



Infinity Offshore

Decommissioning

A phased approach to efficient decommissioning

- Decommissioning refers to a controlled process of shutting down operations and removing all production equipment from the fields for disposal, before the title is surrendered to the regulator.
- The current default requirement in Australia is complete removal, however, in situ decommissioning may be considered where the disposal option is demonstrated to be the least harmful to the environment, carries the lowest risk to personnel, and is the most cost effective.
- An approach that integrates stakeholder engagement during the decision making process was beneficial for Shell in previous decommissioning programs*.

* Chandler, J. et al (2017) Engineering and legal considerations for decommissioning of offshore oil and gas infrastructure in Australia, Ocean Engineering

- **Abandonment** is the relinquishment of titles and abrogation of responsibility for all equipment remaining in the title area, having satisfied and gained approval from all regulatory agencies.
- **Decommissioning** is a controlled process of shutting down operations and removing all petroleum production equipment, ancillary equipment and/or debris from oil and gas fields. In Australia, decommissioning is a “significant activity” in terms of field management under the OPPGSA.
- **Dismantling** is the act of taking a machine or structure to pieces. In the context of decommissioning, dismantling of the equipment and structures occurs in the field.
- **Demolition** is the action or process of knocking down, pulling down, tearing down, flattening, or razing structures and equipment for disposal. In the context of decommissioning, demolition of the equipment and structures occurs ashore.
- **Disposal** means getting rid of unwanted equipment by reuse, repurposing, recycling, or being discarded as waste.

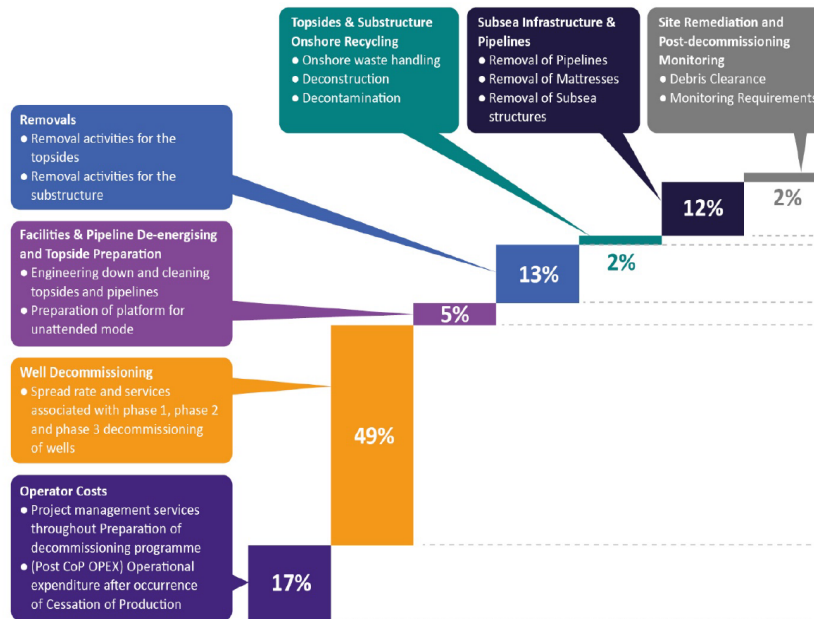
- Infinity Offshore proposes a phased approach to decommissioning that seeks to plan all activities in detail from initial risk assessment to final surrender of title, before production ceases.
- We have an experienced team of engineers and construction managers that can provide support to operators in each of the following lifecycle phases:
 - **Operations Phase:** activities supporting decommissioning while production is ongoing
 - **Decommissioning Phase:** the physical well abandonment and equipment dismantling offshore before onshore demolition and disposal
 - **Abandonment Phase:** the submission of reports and documentation to support surrendering the title



- An efficient decommissioning program requires that the operator engage different specialists during particular phases to provide expertise and achieve cost effective outcomes.

What is the cost breakdown?

- While the bulk of the cost in decommissioning is well plugging and abandonment, the second largest cost to the operator is Project Management and Engineering activities both during and after cessation of production.



