Section 8. Selected Decommissioning Option for the Maureen Loading Column

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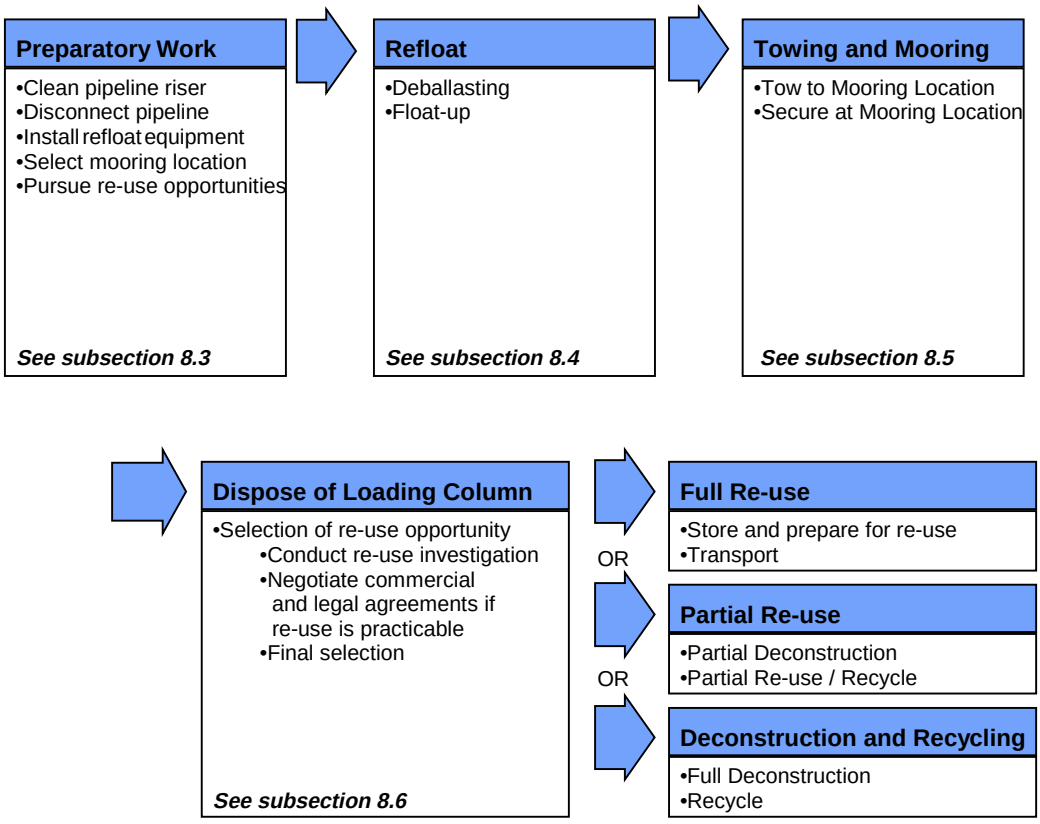
This section provides a description of the Selected Decommissioning Option for the Maureen Loading Column.

8.2 Overview of the Selected Decommissioning Option



8.3 Preparatory Work for Removal of the Loading Column

The sequence of events in preparation for refloat of the Maureen Loading Column includes:

- Pipeline riser clean-up
- Base deballasting equipment installation
- Column ballasting/deballasting equipment installation
- Pipeline disconnection
- Tow ancillary installation

8.3.1 Clean-Up and Disconnection of the Loading Column

The Loading Column riser will be water flushed and pigged to displace any hydrocarbon residues, as part of the decommissioning exercise for the Oil Loading Pipeline. The flushing and pigging will be initiated from the Platform using the existing oil pumps and the flush water and residues will be collected in a tanker connected to the Loading Column for disposal at an onshore treatment facility.

The Loading Column will be utilised during the refloat of the Maureen Platform to transfer the ballast water from its storage tanks into a tanker, for subsequent disposal at an onshore treatment facility.

