A BHA with Integrated Casing Cutting and Fishing Tools Applied in Offshore of Well Abandonment

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ABSTRACT

This paper introduces a BHA with integrated casing cutting and fishing tools applied in offshore operations of well abandonment. This kind of tool systems successfully applied in an offshore project of permanent abandoned wells. The advantage of the system is the combination of both cutting and fishing operations, and thereby the completion of the both operations implemented in one string tripping. The benefit through the application of this novel combination could be of reducing numbers of make-up of BHAs and tripping. Therefore, the operation process is simplified, and the operation efficiency and reliability are significantly improved.

KEY WORDS: Well Abandonment; Casing; Cutting and Fishing; Make-up; BHA; Technology.

INTRODUCTION

More and more high levels for further development of offshore exploration technology, it is necessary for the company to promote the efficiency of abandonment of offshore wells. All the exploration wells obtained the required reservoir data, production wells completed, the production life of offshore oil and gas fields must be permanently abandoned. It is to eliminate their potential threats on the environment. Dong and Wang (Dong and Wang, 2011) raised similar proposal that a critical process utilized in well abandonment is the cutting and recycling of casing pipes.

It is particularly important to apply appropriate cutting and fishing tools through controlling reasonable cutting parameters, to ensure the casing pipes cut and recycled quickly and efficiently because of the high cost of offshore operations. Traditional method of casing pipe cutting and recycling requires that the cutting is performed under the state of drill string compression, and that the tripping out is implemented after cutting. Finally, the fishing spear drilling tools run down for casing pipe fishing in the wells. Although the tools and technical performances are stable using the traditional method, it takes a long time. In addition, misjudgment and repeated operations could take place from time to time and therefore, it would be difficult to get the costs to strictly control within the specified budget.

In order to improve the operation efficiency and reliability, this paper puts forward a program of deploying integrated tools for a 244.5mm diameter casing pipes for the cutting and fishing operations, and develops corresponding construction technology to facilitate it. The program aimed at the permanent abandonment project of so-and-so wells. The tools are able to perform the cutting of the casing pipes as long as the pipes are in tension state, and simultaneously can complete fishing operations in one go. Presumably, the developed tools improve the operations efficiency, reduce the operation time, and cost considerably.

ABANDONED WELL STANDARD

In accordance with the relative standards and regulations of offshore abandonment operations for offshore wells, all the casing pipes within 4.0m below the seabed mudline must be cut and recycled for permanent abandoned wells, which is discovered in ("Code for Abandoned Wells for Offshore Oil" Enterprise Standard Q/HIS 2025-2010 of China National Offshore Oil Corporation). For abandonment operations of offshore permanent wells, the casing pipes of diameter 244.5mm are often the first layer of the cutting and recycling casing.

STRUCTURES AND PRINCIPLE OF HYDRAULIC CUTTER

The cutting tools of casing pipes commonly used in offshore operations are hydraulic cutters, which consist of a top joint, body, piston, piston pipe, spring wear-resistant bushing, cutting blade, nozzle, hinge pin, etc.

The high-pressure mud pumps drilling fluid or seawater into the hydraulic cutter body. The pressure drop generated by the nozzle in the piston pushes the piston compression spring, which in turn pushes the piston rod downwards. Subsequently, the lower end of the piston rod pushes the three cutting blades outwards to open and contact with the inner walls of the casing pipes, the opened cutting blades rotate

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