

Section 16
Health & Safety Risk Assessment



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16. Health and Safety Risk Assessment

16.1 Summary

This section outlines the processes and key issues for the management of Health and Safety of workers and the public during the construction and operation of the Blacktip Project. It presents the findings of specialist studies, which have been undertaken to identify potential impacts, preventative and management measures. These studies include:

- Preliminary Safety Risk Assessment undertaken by Woodside which presents the results of a Quantitative Risk Assessment for the Blacktip Project.
- Preliminary desk top Health Risk Assessment to identify key health related issues for the Blacktip Project undertaken by Worley (2004). This study is presented in **Appendix N, Volume 2** of this EIS.

The section also presents Woodside's Operational Health and Safety Commitments for the Blacktip Project and outlines the approach taken to Health and Safety issues during the Front End Engineering and Design (FEED) stage. This approach will be further progressed and expanded as the project enters the detailed design phase.

16.2 Preliminary Safety Risk Assessment

16.2.1 Introduction

Woodside has undertaken initial coarse safety studies for the Blacktip Project as part of the early design development, which has included hazard identification and coarse risk analysis. The purpose of the initial safety studies were to:

- Enable Woodside to optimise the position of the main plant site such that the risks to the public are minimised.
- Identify the principal risk contributions associated with the facilities to further the understanding of their risk profile.
- Identify whether the risk to life of project personnel and public will satisfy legal and corporate risk acceptance criteria.
- Aid in demonstration of adherence to ALARP principles.

16.2.2 Methodology

Through a hazard identification workshop, principal contributors to project risk were identified. Subsequent risk assessment estimated the frequency of these events and the estimated consequences in terms of risk to life. The Quantitative Risk Assessment (QRA) was consistent with risk assessments undertaken on similar projects and it is anticipated that this approach reflects the level of risk likely to be generated by the project. The QRA assessed both onshore and offshore facilities.

Risk Acceptance Criteria: The following criteria were adopted for the conduction of the QRA:

- The upper level of tolerability of Individual Risk Per Annum (IRPA) for workers involved in the operation of the offshore wellhead platform as defined in legislation and Woodside Corporate Requirements. This limit is applied to offshore as well as onshore workers.
- The upper level of risk tolerability for the onshore plant is such that the risk at the boundary of the onshore facility will not exceed 1×10^{-5} per year.

Tolerability criteria provides an upper limit of acceptability, the residual risks should always be demonstrated to be ALARP and as such should be considerably lower than this upper limit. The IRPA tolerability criteria is applied to personnel in the normal operation of the facilities and does not account for non-routine activities carried out by contractors or their personnel, for example marine support crews, divers, drilling crews and helicopter pilots. The management of risks associated with supporting personnel will be managed through the contractor's HSE management system and its relevant interfaces with the Blacktip HSE management system.

Risk levels will be benchmarked against existing Woodside assets with the goal to have lower exposure in terms of IRPA.

16.2.3 Summary of Potential Impacts

Table 16-1 presents the identification of safety risk issues identified during the preliminary safety assessment.

■ **Table 16-1 Principal Safety Risks Identified by QRA**

Project Phase	Project Component	Safety Risk
Design	Surveying	Vessel collision/ accident Occupational risk
Construction	Offshore vessel mobilisation/ demobilisation and offshore facilities and installation	Construction site accident – occupational risk
	Well drilling	Blowouts Helicopter accidents Occupational risk
	Onshore facilities fabrication and installation	Construction site accident – occupational risk
Operation	Wellhead platform	Hydrocarbon leak/fire/explosion Collision (helicopter, ship etc) Occupational risk
	Subsea facilities	Maintenance and intervention activity incident – loss of hydrocarbon containment Occupational risk
	pipelines	Accidental damage (external) Leak ignition Corrosion damage (internal)
	Supply vessel operations	Extreme weather Occupational risk
	Onshore facilities	Process operations Hydrocarbon leak/fire/ explosion Condensate tank fire Occupational risk
Decommissioning	Onshore and offshore facilities	Occupational accidents Hazardous material management
	Well decommissioning	Loss of well containment Occupational risk

The preliminary coarse QRA modelling at the onshore plant indicated the following:

- IRPA levels for on-site personnel for the offshore and onshore facilities will satisfy the Woodside corporate acceptance criteria.
- At the onshore plant site, societal risk contours satisfy the acceptance criteria.

