DECOMMISSIONING PROJECT

Iwaki Platform
Decommissioning Project

Introduction

The Iwaki Gas field, operated by Offshore Iwaki Petroleum Co. Ltd., was initially discovered offshore Japan in 1973, developed in 1983 and ceased production in 2007. Offshore Iwaki Petroleum Co. Ltd.'s consortium comprises ExxonMobil, Yugen Kaisha and Tonen General Sekiyu K.K.

Located approximately 40km east of Nahara Cho, in a water depth of approximately 154 metres, the Iwaki Platform consists of a steel jacket structure, topside drilling, production modules and a 12" diameter pipeline for transporting gas from the field to the onshore plant in Nahara Cho.

SapuraAcergy, using their key asset, the Sapura 3000, was awarded the Heavy Lift Subcontract of the Decommissioning Scope. This subcontract includes lifting and transportation of the topsides, jacket and sections of the 12" gas export pipeline to an onshore location for disposal by others. The decommissioning work was successfully completed in July 2010.

Project Fact Sheet

Project Name	:	Iwaki Platform Decommissioning Project
Location	:	Iwaki Field, Japan
Operator		Offshore Iwaki Petroleum Co. Ltd.
Client	:	Nippon Steel Engineering Ltd.
Contract Type	:	Heavy Lift Sub-Contract
Water Depth	:	154m
Project Duration	:	2009-2010 (Approximately 60 Days Vessel Onsite)
Vessel Utilised	:	Sapura 3000
Scope of Work	:	SapuraAcergy's scope includes the following: • Removal of topside facilities and module support frame • Cutting jacket members at EL-92 metres • Lifting of upper section of jacket, lowering onto seabed and toppling • Cutting and stabilising export pipeline

Project Overview

The Iwaki Gas facility, commissioned in 1983, consists of offshore drilling, process and accommodation modules installed on a jacket structure. A gas pipeline transports gas from the field to the Offshore Iwaki Petroleum onshore plant in Nahara Cho.

The Iwaki platform has 8 legs, weighs 20,735MT and stands in 154 metres of water. The platform is located 40km off the east coast of Japan and was the first ever installed offshore Japan. It is also the largest to be decommissioned in Japan. The Iwaki platform was shut down in 2007.

SapuraAcergy Sdn Bhd was awarded a sub-contract in May 2009 for the Iwaki Platform Decommissioning Project which included:

- Removal of 16 modular topside lifts ranging from 10MT to 1100MT
- 118 subsea cuts, at a depth of 92m
- Removal of 16 No. pile sections
- Cutting and removal of a section of 12" pipeline
- Lifting the jacket, lowering to seabed and toppling (to create an artificial reef)

This project, worth an estimated US$60 million, was successfully completed on behalf of Nippon Steel Engineering Co. Ltd., in July 2010.

Project Challenges

Challenge 1 – Environmental Conditions

From historical weather data and knowledge of the sea conditions and downtime during installation, it was known that measures would have to be taken to mitigate the weather risk. This was carried out by physical measures to enable lifting to continue in poor conditions and project planning to ensure as many work faces were open at any one time. It was also essential to ensure that some of the work faces were not sensitive to adverse weather.

The above strategy proved to be successful and allowed the topsides operations to run almost in parallel to the less sensitive subsea works.

Challenge 2 – Jacket Cutting Philosophy

Traditionally, jacket cutting had been performed upon completion of the topside removal. On review of previous decommissioning offshore programmes, it was clear the subsea cutting scope carried a huge schedule and operational risk. With this knowledge, SapuraAcergy developed a method to mitigate these risks and reduce the overall offshore schedule. This includes the development of a full structural model of the jacket which allowed the stress within each leg and brace to be calculated. Within the model, each of the planned module lifts was able to be simulated and the resulting changes in the leg and member stresses were able to be accessed. This method allowed the low stress members to be identified, enabling a sequence of structural members to be cut after each lift.