Once the Maureen Platform has left the field the mooring hawser and loading hose will be removed. The rotating head will be locked in position for towing and the pipeline will be disconnected prior to refloat of the Loading Column.

Sealine disconnection

Figure 8-1 and Figure 8-2 show views of the Maureen Loading Column base including the 24" Oil Loading Pipeline and the pipeline cutting area. The cutting works will be performed by divers prior to the refloat.

Figure 8-1 Elevation View of Column Base

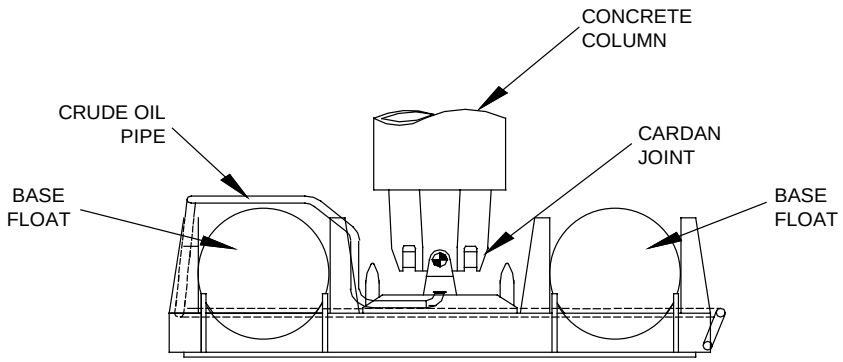
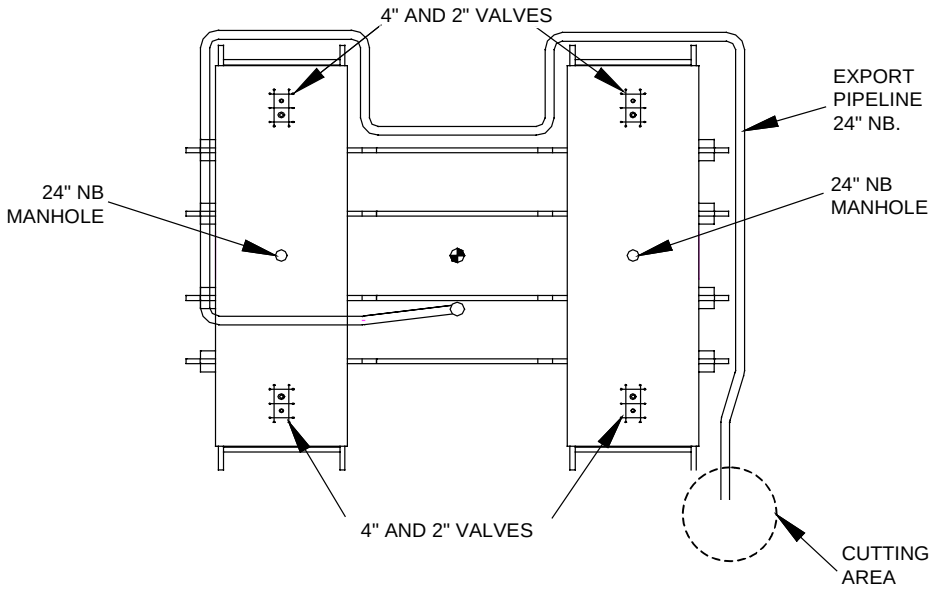


Figure 8-2 Plan View of Base



8.3.2 Preparation of the Loading Column

Inspection of base structure and equipment

The following items have been or will be inspected by ROV or divers prior to preparatory work commencing:

- Base structure
- Base floats
- Connection plate
- Universal joint
- Crude Oil valves and circuit
- Base float ballasting system penetrations

Work to be performed on the base foundation

High pressure water jets may be used to dislodge the rubber skirts, attached to the base floats, from the seabed. Before the jetting can be carried out, the rock placement material that was placed to overcome the scouring around the base will be displaced. This small quantity of rock material will be left on the seabed as it will not represent a fisheries hazard.

