AMERICAN PETROLEUM INSTITUTE

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Identification, Repair, and Mitigation of Cracking of Steel Equipment in Fuel Ethanol Service

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Usage of fuel ethanol as an oxygenate additive in gasoline blends is increasing both in the United States and internationally. This document discusses stress corrosion cracking (SCC) of carbon steel tanks, piping, and equipment exposed to fuel ethanol as a consequence of being in the distribution system, at ethanol distribution facilities, or end user (EU) facilities where the fuel ethanol is eventually added to gasoline. Such equipment includes but is not limited to:

— storage tanks,
— piping and related handling equipment, and
— pipelines

that are used in distribution, handling, storage, and blending of fuel ethanol. However, data for pipelines in ethanol service is limited and caution should be used when applying guidelines from this document that have been derived mainly from applications involving piping and tanks in ethanol storage and blending facilities. SCC of other metals and alloys is beyond the scope of this document, as is the corrosion of steel in this service.

It is realized that SCC of steel in fuel ethanol is a topic where knowledge of the subject is actively growing through documentation of recent experience and through research in progress. This document deals with handling of cracks in existing equipment and reduction of SCC occurrence in new equipment as a result of exposure to fuel ethanol per ASTM D4806 (or other international specifications), ethanol fuel blends, and pipeline transmixes involving fuel ethanol and conventional hydrocarbon fuels (gasoline, diesel, or jet fuel). It includes guidelines for carbon steel construction materials, including their fabrication, inspection, and repair to help assure safe and reliable operations.

This document is based on current engineering practices and insights from recent industrial experience and research. Older equipment may not conform exactly to the information contained herein, but this does not imply that such equipment is being operated in an unsafe or unreliable manner. It is also recognized that facilities may vary and may need to be modified depending on specific operating conditions, inspection, and maintenance experience. Each user company is ultimately responsible for its own safe and reliable operations.

The steels referred to in this document are defined by the ASTM or API designation systems or equivalent steel grades contained in other recognized codes or standards. Welded construction is considered the primary method of fabrication in equipment exposed to fuel ethanol.

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Contents

Page

1 Scope . . . 1

2 Normative References . . . 1

3 Terms, Definitions, Acronyms, and Abbreviations . . . 3
3.1 Terms and Definitions . . . 3
3.2 Acronyms and Abbreviations . . . 4

4 Background on SCC in Fuel Ethanol . . . 5
4.1 Description of Fuel Ethanol . . . 5
4.2 Relevant Standards for Fuel Ethanol . . . 5
4.3 Supply Chain for Fuel Ethanol . . . 6
4.4 Significance of SCC in Fuel Ethanol . . . 7
4.5 Factors Related to SCC . . . 10

5 Guidelines for Fabrication of Equipment . . . 13
5.1 Materials of Construction . . . 13
5.2 Tank Foundations . . . 15
5.3 Fabrication of Tanks . . . 15
5.4 Fabrication Guidelines to Minimize SCC . . . 16
5.5 Specific Guidelines for Minimizing SCC in Various Components . . . 16
5.6 Guidelines for PWHT . . . 17
5.7 Organic Coatings for Internal Protection of Tanks . . . 18

6 Inspection of Existing Equipment . . . 19
6.1 General . . . 19
6.2 Inspection Intervals . . . 19
6.3 Inspection After Leakage Caused by SCC . . . 20
6.4 Initial Inspection Without Leakage . . . 20
6.5 Examination Procedures for Identification of SCC . . . 20

7 Repair of SCC Damaged Equipment . . . 23
7.1 General . . . 23
7.2 Assessment of Fitness-for-service and Risk . . . 23
7.3 Temporary Repair by Clamps and Patches . . . 23
7.4 Crack Repair . . . 24
7.5 Stress Relief Heat Treatment Applied to Piping and Components . . . 24
7.6 Coatings . . . 25

8 Monitoring of Fuel Ethanol . . . 25
8.1 Sampling and Analysis of Fuel Ethanol . . . 25
8.2 Methods for Monitoring and Testing for Corrosion and SCC . . . 25

Annex A (informative) **Listing of Reported Cases of SCC in Fuel Ethanol and Remedial Measures** . . . 26

Annex B (informative) **Form to Submit New Information on SCC in Fuel Ethanol Systems** . . . 32

Annex C (informative) **Examples of Typical SCC in Fuel Ethanol** . . . 34

Bibliography . . . 42

Contents

Page

Figures

C.1 SCC in Steel Tank Bottom 34
C.2 SCC in Steel Air Eliminator Vessel 35
C.3 Leak in Piping Resulting from a Crack Adjacent to the Weld 36
C.4 Characteristics of SCC in Steel Exposed to Fuel Ethanol, Showing Multiple Crack Initiations and Through-thickness Propagation in Piping 36
C.5 SCC in Steel Tank Bottom Showing Highly Branched, Intergranular Cracks at 100X 37
C.6 SCC in Steel Metallographically Prepared with Grain Boundary Etch at 500X 37
C.7 SCC in Steel Pipe from a Loading Rack Supply Line 38
C.8 Cracking of Another Pipe Sample from Same Situation as Noted in the Previous Figure 39
C.9 SCC of Steel Piping in a Fuel Ethanol System Return Line/Tank Transfer Line 40
C.10 Same SCC Incidence Shown in Previous Figure 41

Tables

1 Quality Specification for Fuel Ethanol per ASTM D4806 6
2 Generally Compatible and Incompatible Polymeric Materials 15