Challenge 3 – Subsea Cutting Equipment

In order to reduce risk and improve schedule, it was concluded that "Fly to Place" cutting equipment was required. Following a market review, it was found that although the cutting tooling to complete the cuts was available, a reliable ROV delivery system was not. After a demanding selection process, which cumulated in a 400te diamond wire compression cut being performed, Proserv offshore were awarded the jacket cutting subcontract.
The ROV delivery system was identified as the critical component to enable cutting operations to be carried out off the critical path. SapuraAcergy, Proserv and TMT worked together to design, build, complete factory acceptance and site testing of the ROV delivery system. Refinements were made throughout this process which ensured a fully integrated and rigorously tested system was taken offshore.

All subsea cutting operations were performed off the critical path and without impact on the topside lifting and jacket removal scope.

The WROV performed the Diagonal Brace Cutting in parallel with the topside removal

Challenge 4 – The Jacket Lift

During the engineering phase, it was determined that the actual lift weight of the jacket could vary significantly, depending on the amount of marine growth and integrity of the jacket legs for instance. In order to mitigate the risk associated with a large range of weights, it was decided to seal the jacket legs, de-ballast them and use the buoyancy created. A method of ballasting and gradually increasing the load on the crane, in stages, was developed such that the actual lift weight could be accurately and predictably maintained. In fact, a buoyancy of 1543MT was gained from 78% of the leg length being filled with air resulting in the crane experiencing a total weight of 1050MT.

Challenge 5 – Logistics

One of the key challenges to overcome, was the sourcing, transport, storage and maintenance of the required equipment. Also, due to the remote location, it was essential to have adequate contingency and spares to mitigate the risk of downtime. The following list provides an indication of the magnitude of equipment which was carried on the Sapura 3000:

- 200MT of fabricated installation aids
- 70 heavy lift slings up to 14" in diameter
- 75 heavy lift shackles up to 700T
- 14 subsea cutting tools
- 360m of diamond wire
- 64MT of garnet (grit)
- 1400m of wire rope
- 9 compressors
- 1800m of air hose
- Air diving spread

Lessons Learnt

The Iwaki Decommissioning project was SapuraAcergy's first venture into decommissioning work and hence we have gained extensive and detailed first-hand knowledge of the unique challenges associated with decommissioning. The following highlights just of few of the lessons learnt.

Lesson 1: Risk Analysis – As Installed

The Iwaki Platform was more than 28 years old when decommissioned. One of the key risks is the reliability of the provided information with regards to original configuration, modifications, inherent structural defects, weight and weight growth. For this project, the information provided by our client, Nippon Steel, was very accurate, with excellent records being maintained. This information, coupled with many on-site visits proved invaluable in the efficient planning and execution of the works.

Lesson 2: Regulatory Compliances

It was a challenge for SapuraAcergy to ensure the compliance with the Japanese regulatory requirements especially when English is not widely used as the medium of communication. As such, an engagement of a local legal consultant in Tokyo has facilitated SapuraAcergy to establish a Japan Branch Office (JBO) in Iwaki-City, Fukushima-prefecture, application of a Construction License for SapuraAcergy, application of Aviation Light License for Sapura 3000, personnel Visa fulfillment and other local requirements prior to the execution of the offshore campaign in Japan by Sapura 3000. A SapuraAcergy JBO representative and local Project Engineer was appointed to administer the JBO. Having a local employee has helped the communications between SapuraAcergy with the local client, suppliers, contractors, government and the community. It is also learnt that lengthy period is required for any formalities in Japan. In addition, all documentation shall be translated in Japanese. As such, it is essential to prepare a complete documentation to shorten the process. The JBO is closed and Construction License is cancelled right after the completion of the project. All requirements were achieved on time or ahead of schedule.

Pressure Cap


Sapura 3000 main crane performed lift 11; Module 7

Achievements/Results

The Iwaki Platform Decommissioning Project was SapuraAcergy's maiden decommissioning project. Some key facts include:

- Approximately 276,500 manhours were expended onboard the Sapura 3000
- The total vessel duration was 92 days, of which approximately 60 days were on site. This was two days longer than planned
- Seven critical path weather days were incurred
- Zero lost time incidents were incurred
- Invaluable experience has been gained from the Iwaki decommissioning project - this shall enable SapuraAcergy to execute even more challenging projects in the future, with confidence we shall deliver.