The concrete cylindrical floats on the base are full of water and each was provided with two 2" and two 4" valves and a 24" manway to assist with refloat operations.

The base floats are able to withstand an external pressure of 10 bars greater than the internal pressure and an internal pressure 0.5 bar greater than the external pressure. They are currently full of clean sea water at ambient seabed pressure.

Divers will install eductors at either end of each float, and single compressed air injection points as part of the preparatory work. An umbilical containing two sea water hoses, instrument cables and a 3" compressed air hose will be connected between each float and a support vessel, which will provide the utilities to carry out the refloat operation.

Internal column preparations

Two new column deballasting pumps will be installed at the bottom of the internal shaft to replace the existing pumps that were used during the installation process. The new pumps will be electrical submersible pumps that will be powered via electric cables by a generator located on the support vessel. The pumps will be connected via flexible hoses to existing piping, within the column, which will discharge the clean seawater, that acts as ballast, overboard. Instrumentation will also be installed inside the column to accurately measure water levels during the ballasting and deballasting operations.

Figure 8-3 Column Ballasting

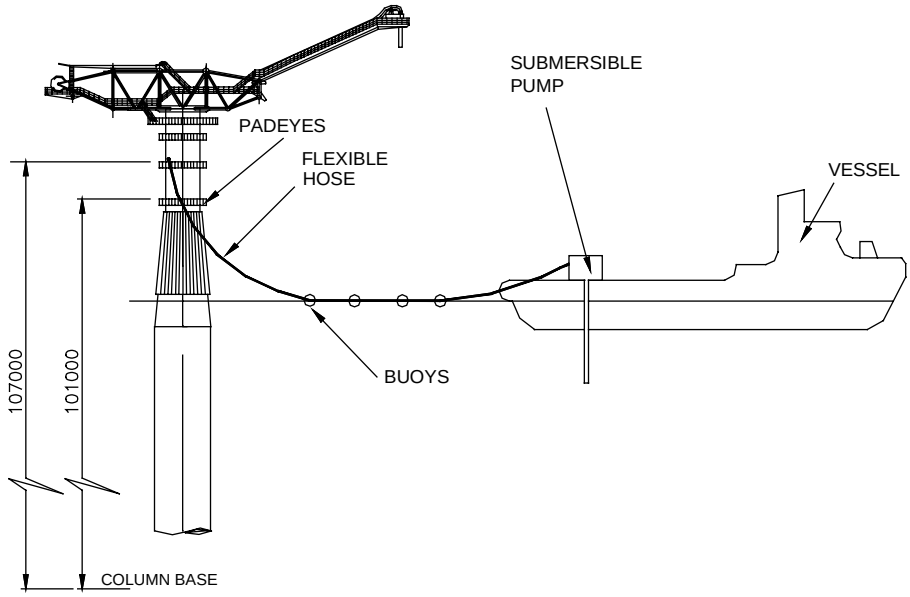


Figure 8-3 shows the column ballasting arrangement. The ballast water into the column will be supplied from submersible pumps on the vessel via a flexible hose connected to the original column ballast pipework.

The purpose of this operation is to ballast 200 te (195 m^3) of sea water into the shaft to keep an overall downwards apparent weight on the pivot prior to the base deballasting operation.

Other preparations for tow

Wherever practicable, preparations for the tow will be completed before the refloat operation commences. These preparations include:

- Installing temporary navigation lights under the winch deck in the port, starboard and astern position
- Providing 30 days power capacity for navigation lights
- Installing a black towing diamond on top of the winch deck
- Switching off column permanent navigation aids and fog
- Sea fastening equipment as necessary
- Deploying an emergency towing line
- Performing a detailed tow route bathymetric survey.

