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B١٥٢١٤

STUDY OF DUCTILE IRON WATER PIPES CORROSION UNDER KUWAIT ENVIRONMENT

M. Sc. THESIS BY

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إدارة الجامعة
المكتبة المركزية
بنها

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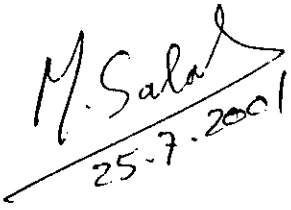

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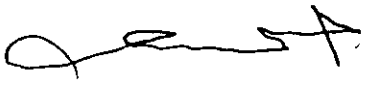

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ABSTRACT

ABSTRACT

Pipelines are generally externally protected against soil-side corrosion by a combination of protective coatings and impressed current cathodic protection. For the protection of the internal area of the pipelines, depending upon the corrosive tendency of the process fluids, corrosion control measures are adopted in the form of inhibitor dosing.

Considering the inherent hazard posed in the event of the failure of pipelines, corrosion monitoring of the external and internal surface is necessary for pipelines in spite of the fact that proper corrosion control measures like protective coating and cathodic protection have been implemented. Monitoring is required to ensure that all sections of pipelines are protected against corrosion (external and internal). It is also to assess the performance level of various control measures, and to thereby ensure that the corrosion prevention systems, e.g., the cathodic protection and protective coating, are performing adequately as intended and affording complete protection.

Various causes of pipeline failures are discussed, and the methods for ensuring the safety and integrity of a system are described in detail. The capabilities and limitations of various techniques in use for monitoring the effectiveness of corrosion protection systems and for assessing the health of pipelines are discussed based on practical experience and established practice in the industry.

The thesis investigates the corrosion of ductile iron pipe under Kuwait environment. Experiments cover pipes used on both fresh water transport and sewage. The study emphasized that under normal coating condition, corrosion in most of the tested pipes is within the allowed limits that recommended by the different standards.

The work has been extended to the study both adhesion and abrasion resistance especially for pipes used for sewage transport. This is because that such mechanisms of wear will affect the efficiency of pipe coating. Therefore, corrosion rate will exceed the allowed standard level.

Recommendations for selection of a particular coating for both pipes applications for water pipe it is suggested to use epoxy internal lining while sewage pipes is better to be lined with pure Polyurethane.

CHAPTER I

LITERATURE REVIEW

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LITERATURE REVIEW

1.1 Introduction

A pipeline is generally externally protected against soil-side corrosion by a combination of protective coating and impressed current cathodic protection. For protection of the internal area of a pipeline, depending upon the corrosive tendency of the process fluids, corrosion control measures can be adopted in the form of inhibitor dosing.

External corrosion protection coating is made up of an inner layer of fusion-bonded epoxy and an outer layer of yard-applied, hot, extruded polyethylene (PE) coating with a total thickness of 4 mm, or coal tar enamel coating (4-5 mm thick). Impressed current cathodic protection consists of the required rectifier station with permanent anode groundbeds located at predesigned intervals along the pipeline.

Considering the inherent hazard posed in the event of the failure of pipelines, corrosion monitoring of the external and internal surface is a necessity for pipelines in spite of the fact that proper corrosion control measures, like protective coatings and cathodic protection have been implemented. Monitoring is required to ensure that all the sections of pipelines are protected against corrosion (external or internal) and also to assess or monitor the performance of various control measures, and to thereby, ensure that the corrosion prevention systems, e.g., the cathodic protection system and coating, are performing adequately as intended and affording complete protection.

Gas sweetening, in the case of sweetened natural gas high-pressure pipelines, does not preclude the chance of internal corrosion due to the fact