16.2.4 Safety Risk Management Measures

Woodside has already adopted significant risk safety mitigation measures for the Blacktip project. These measures will be added to and refined as the project progresses into detailed design and will be prepared in consultation with designated authorities. Mitigation measures include:

- offshore facilities being normally unattended;

- offshore wellhead platform being minimum facilities;
- infrequent attendance offshore (thus minimising helicopter flights) through remote monitoring and control from the onshore plant;
- minimal offshore hydrocarbon inventories;
- pipeline buried onshore (reduced potential for external damage);
- onshore plant located in rural area with low population density;
- significant separation distances between plant modules, storage, central control room and accommodation areas;
- blowdown system and emergency flare;
- utility system to act as buffer between plant modules, storage, central control room and accommodation areas;
- blowdown system and emergency flare (reduces escalation potential);
- utility system to act as buffer between process area accident events and administration building;
- a fenced buffer zone around the site to prevent public access and exposure to site risk;
- fire and gas detection system to identify loss of containment;
- automatic electrical isolation on gas detection to prevent ignition;
- firewater systems to reduce escalation potential and potentially extinguish fires with foam;
- site security including fencing and CCTV to limit unwanted access.

16.3 Preliminary Health Risk Assessment

16.3.1 Introduction

Health assessments represent a key component in the decision making process and aim to facilitate the reduction of or avoidance of negative impacts on human health and enhancement of the positive impacts in accordance with the Commonwealth Government's Health Impact Assessment Guidelines, 2001.

A preliminary health risk assessment has been undertaken for the Blacktip project to identify health related issues to the workforce and general public. These issues have undergone an initial screening, with those of highest significance being identified for further study, work or control (**Appendix N, Volume 2**).

The desktop Health Risk Assessment is a high level screening assessment that will be developed and built upon during detailed design. In addition, the assessment will be developed to ensure integration with future community consultation undertaken as part of the Social Impact Assessment (SIA) process.

16.3.2 Methodology

The preliminary Health Impact Assessment was undertaken in two stages as follows:

Stage 1: Risks were listed and potential exposures and typical oilfield control measures recorded. An initial screening was carried out to determine expected low, medium or high risks based on the risk assessment teams expertise and knowledge.

Stage 2: Items assessed to have a medium or high risk were further considered and more specific controls identified for consideration during detailed design.

16.3.3 Summary of Potential Impacts

The preliminary Health Assessment did not identify any unusual health related risks for the offshore project activities, provided that Woodside's normal subcontractor hire selection and contract process is followed and safety case development follows appropriate industry standards. Onshore works health hazards to the workforce are largely related to:

- the remote location, limited medical support;
- potential interaction with wildlife (for example snakes, biting insects etc);
- bacterial or viral infection;
- heat humidity and exposure to sun;
- occupational hazards (for example trips, strains, falls etc).

Preliminary identification of potential health impacts to the public from the facilities have been identified as either medium or low. Issues considered as 'medium' from the screening exercise include:

- security (for example pirates) and access (for example potential fishing activity in the area) to offshore facilities during construction, operation and maintenance;
- transportation of workforce (for example by sea, land and air) to all project related activities (for example offshore well head, onshore plant);
- potential exposure to toxic chemicals during all project phases;
- limitation of health facilities onboard marine vessels and jack-up drill rig;
- handling of toxics onboard the drill rig, hazards associated with welding, soldering and mud handling.
- risk from marine and terrestrial wildlife (for example jellyfish stings, sharks, sea snakes, biting insects etc).
- dust and fumes generated by various project components (for example dust from vehicles and emissions from flare);
- exposure to unsecured machinery (for example rotating machinery);
- hygiene arrangements during construction activities.