8.4 Refloat Sequence for the Loading Column

8.4.1 Deballasting of the Base Floats

Deballasting the base floats will be achieved by introducing compressed air at ambient pressure, at the top of the floats whilst removing water from the floats using an eductor system. The eductors will be powered by submersible pumps suspended from a support vessel on the surface.

The volume of water to be deballasted is about 1300 m^3 for each base float. This leads to a deballasting duration of about 25 hours using the eductor system with 50 m^3/h flow rate.

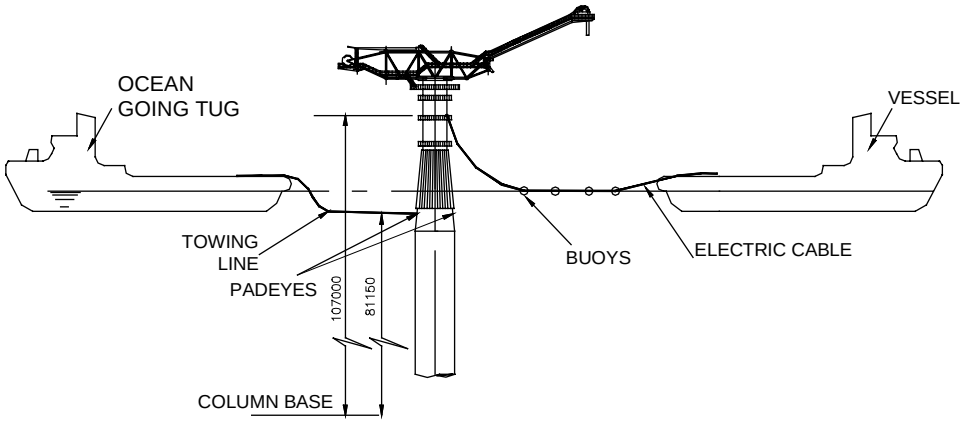
8.4.2 Deballasting of the Column

The purpose of this operation is to deballast about 400 m^3 of sea water from the shaft to reach the 88.0 m towing draft (4 hours duration using a pump flow rate of 100 m^3/h). In this operation, the power will be provided by a generator located on the support vessel (see Figure 8-4). An electric cable will be connected from the generator to the new submersible pumps located in the column.

Before this operation commences, the main tow tug will be connected to the column by the main tow line. A second tow line is connected from the vessel to hold it in position during the refloat operation. Towing padeyes are located 11.85 m below the sea surface. Securing the tow line connection will require diver intervention.

When the base has left the sea-bed, the vessels will maintain the column on station until it reaches the towing draft.

Figure 8-4 Column Refloat



8.5 Loading Column Tow to Deep Water Mooring

After completion of the refloat operations, the free floating column and base will be towed out of the Maureen Field in a vertical position.

The Loading Column will be towed to a deep water location for mooring, via the pre-planned, surveyed route. The mooring will be in suitable deep, near-shore, waters. The ultimate destination has yet to be confirmed, but the location will be selected through careful evaluation of contractor bids, taking into account environmental, health, safety, technical and economic factors.

8.5.1 Marine Operations

All marine operations in the United Kingdom Continental Shelf will be conducted in accordance with the Maureen Operator's established procedures[1] .

