - Transport by Aircraft to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
560	Capping Stack - Installation by Sea Vessel - Transport by Sea or Air	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	Yes	Yes	
617	Capping Stack - Installation by Offset Installation Equipment (OIE) - Offset Installation System (OIS)	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	
909	Relief Well / Well Kill Operations	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes	

Figure 3: Illustrating the highlighted red row of Incident Occurs. This is where the time stamp datum is defined.

1.3 Pre-Incident Preparedness Activities

Colour coded in green, the 'Response Planning Activities, SCERP Preparation' section has been aligned with IOGP Report 594. The section includes recommended pre-incident preparedness activities that should be performed prior to an incident to enable an operator to respond more effectively and/or more efficiently. When these activities have been completed prior to an incident, the duration should be set as 0 hrs.

Each pre-incident activity is linked to a dependant response activity (or activities) that will be affected if the pre-incident preparedness work has not been completed. The model has been constructed to recognise that if it is not possible to complete a response planning activity, the impact to response time line can be captured. Some planning activities may not impact critical path response activities, and in this sense, can be made a lesser priority to those that do. Or, if for some reason an activity is omitted, users can use the model to estimate the impact of that decision. In situations where the activity is not performed, users are advised to estimate a time duration to complete the task. 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.

1.4 Offset Installation Equipment (OIE)

Within the model, a special provision has been made to aid in the planning of the OSRL OIE equipment. The IOGP SWRSC recognises the validity of other alternatives and is not prescribing that this is the lone solution. Due to its nature, if electing to make use of the OSRL OIE solution, particular attention needs to be given toward planning for this response solution and implementing it. For this reason, it has been included in the RTM and can serve as relevant guidance for alternate installation systems. Cells of relevance to the OSRL OIE equipment have been highlighted in grey.

1.5 Logistical Activities in Yellow Highlight

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.

	Ta M	Task Name	Duration	Start	Finish	Pred	Successors	Re Nz	Le v 1	Le v 2	Le v 3	Justification for Time Estimates
97		Incident Occurs	0 hrs	Sun 10/20/19	Sun 10/20/19		6,5,7,12,13,14		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
100		Calls in to Crisis Call Center (CCC - identified by name) and Drilling Manager (identified by title)	0 hrs	Sun 10/20/19	Sun 10/20/19	97,6,8	101	Cor Req	No	No	No	Yes
101		Identifies Incident Command Team (ICT)	0 hrs	Sun 10/20/19	Sun 10/20/19	100,5	102,107	Cor	No	No	No	Yes
102		Notifies/activates Incident Command Team (ICT as described in SCERP)	0 hrs	Sun 10/20/19	Sun 10/20/19	101,5	103,109,111	Cor	No	No	No	Yes
103		Notifies local governmental and regulatory authorities (identified by organization and listed in SCERP)	0 hrs	Sun 10/20/19	Sun 10/20/19	102,8	104	Cor Req	No	No	No	Yes
104		Notifies Company Senior Management (identified by title) and Company Safety Dept (identified by organization and/or title)	0 hrs	Sun 10/20/19	Sun 10/20/19	103,8	133	Cor Req	No	No	No	Yes
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
258		▸ Mobilization of Aircraft, Crane and Road Transport for Subsea Response Equipment Packages and Subsea Dispersant supplies, not including the capping stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
304		▸ Mobilization of Subsea Equipment Packages, except capping stack, to Offshore Operations Deployment Site for Subsea Missions	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
355		▸ Mobilization of Sea Vessels for Subsea Missions, except for capping stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
443		▸ Offshore / Subsea Well Incident Response Missions	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
477		▸ Capping Stack - Transport by Sea Vessel to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
512		▸ Capping Stack - Transport by Aircraft to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	Yes	Yes	Yes
513		Specifications are reviewed for trucks, cranes, loading support equipment and aircraft needed to transport capping stack in assembled/disassembled condition from storage site to Offshore Operations Deployment Site	0 hrs	Sun 10/20/19	Sun 10/20/19	133,5	515,518,529	Cap Sta Sup Airt	No	No	No	Yes
514		Storage site - Capping Stack	0 hrs	Sun 10/20/19	Sun 10/20/19				Yes	No	No	Yes
515		Crane service is contracted for capping stack configuration/disassembly/loadout in disassembled condition onto trucks or Transport Vessel	0 hrs	Sun 10/20/19	Sun 10/20/19	513,5	516	Cap Sta Sup Cra	No	No	No	No
516		Crane transits to storage site dock	0 hrs	Sun 10/20/19	Sun 10/20/19	515	517	Cor	No	No	No	No
517		Crane sets up for lift and all crews review procedures, conduct safety briefing	0 hrs	Sun 10/20/19	Sun 10/20/19	516	569,571,590	Cap	No	No	No	No
518		Crane service is contracted for capping stack loadout onto truck in assembled condition	0 hrs	Sun 10/20/19	Sun 10/20/19	513,5	519	Cap Sta Airt	No	No	No	No
519		Two cranes transit to storage site	0 hrs	Sun 10/20/19	Sun 10/20/19	518	520	Cra	No	No	No	No
520		Two cranes set up for lift and all crews review procedures, conduct safety briefing	0 hrs	Sun 10/20/19	Sun 10/20/19	519	578,527	Cap	No	No	No	No
521		Loading/Offloading support equipment is contracted at storage site for capping stack and associated equipment	0 hrs	Sun 10/20/19	Sun 10/20/19	513,5	522	Cor Req	No	No	No	No
522		Loading/Offloading support equipment transits to storage site	0 hrs	Sun 10/20/19	Sun 10/20/19	521	569,571,578	Cor	No	No	No	No
523		Trucks/trailers are contracted for transporting capping stack and associated equipment from storage site to dock or to departure airport	0 hrs	Sun 10/20/19	Sun 10/20/19	513,5	524,529	Cap Sta Airt	No	No	No	No