A detailed list of potential health impacts is provided in **Appendix N, Volume 2**. Detailed information on health impacts from biting insects are contained in **Section 12.4.2**.

16.3.4 Health Risk Management Measures

An outline Health Programme for the Blacktip Project is presented in **Appendix N, Volume 2**. This outline programme will act as the precursor to the development and implementation of management plans to address the project related health impacts. The key recommendations from this plan for consideration during detailed design include:

- development of a Medical Management Strategy and Plan;
- development of Emergency Response Plans;
- development of a detailed Health Programme.

16.4 Woodside's Health and Safety Programme

16.4.1 Operational Health and Safety Commitments

Woodside employs a structured approach to the management of Health, Safety and Environment (HSE) issues via a formal and documented HSE management system (HSE-MS). The HSE-MS ensures that impacts from Woodside's operations are either avoided or kept "as low as reasonably practicable" (ALARP), and it also drives continuous improvement in the company's environmental performance. The HSE-MS assists in providing confidence to regulators, stakeholders and the community that Woodside is responsibly fulfilling its environmental responsibilities.

Woodside believes that all injuries are preventable and that striving continuously to improve the health and safety of all employees, contractors and third parties who are impacted by Woodside activities is fundamental. Woodside's Health and Safety Policy is included in **Appendix D, Volume 1**. As a minimum, Woodside is committed to satisfying all health and safety legislative requirements.

16.5 Health and Safety Management

The development of HSE management Plans for the various project phases will be in accordance with the requirements of Woodside's HSE Management System. To ensure appropriate management of risks associated with the Blacktip Project, the following HSE management measures will be implemented (**Table 16-2**).

■ **Table 16-2 Project HSE Management Measures**

Project Phase	Project Activity	HSE Management Measure
Design	Surveying	Project HSE Management Plan
	Design	Project HSE Management Plan
Construction	Offshore vessel mobilisation/demobilisation; and offshore facilities fabrication and installation	Construction HSE Management Plans
	Well drilling	Drilling Safety Case and HSE Management Plans
	Onshore facilities fabrication and installation	Construction HSE Management Plan
Operation	Wellhead platform	Operations Safety Case
	Subsea facilities	Operations Safety Case
	Pipelines	Pipeline Operations Management Plan
	Supply vessel operations	Vessel operator's HSE Management System in accordance with Maritime legislation and interfaces with Operations Safety Cases
	Onshore facilities	Operations Safety Case
Decommissioning	Onshore facilities	Decommissioning Safety Case
	Offshore Well head platform	Decommissioning Safety Case
	Well decommissioning	Decommissioning Safety Case

The preparation of the Operational Safety Case(s) and Management Plan for the offshore platform, onshore plant and pipeline will provide the basis for the demonstration that risks are managed to ALARP. The safety case will comprise three main sections including a description of the facilities, an outline of the formal safety assessment process and a description of the HSE management system for the facilities.

The formal safety assessment will be carried out in parallel with and feeding directly into the development of the design of the facilities. The key objective of the formal safety assessment process are:

- To provide a structured and rigorous process for the identification of hazards and the assessment of the risk associated with those hazards;
- To provide input into the design in terms of eliminating hazards and managing risks early in the design process;
- To assess compliance with the project risk acceptance criteria and legislative requirements;
- To provide a clear and thorough demonstration that the risks are managed to ALARP.

The key studies carried out as part of the formal safety assessment include:

- Hazard and Operability Studies;

- Hazard Identification Studies;
- Safety Integrity Level Assessment;
- Fire and Explosion Analysis;
- Non Flammable Hazard Analysis;
- Escape, Evacuation and Rescue Analysis;
- Quantitative Risk Assessment.

