ABSTRACT

Many offshore platforms have been developed in the offshore fields in Indonesia since 1969. National authorities in Indonesia stated that the existing platforms required the performance of underwater inspection on a regular basis. However, underwater inspections are very costly. Hence, this paper proposed Risk-based Underwater Inspection (RBUI) analysis as a highly effective method of conducting underwater inspections. The analytical approach was adopted from the American Petroleum Institute Recommended Practice for Structural Integrity Management of Fixed Offshore Structures in which a mix of quantitative analysis and qualitative analysis methods were used. The analysis generated the Probability of Failure (PoF) and the Consequence of Failure (CoF) that were subsequently required to determine the risk level of a platform. Additionally, the exposure level was also categorized for each platform based on its consequence category and life safety aspects. The usage of a combination of risk levels and exposure categories resulted in different inspection intervals for each platform. In this study, only characteristic factors were used for the PoF calculation. The condition factors were accounted for in the anomaly treatment. Hence, the RBUI analysis for 14 fixed platforms in West Madura Offshore resulted in an inspection plan that accentuated safety, but also had a longer interval when compared with the previous time-based methods.

KEY WORDS: Risk-based underwater inspection; fixed platform; assessment; integrity; inspection intervals

INTRODUCTION

The first offshore platform in Indonesia was built in 1969. Since then, there was a tremendous increase in the number of offshore platforms. Previously, based on Minister of Mining Regulations no. 05 /P/II/PERTAMBANGAN/1997 (1977), Indonesian authority necessitate regular inspections of all oil and gas offshore platforms in which minor, major, and complete inspections require annual, biennial, and four-year inspection periods, respectively.

The decline in oil prices since 2014 has forced most oil companies to cut costs. Indonesian companies are not an exception to this matter. The implementation of the risk-based underwater inspection (RBUI) is an alternative to traditional cost cutting methods in underwater inspections. Therefore, a new regulation recommends instead of the conventional time-based method, the inspection should be performed by a risk-based method that considers the risk level of the offshore platforms.

To achieve the two previously discussed objectives, namely, complying with the new regulations and minimizing the inspection costs, the RBUI was developed by adopting the methodology from the American Petroleum Institute Recommended Practice for Structural Integrity Management (API RP 2SIM), American Petroleum Institute Recommended Practice for planning, designing and constructing fixed offshore platforms-working stress design (API RP2A-WSD), and the standard guidelines for owner safety and risk acceptance.

DeFranco et al., (1999) describe RBUI system and demonstrate its use through ranking of an example fleet of platforms. The ranking process was upon the likelihood of failure (structural characteristics, structural conditions, etc.) and consequence of failure (safety, environment, business interruption). O’Connor et al (2005) discusses the history and development of the Structural Integrity Management (SIM) process, and develop the SIM strategy for BP in the Gulf of Mexico through integration of the SIM process within the wider operations of the Business Unit. Puskar et al (2006) summarizes the proposed API RP