Source: Oil & Gas UK, OGA

- Infinity Offshore has the capability, procedures and tools to increase the effectiveness of PM&E and reduce cost based on our knowledge and long experience with upstream oil and gas projects.

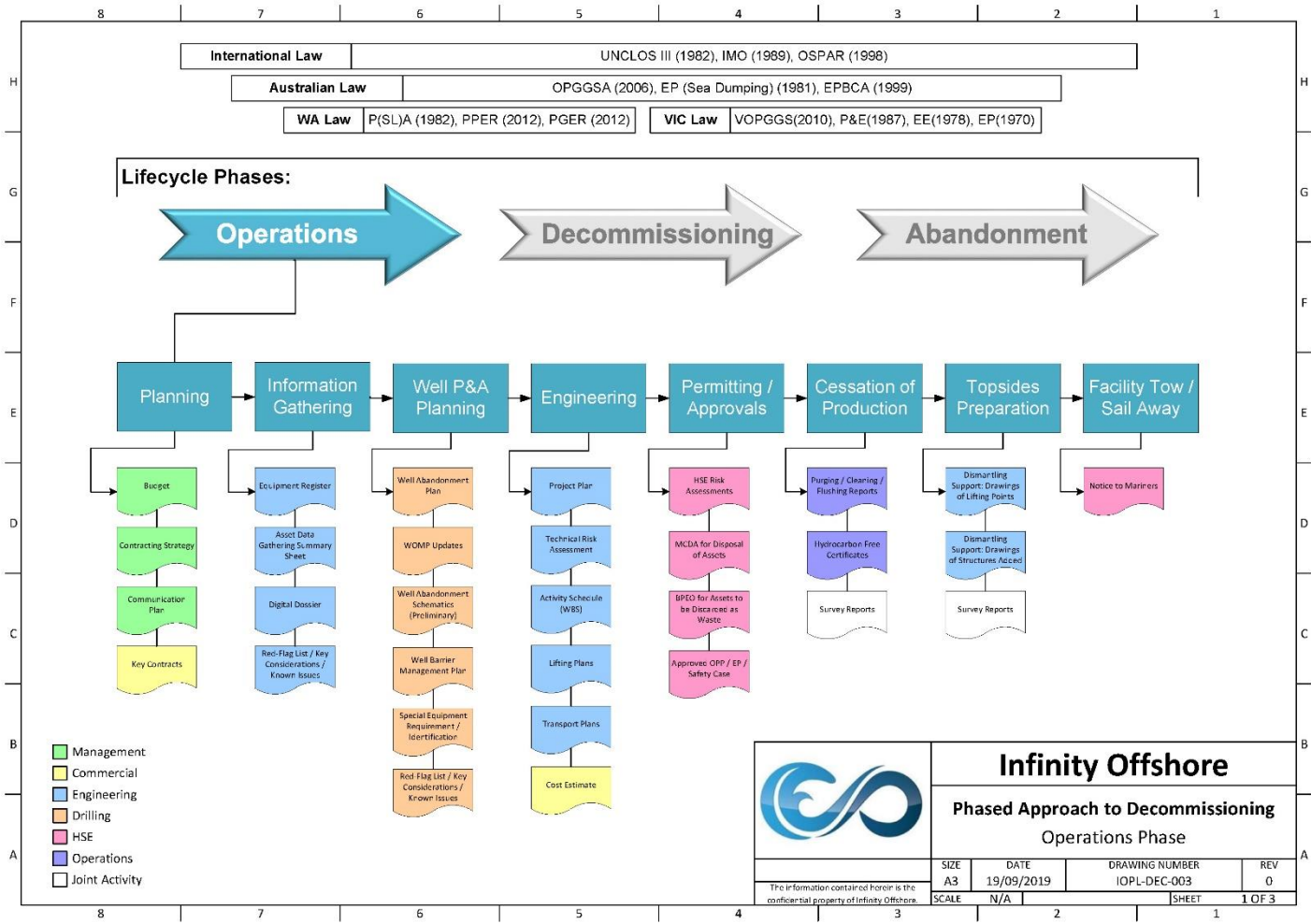
- The applicable International law and conventions that related to decommissioning include:
 - United Nations Convention on the Law of the Sea (UNCLOS III) 1982
 - IMO Guidelines and Standards for the Removal of Offshore Installations and Structures, 1989
 - Oslo Paris (OSPAR) Convention 1998
- The law and regulations that apply in Australian Commonwealth Waters includes:
 - Offshore Petroleum and Greenhouse Gas Storage Act 2006
 - Environment Protection (Sea Dumping) Act 1981
 - Environment Protection and Biodiversity Conservation Act 1999
- The law and regulations that apply in Western Australian State Waters includes:
 - Petroleum (Submerged Lands) Act 1982
 - Petroleum Pipelines (Environment) Regulations 2012
 - Petroleum and Geothermal Energy Resources (Environment) Regulations 2012
- There are implications in each of the legislative instruments that will determine how a field is decommissioned and what the requirements for the operator are!