Figure 4: Illustrating the highlighted yellow rows with tasks associated with moving things.

1.6 Governmental Authority Approvals

There are numerous activities that depict an approval process or specific approvals from specific governmental or regulatory entities. They are highlighted as follows:

Orange highlight – governmental/regulatory agency approval – for personnel visa, immigration, and security approval processes

Peach highlight – governmental/regulatory agency approval – for equipment, truck, vessel, aircraft including customs approval processes

	Task Name	Duration	Start	Finish	Pred	Successors	Re No	Lev 1	Lev 2	Lev 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	213,5	214,215	Gov	No	No	No	No

Figure 5: Illustrating the highlighted orange and peach rows with tasks associated with some form of governmental or regulatory approval.

1.7 Resource Names

An attempt has been made to describe a generic list of resources that are commonly used in a source control emergency response. Operators should review/revise this resource list to reflect local governmental/regulatory organisations and the operator's own internal organisation, if resource planning capability is desired. 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.

As stated above, an operator should investigate its own resource availability and evaluate whether assigning specific resources will result in worthwhile value. Note: For resource identification, refer to the Acronyms list at the end of this document.

Resource Name	Functional Description
Company Rep	Represents WO personnel in charge, can be one or multiple personnel, for planning, the title or name should be listed to allow sorting by duty and to allow resource scheduling/levelling feature
WCRC	Well Control Response Company selected by the WO
Installation Contractor	This represents a specific installation contractor, if one is hired by Company or the WCRC
TEI	Trendsetter Engineering Inc. – OEM of most capping stacks
Capping Stack Supplier	Alternate capping stack supplier/OEM
Vessel Owner	Owns the sea vessel
Aircraft Owner	Owns the aircraft
RWD MODU Contractor	Relief Well Driller MODU (drilling rig) selected by the WO
Water Column Monitoring Contractor	Owns the Water Column Monitoring equipment
SS Dispersant Conveyance Contractor	Owns the subsea dispersant conveyance equipment
SS Dispersant Manufacturer	Manufactures the subsea dispersant
Saipem	Owner of the OIE system
Mutual Aid Entities	Mutual aid companies selected by the WO
ROV Contractor	The ROV contractor selected by the WO
Subsea Response Organisation	The Tier 3 Oil Spill Response organisation selected by the WO
Trucking Contractor	Trucking contractor selected by the WO
Incident Command Team	The group selected by the WO per ICS
SIMOPS Team	The group selected by the WO per ICS
Govt/Reg	Multiple governmental, regulatory and approval authority groups within this designation – Vessel Safety Cases, Road Permits, Transportation, Flight Plans, Dispersant approvals, Aircraft Safety Cases, Customs, Security
Nitrogen Supplier	Selected by WO
Hydraulic Fluid Supplier	Selected by WO
Fabricator	Selected by WO
SWIS	Subsea Well Intervention Services – subsidiary of OSRL
Crane Contractor	Selected by WO
Loading/Offloading Support Contractor	Selected by WO
SS Dispersant Supplier	Selected by WO