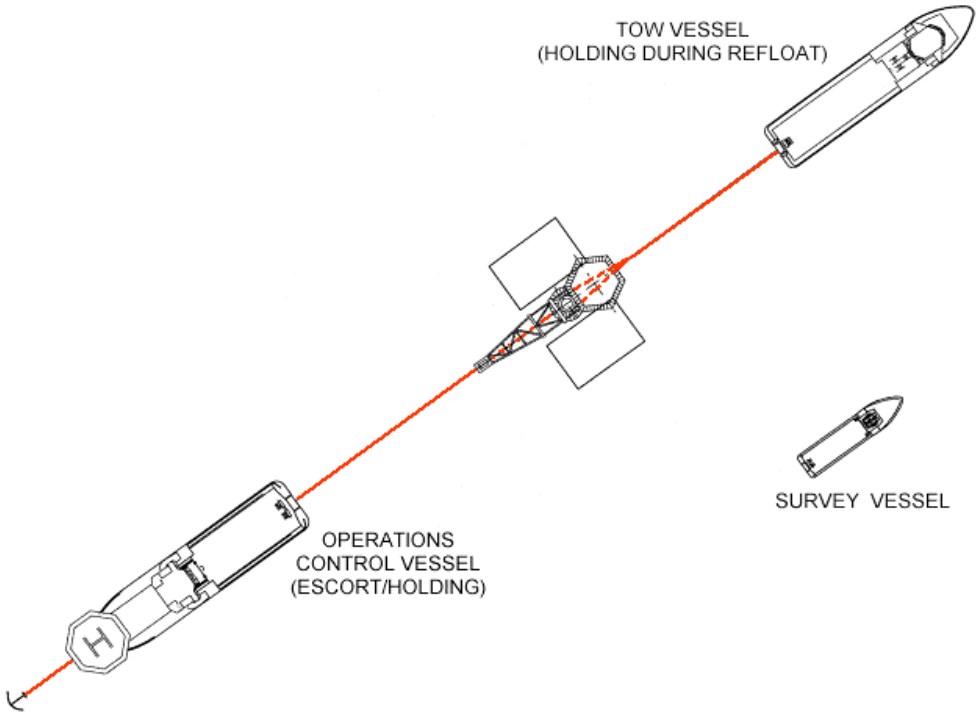
8.5.2 Initial Deployment of Vessels

The Maureen Loading Column will be towed by one tow vessel having a total pull of approximately 120 te.

The tow vessel will be connected to the Loading Column prior to float up using pre installed towing pennants, which will be laid out on the seabed and buoyed to the surface.

The tow vessel and an operations control vessel (OCV) will initially be deployed to provide necessary station keeping during the float up operation. This is shown in Figure 8-5 in which it can be seen that the OCV is also connected to a mooring on the seabed.

Figure 8-5 Initial Deployment of Vessels



8.5.3 Towing Operations

The tow operation will begin when the towing draft of approximately 88 m is achieved. The OCV will keep a low tension in the direction opposite to the towing direction during the tow.

Tow Fleet

In addition to the tow vessel and OCV, a survey vessel (shown in Figure 8-5) will be included in the tow fleet.

The OCV will escort the tow to remotely monitor the Loading Column and act as an emergency replacement tow vessel.

The survey vessel will run ahead of the tow and will use a side scan sonar to check the tow route for unexpected obstructions. A pre tow route survey will have been conducted within 6 months prior to the tow, so this survey will confirm that the route has not been obstructed during the intervening period. The survey vessel will also check the tow route behind the tow to confirm that no obstructions have been placed in the route as a result of the tow. Any pipelines or telephone lines crossed will be identified and inspected using an ROV before and after the tow. The survey vessel also acts as a guard vessel for the tow by passing warnings to other traffic in the area to ensure a clear path is maintained.

Tow Routes

There are six different possible tow routes that can be used to take the Loading Column from the offshore site to the potential inshore mooring site. These vary from 165 nautical miles (nm) to 600 nm in length. The tows are anticipated to take between approximately 3 days to two weeks depending on which inshore mooring site is selected. The average tow speed is anticipated to be between two (2) and 2.5 knots (nm per hour).

Deep Water Mooring Operations

When arriving at the deep water mooring inshore tow vessels will be engaged to manoeuvre and hold the Loading Column during mooring connection.

8.5.4 Loading Column Requirements for Mooring

Preliminary analysis of the mooring system requirements for the Loading Column, to ensure stability under 100 year storm conditions, has been undertaken for each potential mooring site using the wind and wave conditions specific to it.

Final analysis and detailed design will be undertaken for the selected mooring site once the contract for this work has been awarded.