Operations Phase

Summary of the Activities and Deliverables

- The activities that are to be carried out while the field is still in production encompass:
 - Planning;
 - Information Gathering;
 - Well P&A Planning Engineering;
 - Engineering;
 - Permitting / Approvals;
 - Cessation of Production; and,
 - Preparation for Dismantling.
- Access to the collective knowledge of all technical and support disciplines from the operations team will be a key determinant of success as they have the operational history and are likely to be able to red-flag issues pertaining to particular pieces of equipment.



- This sub-phase of work involves senior management in conjunction with legal and operations management, planning the key organisational structures, agreements and finance arrangements to support the decommissioning program.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Budget
 2. Contracting Strategy / Key Contracts
 3. Communication Plan

- In this sub-phase the aim is to produce a dossier of information that will inform the decommissioning and dismantling work programs. The information gathered will facilitate engineering and disposal activity planning, scheduling and resourcing.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Equipment Register
 2. Asset Data Gathering Summary Sheet for each asset in the field
 3. Digital Dossier of Asset Data. Refer to Appendix
 4. Red-Flag List / Key Considerations / Known Issues

- This sub-phase of the work involves the drilling engineering team planning the Well P&A activities, tooling and equipment requirements, and producing the documentation that facilitates detailed cost estimation, scheduling and planning.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Well Abandonment Plan
 2. WOMP Updates
 3. Well Abandonment Schematics
 4. Well Barrier Management Plan
 5. Specialist Equipment Requirement / Identification
 6. Red-Flag List / Key Considerations / Known Issues

- This sub-phase is concerned with a multi-discipline engineering team planning the dismantling of field assets, tooling and equipment requirements and producing the documentation that facilitates detailed cost estimation, scheduling and planning.
- The suitability of the various methods from removing the topsides, sub-structures and subsea equipment is assessed during this sub-phase with due regard given to feasibility, safety, risk, and cost.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Project Plan, Schedule
 2. Risk Assessment
 3. Cost Estimates
 4. Lifting Plans
 5. Transport Plan

- This sub-phase is the responsibility of the Safety and Environmental departments in conjunction with technical input from engineering whereby the approvals to dispose of the production assets are gained.
- This phase involves risk assessment, stakeholder engagement, regulatory approval and the identification of disposal pathways for all of the equipment and wastes of production. It is this sub-phase where the bulk of the work is done to allow a rigs-to-reef or pipeline-cut-and-bury disposal option.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. HSE Risk Assessments
 2. MCDA for disposal of assets
 3. BEPO for assets to be discarded as waste
 4. Approved OPP / EP / Safety Case

- Prior to dismantling, the production equipment on the facilities and the subsea production system must be de-energised and cleaned. This involves isolating pressure sources and ensuring all equipment — as far as reasonably practicable — is free of hydrocarbons and contaminants.
- Where possible wastes generated by cleaning process equipment should be bull-headed into the production wells before isolation. This will require well service pumps with high pressure and flow rate capacity.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Purging / Cleaning / Flushing Reports
 2. Hydrocarbon Free Certificate
 3. Survey Reports