1.8 RTM Mechanics and Functionality

1.8.1 Sorting and Displaying Activities using Filters

Using one of several industry-recognised scheduling programs available, there are multiple ways to sort the activities and to provide summaries of lower level activities; using one of the “filter” features is the simplest. There are three custom filters provided in this MS Project version – Level 1, Level 2 and Level 3 – all described earlier in Section 1.1 of this document. In the “view” menu, through the “outline” selection icon, choose the level you wish to view, or select “all subtasks” to display the entire project. The custom filters can be modified easily by scrolling down the columns under each Level designation and then populating a task with a “yes” or “no” from a drop-down menu, allowing that activity to show up when selecting the desired level. Another way to display all activities without any sorting is to simply select “no filter” on the list of sort categories.

With all scheduling programs, there are several features to allow sorting of the activities in meaningful ways. One of the common sorting categories is a “Summary” level; it lists all activities which are rolled up into summary lines within the schedule. There is usually a pull-down list of other sorting categories provided by the scheduling program and most scheduling programs provide a means for adding additional custom sorting categories as desired.

1.8.2 Detailed Activity List and Durations/Links

Each task listed is intended to represent the steps needed in a response. There may be some omissions and there may be various other ways to describe the activities in a response, but these lines depicted here are basic enough to accurately estimate a response timeline.

Some of the steps listed may be particular to a specific world region; different regions use different words to describe actions, and there are always going to be language and cultural differences communication. An attempt was made to include all potential activities involved in a response while limiting the details to a manageable level.

Durations can be input as hours or decimal fractions of hours (e.g., .25 hr or .80 hr). For simplicity, the entire schedule has been set up with “0” hrs listed in each duration slot. It is up to the operator to input the estimated duration for each task.

As stated above in Section 1.2, the RTM is designed to accept manual entry of task durations for the lowest level tasks (e.g., those which are not rollups), which will be Level 3 tasks or lower. After manually entering task durations for the lowest level tasks, the RTM is designed to automatically schedule the tasks and to automatically populate all the summary tasks for Levels 1, 2 and 3. NOTE - Attempting to manually enter durations for any of the rollup tasks will cancel the automatic features and may distort the displayed timeline.

The links between activities that are provided here are simple finish-start links. More complex links can be added as desired.

1.8.3 Critical Path Analysis

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 their underlying tasks on the critical path and can avoid spending time and effort to shorten the activities/tasks that will have little or no effect on the overall response timeline.

Glossary of Terms

For purposes of this document, the following terms and definitions apply:

Capping

The process in which a capping stack is installed onto a flowing well and then used to shut-in the flowing well.

Contractor

Company or other legal entity that provides a service to a client.

Containment

The process in which a capping stack is installed onto a flowing well and then partially closed in such a way that flow is diverted to surface processing facilities. It differs from Capping in that the well is not shut in.

Acronyms

API	American Petroleum Institute
CFD	Computational Fluid Dynamics
Govt/Reg	Governmental/Regulatory
IOGP	International Association of Oil & Gas Producers
IPOPER	International Offshore Petroleum Environmental Regulators
ICS	Incident Command System
MODU	Mobile Offshore Drilling Unit
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OIE	Offset Installation Equipment
OSRL	Oil Spill Response, Ltd.
OSRO	Oil Spill Response Organisation
ROV	Remotely Operated Vehicle
RTM	Response Time Model
RWD	Relief Well Drilling
SCERP	Source Control Emergency Response Plan
SPE	Society of Petroleum Engineers
SS	Subsea
SWRSC	Subsea Well Response and Source Control Subcommittee
SWIS	Subsea Well Intervention Services, subsidiary of OSRL
TEI	Trendsetter Engineering
WCRC	Well Control Response Contractor
WEC	Well Experts Committee
WO	Well Owner
WOW	Waiting on Weather

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This report provides release notes for how to use the Response Time Model (RTM) Toolkit for subsea capping. The RTM Toolkit consists of two parts: (1) this report and (2) the accompanying RTM schedule, available in two formats. The RTM Toolkit was developed to be used by an Operator to predict an estimated response timeline for capping a subsea well blowout.