The formal safety assessment will provide the mechanism to ensure that risks are reduced to ALARP in the design of the facilities. The nature of the hydrocarbon processing is such that there will be residual risks involved in the operation of the facilities. The residual risk is managed throughout the operational life of the facilities through the HSE Management System and the application of suitable controls and procedures.

16.6 Emergency Response Plan

16.6.1 Emergency Response Objectives

The objectives of an Emergency Response Plan (ERP) are the protection of:

- life and the safety of people;
- the environment;
- Woodside's assets;
- contractual/commercial arrangements;
- the reputation and image of the Company and its Co-venturers.

The primary goals to be achieved in providing an efficient emergency response management system are as follows:

- The creation of an organisational framework that will guarantee a rapid and effective response to an emergency situation regardless of scale or location.
- The provision of a list of actions which must be taken in an emergency with clear indications as to their priority.
- The assignment of the persons who shall be responsible for taking the aforementioned actions and the assurance that these persons are competent to undertake their role.
- The provision of effective communication channels essential to the coordination of tasks needed to deal with an emergency.
- The specification of required personnel, equipment and materials to carry out the measures to be undertaken in an emergency.

In addition, the emergency response planning and procedures will interface with the WEL Accident and Incident Investigation and Reporting mechanism and fulfil any legislative or industry reporting requirements.

16.6.2 Emergency Response Plans

The Blacktip Project will develop and maintain an ERP capable of responding to any incident which may affect the operation.

Emergency Response Plans shall be prepared for all of the project activities including:

- site surveys
- onshore site construction activities
- offshore constructions activities
 - wellhead platform installation
 - pipelay activities
- commissioning activities
- operations
- decommissioning

In the case of contractor operated facilities, such as construction / pipelay vessels or drilling rigs, the contractor shall have an emergency response plan suitable for the specific activities associated with Blacktip Project. The contractor, in conjunction with Woodside Blacktip Project will develop an Emergency Response Bridging Document to identify the interfaces and inter-relationships between the contractor Emergency Response Systems the Blacktip Project Emergency Response system and the WEL Emergency Response system.

The potential incident scenarios shall be identified during the development of the ERPs, and shall include all unplanned events and incidents including major accident events, environmental events, severe weather events and natural events