- Once hydrocarbon free and de-energised, the topside equipment can be prepared for dismantling. Preparatory activities include the separation of process equipment from the wells and pipelines as well as module separation. At this stage a floating facility may be disconnected and be towed or sail away after disconnection and blinding of risers.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. As-Built Reports / Drawings of any Structures or Lifting Appurtenances installed to support Dismantling
 2. Survey Reports
 3. Notice to Mariners (if required)

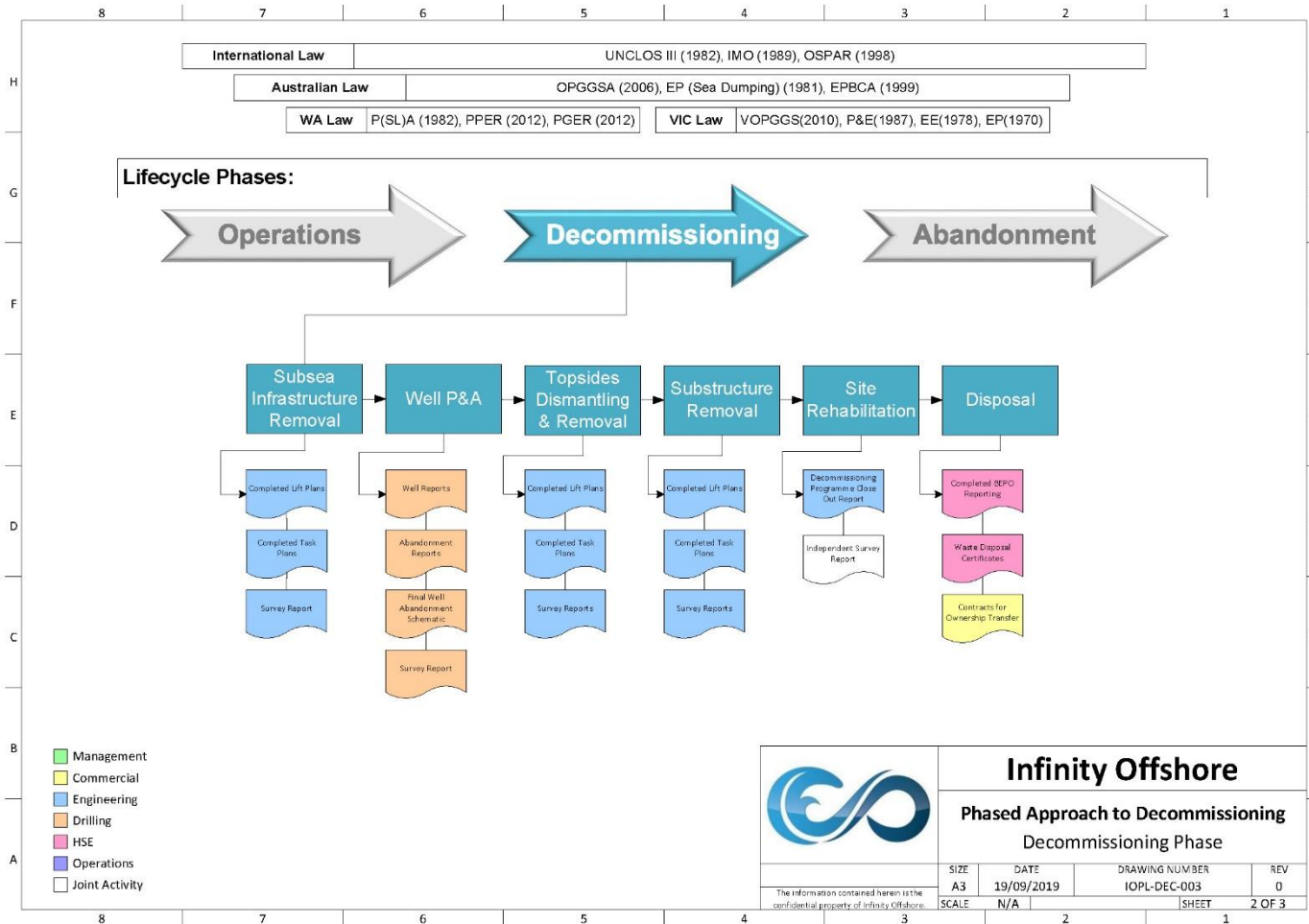


Decommissioning Phase

Summary of the Activities and Deliverables

- The decommissioning phase in the lifecycle is following planning, permitting and approvals in which the well P&A and physical dismantling of the equipment occurs.
- The activities that are to be carried out during this phase include:
 - Subsea Infrastructure Removal;
 - Well Plugging and Abandonment;
 - Topsides Removal / Facility Dismantling;
 - Substructure Removal;
 - Site Rehabilitation; and,
 - Disposal.
- The starting state of the equipment is that it is de-energised, cleaned and hydrocarbon free with the end goal being that the wells are permanently isolated, equipment to be left in field disposed of in accordance with approvals and all other equipment cut, lifted and transported to shore for reuse, recycling, repurposed or discarded as waste.

Decommissioning Phase



- During this sub-phase of decommissioning, the subsea infrastructure supporting the wells is removed. This may include manifolds, PLETs, PLEMs, UTAs, SDUs, Riser Bases, Umbilicals, Cables, Flying Leads, Spools, Jumpers and Flowlines.
