

Experience from Operation, Inspection and Condition Monitoring of Offshore Pipeline Systems on the Norwegian Continental Shelf

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ABSTRACT

The Norwegian Petroleum Directorate (NPD) possesses a computer database called CODAM (CORrosion and DAMAge Database) in which incidents and damages on structures, risers and pipelines are registered. The reporting to the CODAM database is part of the requirements stated in regulations relating to loadbearing structures and regulations concerning pipeline systems. The regulations state that the different operators shall submit an annual summary report for each pipeline system and load carrying structure. The summary report provides the results from the inspection and condition monitoring of the different pipeline systems and structures. This paper will only cover incidents to pipelines and risers.

Today, approximately 5400 km of gas pipelines, approx. 920 km of oil pipelines and approx. 580 km of pipeline with other media, like condensate, water or glycol, exist on the Norwegian Continental Shelf. The above mentioned lengths of pipelines include all kinds of different systems from large diameter export pipelines ending in Germany, United Kingdom, Norway, Belgium and France to small diameter pipelines and risers between subsea structures and offshore installations as well as in between different offshore installations. Approximately 2200 incidents and damages to these pipeline systems have been reported to CODAM. We divide the reporting incidents in three different categories; major, minor and insignificant.

The intention with this paper is to provide an overview of different incidents and occurrences related to offshore pipeline systems on the Norwegian Continental Shelf, based on the information available in CODAM. The types of incidents available are in general very different and include for instance causes of loss of containment, corrosion attacks (both internally and externally), free spans exceeding the design criteria, upheaval buckling, scratchmarks, dents, cracks, horizontal deflections etc. A description of the types of incidents and damages will be presented and some explanation will be provided. Also different statistics will be presented. The paper describes incidents, which have occurred during the period 1975 - 1996.

All the statistics will be presented in an anonymous form.

KEY WORDS

Pipelines, risers, incidents, inspection, condition monitoring, offshore, damages

DEFINITIONS

Pipeline system: Submarine pipelines and risers transporting hydrocarbons and other commodities, with associated safety systems, valves, tool launchers/receivers, corrosion protection systems and other accessory equipment.

Submarine pipeline: That part of the pipeline system which is buried in, rests on or which is stored above the sea bed.

Riser: That part of the pipeline system which extends from the submarine pipeline up to and including launcher and receivers of tools for internal maintenance or inspection.

Zone 1: That part of the pipeline system which is located outside a distance of at least 500 meters from installations.

Zone 2: That part of the pipeline system which is located outside a distance of at least 500 meters from installations.

INTRODUCTION

As mentioned earlier there is an extensive network of pipeline systems on the Norwegian Continental Shelf. This network has developed gradually from the early start in 1975 with laying of the first pipeline systems at the Ekofisk field. From the end of 1980's and until today, there has been a rapid development of large diameter pipeline systems both ending in Norway and at the Continent. In addition there is an extensive network of infield pipeline systems connecting the different fields together. Recent developments use more and more flexible pipelines and risers. Typical examples are the Troll B and Draugen development. Both of them have an extensive network of flexible pipelines and risers.

NPD's regulations have a requirement in our regulations regarding an annual condition report for each pipeline system. This requirement is stated in section 10 in Regulations concerning pipeline systems in the petroleum activities. The regulation state that an annual summary report shall be submitted to the Norwegian Petroleum Directorate in respect of