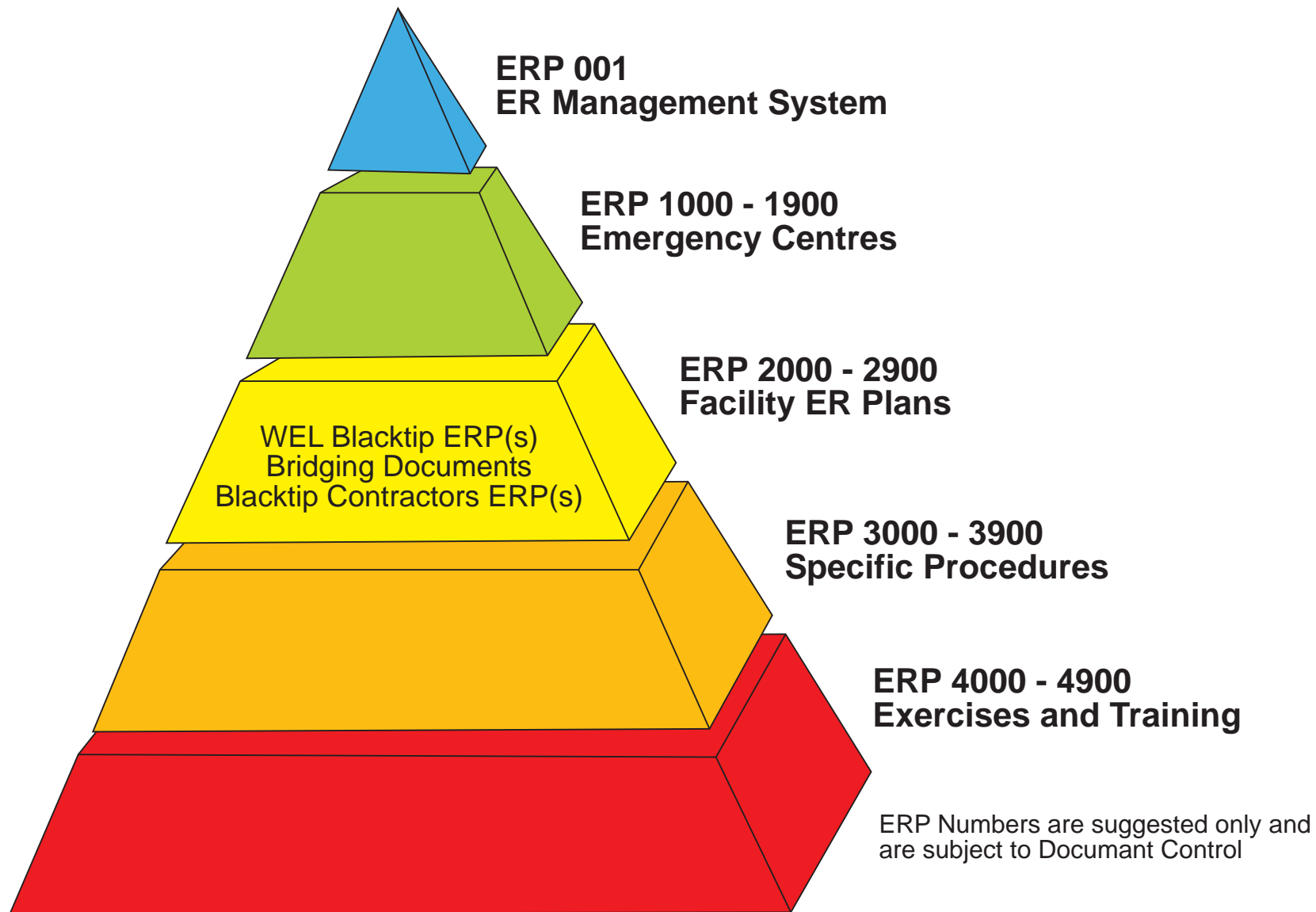
All ERPs will be linked to the core arrangements detailed in the Woodside Emergency Management System, as shown in **Figure 16-1**.

These plans will set out the site, vessel or asset emergency response structure, communication paths and provide guidance for response to emergency scenarios. The plans shall also specify the communication paths off the facilities for reporting or requesting assistance, should it be required. The interfaces and support required from local 3rd party emergency service providers shall be identified and discussed at the earliest opportunity.

Each plan will be tested immediately prior to or during its planned period of enforcement or at least annually, as the case may be. The ERP and bridging documents shall be held in the appropriate emergency centre and a copy provided to the Karratha Main Gate and published on the Woodside HSER Intranet site.