- The subsea infrastructure is decommissioned and removed prior to Well P&A to facilitate efficient mooring / location of the drilling rig.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. As Completed Lift Plans
 2. Survey Reports, including As Left Reports

- Well Plugging and Abandonment is the permanent isolation of any rock formations with flow potential and the restoration of a seabed to its previous status. There are three phases of well decommissioning:
 1. Permanent isolation of the reservoir;
 2. Permanent isolation of all intermediate zones with flow potential. This phase is complete when all required barriers are in place; and,
 3. Removal of the wellhead and conductor.
- **Outputs, Deliverables and/or Reports from the activities in this phase include:**
 1. Well Reports
 2. Abandonment Report
 3. Well Abandonment Diagram
 4. Survey Reports

- During this sub-phase of the decommissioning activity in field, the topsides is cut, lifted and removed for transport and disposal ashore. The method of removal is determined during the Operations Engineering sub-phase.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Completed Lift Plans
 2. Survey Reports

- During this sub-phase of the decommissioning, the removal of jacket or other substructures is conducted either by re-floating, single-lift or by cutting the structure into sections before transport, as determined during the Operations Engineering sub-phase.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Completed Lift Plans
 2. Survey Reports

- Once all equipment has been removed, operators are required to make the area safe for other users of the sea. This involves the removal of any debris and any remediation of the seabed that may be required.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Decommissioning Programme Close Out Report
 2. Independent Survey Reports