8.6 Disposal of the Maureen Loading Column

8.6.1 Option Selection Process

No formal disposal option has yet been selected for the Loading Column, since preference is for full reuse as an offshore Loading Column. Every reasonable effort is being made to realise that potential in accordance with the waste hierarchy (reduce, reuse, recycle, dispose).

Section 6.4 discusses the efforts being made to secure full or partial reuse of the Maureen Loading Column.

In the event that no suitable reuse opportunity is found for the Maureen Loading Column within a reasonable timeframe, it will be deconstructed and its materials recycled as described below.

8.6.2 Deconstruction Description

Dismantling Procedures

In the event that deconstruction of the Maureen Loading Column is selected, all engineering necessary to carry out the deconstruction in a manner which achieves the SH&E objectives for the Project will be performed. More detail on project management is provided in Section 14.

8.6.3 Inshore Deconstruction Works

Removal and Disposal of Concrete and Haematite

Unless a reuse or suitable alternative disposal method can be found and approved, the concrete column and base and the haematite ballast within the column will be demolished by crushing and recycling (eg as hard core).

Topsides Deconstruction

Dismantling and de-construction of Maureen Loading Column rotating head will be carried out in a safe and orderly manner and in accordance with approved dismantling procedures after being separated from the column and set ashore.

The steel section of the column, which supports the rotating head, is connected to the concrete section by pre-stressed tendons. Specific procedures will be prepared for disconnecting the steel and concrete sections which will address the methods for de-stressing the tendons and the safety precautions that must be implemented before commencing the operation.

Column and Base Deconstruction

Once the rotating head has been removed from the column a wire from a floating shearleg crane(s) will be connected by ROV to the lower end of the column. The column will be de-ballasted, a tug will connect a line to the upper end of the column for station keeping, the mooring lines will be disconnected and the shearleg crane will lift the assembly sufficiently for tow to shallow water, where the base will be grounded prior to separation of the base floats and column at the pivot joint.

After disconnection, the tug will manoeuvre the column into a dock for deconstruction.

A similar procedure will be employed for the base.

8.7 Environmental Considerations

The main environmental impacts estimated to arise out of the decommissioning of the Maureen Loading Column are briefly described below.

8.7.1 Energy Consumption/Emissions

No calculations have been undertaken to assess energy consumption or emissions associated with the options considered for the disposal of the Loading Column. It was considered by observation that the option selected, to refloat and tow to a deep water mooring, minimised the use of marine vessels in comparison with undertaking of deconstruction activities offshore, therefore resulting in lower energy consumption and emissions.

8.7.2 Discharges to Sea

There is a small chance of a discharge of a small quantity of hydrocarbon residue when the pipeline is disconnected at the base of the Loading Column. However, every precaution has been taken to clean the pipeline by de-waxing using hot oil, water flushing and pigging. The water remaining in the pipeline contains less than 30 ppm oil in water and it is anticipated only a few cubic metres of this water will be released during the disconnection. The impact of this release on the ecosystem will be negligible.

By definition, refloating the Loading Column will require discharge of ballast water from the base floats and inside the column. The water to be discharged is clean sea water that has never been in contact with any hydrocarbons and which has never had any chemicals added to it. Thus there is no risk of adverse environmental impact from discharging this ballast water to the sea.

8.7.3 Disturbance to the Seabed

There are no drill cuttings in the vicinity of the Maureen Loading Column so there is no issue of redistribution of contaminants when the Loading Column is refloated. There is a small layer of rock material placed around the base floats that was introduced to reduce the potential for seabed scour. Some of this rock material must be moved to free the rubber skirts attached to the bases prior to refloat. The rock is naturally occurring gravel, and there will be only local impact or physical damage to the ecosystem.

8.8 Notes and References

The notes below, provide additional reference information relevant to this section. A Glossary of terms and abbreviations is also included within Appendix A, and a complete list of supporting studies is contained within Section 17.

[1] Phillips Petroleum Company United Kingdom Limited, Marine Operations Manual, Document No. UK/SE-011.