16.6.3 Woodside Emergency Response Support

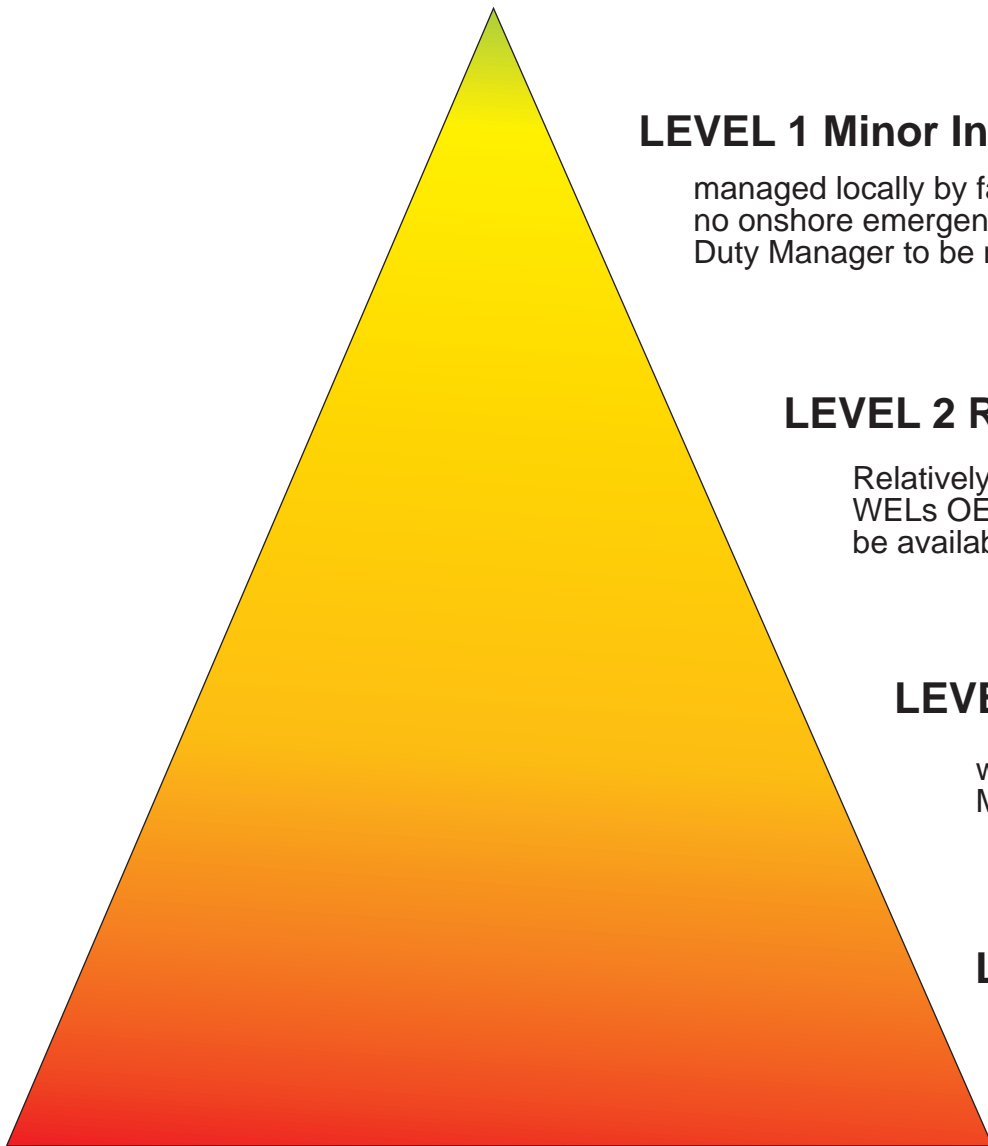
Emergency management assistance to the Blacktip Project will be provided by the Woodside Operations Emergency Centre (OEC). Request for, and provision of, assistance will be in accordance with the four levels of response. These levels are summarised in **Figure 16-2**.



Source: WEL

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LEVEL 1 Minor Incident

managed locally by facility / level with no onshore emergency response support required. Duty Manager to be notified after the event.

LEVEL 2 Relatively Minor Incident

Relatively minor incident but notification of WELs OEC Duty Manager to determine support which may be available. Managed locally by facility / vessel

LEVEL 3 More Serious Incident

with WELs OEC established through KMG & OEC Duty Manager. Managed locally by facility / vessel but supported by WELs OEC.

LEVEL 4 Serious Incident

Serious incident with WELs OEC established, Crisis Management Team (CMT) mobilised and state resources called in. Managed locally by facility / vessel with support from OEC, CMT and state resources

Source: WEL

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