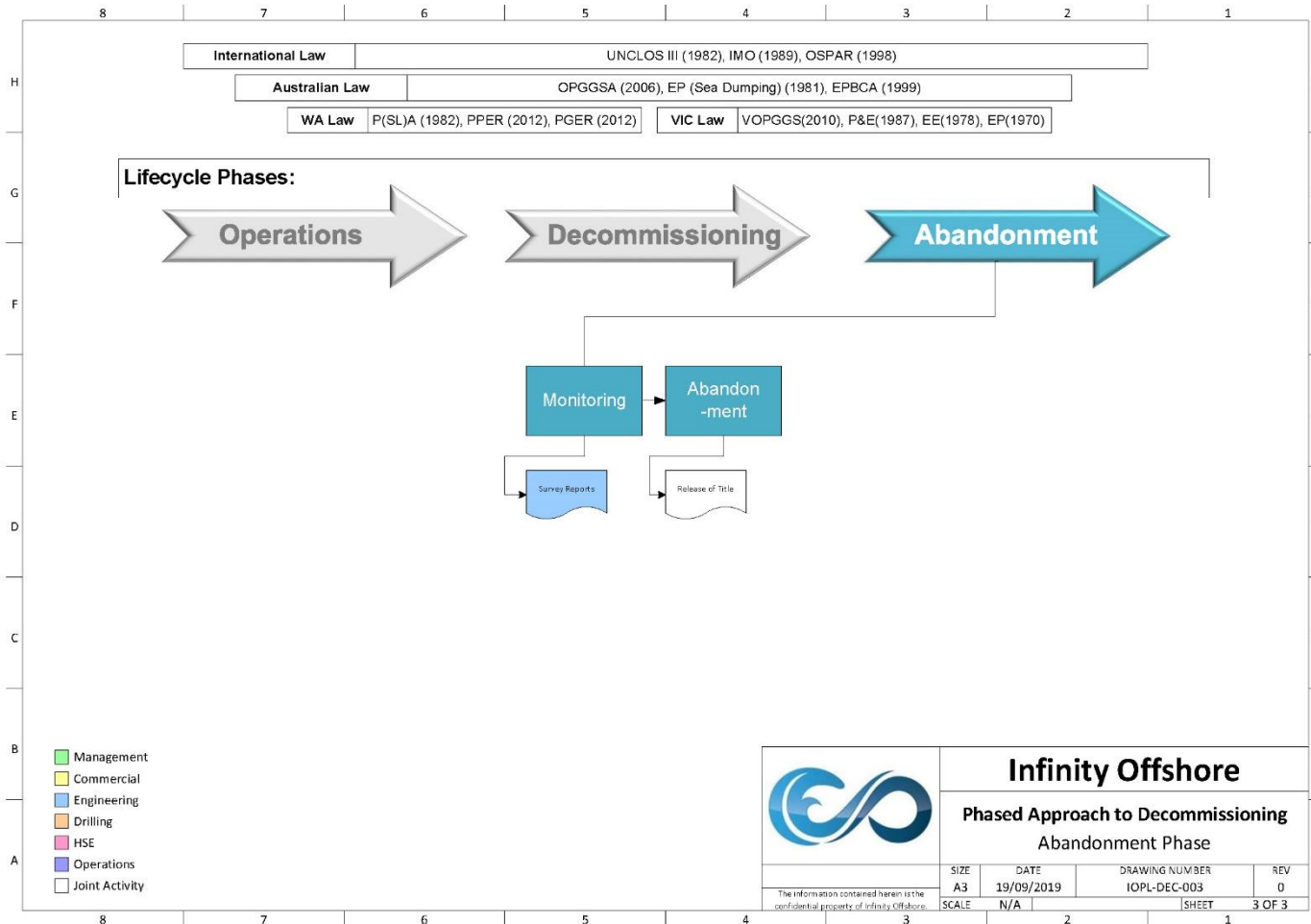
- Once topsides, substructures and subsea infrastructure are ashore they are disposed of by re-use, re-purposing, recycling or being discarded as waste. Careful control of the disposal of all types of waste shall be by licensed service providers with defined disposal pathways.
- All equipment that is to be re-used or re-purposed shall be subject to a formal, documented transfer of ownership, abrogating all future responsibility and liability to the receiving party.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Completed BPEO (Best Practicable Environmental Outcome) Reporting
 2. Waste Disposal Certificates
 3. Contracts for Ownership Transfer



Abandonment Phase

Summary of the Activities and Deliverables

- During the abandonment phase, the key activity is to monitor the decommissioned assets remaining in-situ and to prepare and submit the requisite reports to the regulator that allow the operator to surrender the title to the field and any equipment remaining therein.
- The activities that are to be carried out to abandon the field include:
 - Monitoring.
 - Abandonment.

