

LIFE CYCLE OF SHIPS AND OFFSHORE STRUCTURES DECOMMISSIONING OF FIXED OFFSHORE PLATFORMS

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Summary

All offshore platforms worldwide should be removed after they have served their purpose in order to return the site to its original condition. The process involves numerous steps that need to be well planned and coordinated. The first steps are developing the overall removal plan and preparing the platform by cleaning the topsides equipment of hydrocarbons and plugging and abandoning the wells and removing the conductors. The associated pipelines and underwater cabling are then disconnected. The topsides structure is removed first, typically by cutting the deck legs and lifting the topsides off of the jacket substructure and onto a barge to be taken to shore for salvage. The topsides structure is sometimes cut into smaller pieces in order to reduce the size of the lifted pieces. The substructure jacket located below water is then cut into pieces and also lifted onto a barge for salvage. The site is then cleared of any other miscellaneous debris in order to return it to its original condition. In some cases, instead of salvaging, the removed structure is taken to a special offshore disposal site in order to provide a “rigs-to-reef” underwater habitat for marine life. In other limited special cases the platform is toppled at its original location in order to provide a rigs-to-reef habitat.

1. Background

All offshore platforms worldwide should be removed after they have served their useful life. Most countries have strict regulations that require platform removal. The word “decommissioning” is used to describe this activity since it must be performed in a well planned sequential manner that involves permanently plugging the down-hole components of the wells below the seafloor, environmental cleanup of leftover hydrocarbons in the topsides, removing all pipelines and underwater cables, and removal of all of the physical components of the platform below water. After it is decommissioned, the platform site should be the same as it was before the platform was installed and there must be no remaining long term environmental concerns.

Offshore platforms have been operating since the 1950’s and there have been thousands of platforms decommissioned since that time. Most of the experience is in the USA Gulf of Mexico where 100’s of platforms are removed every few years, mostly smaller steel jacket platforms located in less than 100m water depth. The process for these types of platforms has evolved to a safe and environmentally acceptable approach.

However, there are many larger fixed platforms in deeper water up to 350m and of different design that have yet to be removed. These include the large concrete Gravity Based Structures (GBS) located in the North Sea. Several of these platforms are just now reaching the end of their life and the planning and engineering phase for the decommissioning of these platforms is currently underway. The decommissioning of these larger platforms will follow the same general approach as discussed here, except that there will be some unique technical challenges, such as refloating the GBS with the overall effort being an order of magnitude larger than the removal for that of smaller steel jackets. The overall decommissioning operation may take 1 year or more depending upon the amount of up-front planning and engineering. The actual offshore removal operations for the topsides and jacket may take from 2 weeks to 2 months or more depending upon the platform size.

2. Rigs-to-Reefs

An alternative to complete removal and transporting of the platform to shore for salvaging is the use of the platform to form an artificial reef in order to provide an aquatic habitat for marine life. This approach has become known as the “rigs-to-reef” decommissioning process. There are two ways in which the platform can be converted into a reef. The first method is to topple the platform in place by cutting it at about the -50m water depth and toppling the upper piece to the seafloor. The -50m water depth allows safe passage of vessels and is out of harms way for most recreational and commercial fishing. The debris field created on the seafloor becomes a long term habitat for aquatic life as well as for recreational activities. However, while this is an attractive, safe and low cost option for platform decommissioning – there can not be a rig-to-reef at every platform location worldwide! Instead, most countries such as the USA have developed an alternative second method, where certain offshore zones are defined where a platform is transported after removal and then placed on the seafloor to become a reef. In this manner the rig-to-reef program is limited to designated areas that

can be marked on shipping maps and the debris accumulation controlled and monitored. Additional details about the rigs-to-reef process are discussed later.

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Biographical Sketch

Frank Puskar is President of Energo Engineering located in Houston, Texas. Energo specializes in advanced structural engineering of offshore oil and gas structures. He has more than 25 years of experience in the offshore industry and is the author of numerous publications in addition to having worked on industry related to design assessment of platforms for hurricane conditions. He is the recipient of the US Government Mineral Management Service (MMS) 2007 Corporate Leadership Award for his efforts related to the improvement of structural design codes based upon hurricanes. He has a Master of Engineering degree in Ocean Engineering from the University of California at Berkeley and a Bachelor of Science degree in Civil Engineering from the State University of New York at Buffalo. He is a Registered Professional Engineer in the states of Texas, Louisiana and California.