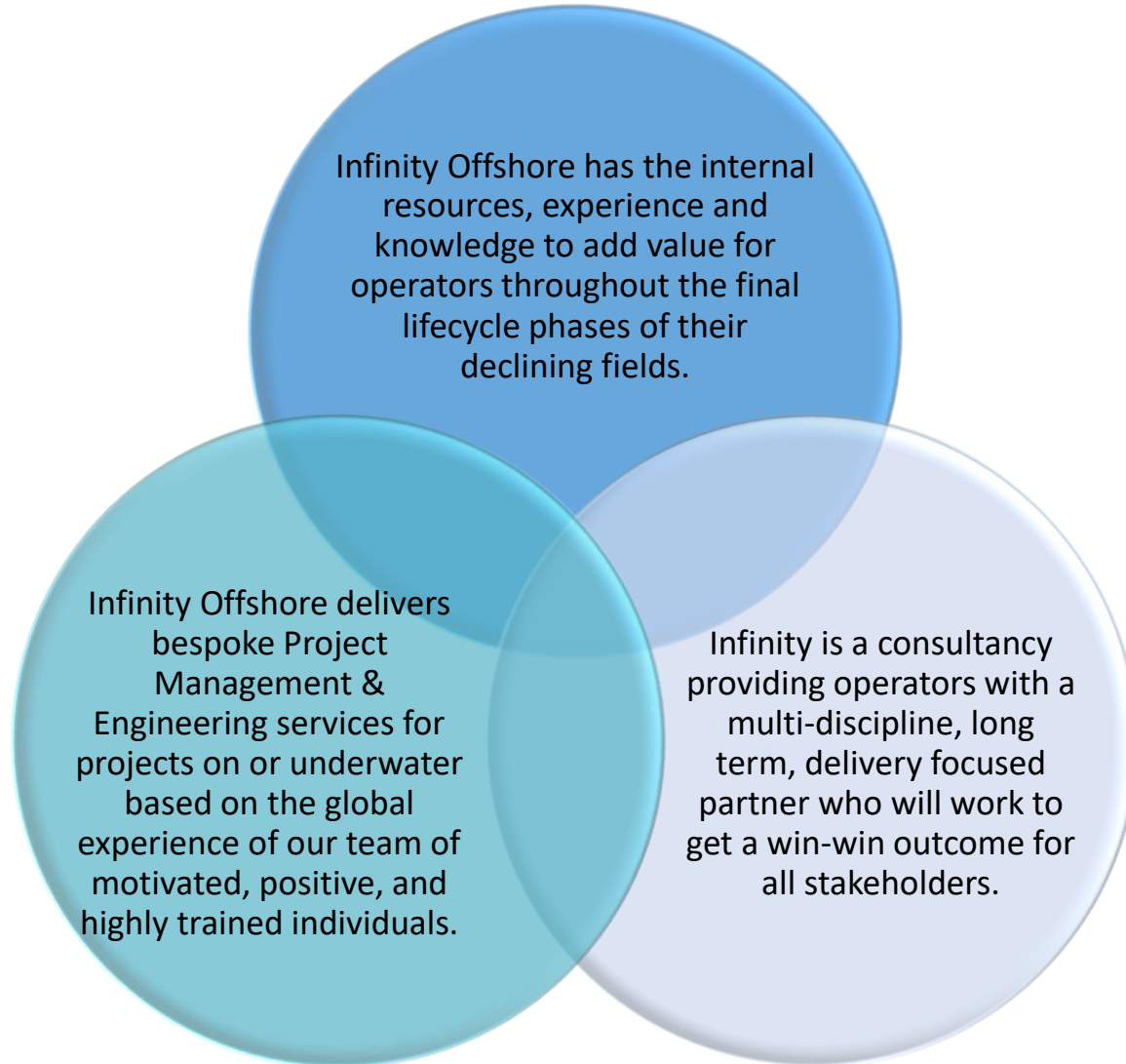


- Monitoring programmes are required for any infrastructure that is left in place. Surveys will be conducted to check the status of infrastructure and assess changes over time to ensure no increased risk to other users of the sea.
- The frequency of these surveys will be determined by the regulator on a case-by-case basis.
- An ongoing monitoring obligation (and costs) can be avoided by complete removal of all equipment.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Survey Reports

- Final abandonment of the field refers to the surrender of title to the field location and abrogation of responsibility for the abandoned wells and disposed of in-situ to the regulator or governing authority.
- This is the final activity related to hydrocarbon production for this particular area.
- Outputs, Deliverables and/or Reports from the activities in this phase include:
 1. Release of Title

Final Thoughts







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Thank You!



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