STEM-Corrosion™

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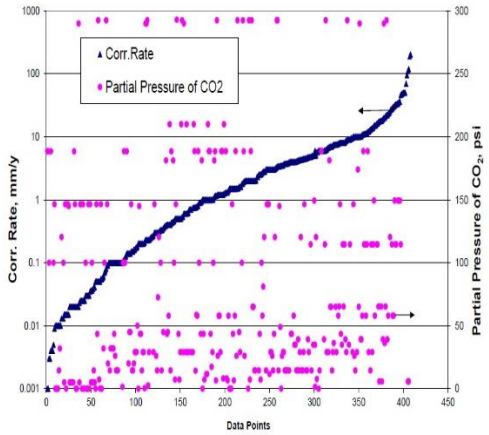
Laboratory Test = Zoo or Rehabilitation Centre?



Animals live and survive in the wild under variety of challenging conditions. Only when they are in distress or injured, they need to be kept in rehabilitation centers. The conditions of the rehabilitation centers should be as close as possible to that of wild so that the natural habits of the animals are not changed. On the other hand, animals kept in zoos lose their natural instinct and survival skills. Consequently, they are never returned to wild, or they would die within short period of being released in the wild.

Similarly, laboratory tests should simulate field operating conditions as much as possible so that corrosion mechanisms and corrosion rates in both laboratory and field are same. Laboratory results are reliable only when they are carried out using appropriate equipment that simulate field operating conditions, by trained and qualified technicians, and the repeatability (what is the variability if the same test is repeatedly carried out using same equipment by the same operator) and reproducibility (what is the variability if the same test is carried out using similar equipment by multiple operators) are understood.

Conducting the laboratory tests without understanding these concepts would result in data that show large variations even in simple system such as sweet corrosion (see Figure) and models and software products developed based solely on such laboratory tests would fail and have failed in the field.

Software products, STEM_Risk_Pipeline™, iFILMS™ and Expedition™ were developed based on correlation between laboratory and field data and analysis of field data and, hence, are effective tools to predict and control corrosion in the oil and gas industry.

Top Influencer of This Newsletter:

Russell D. Kane

My Story

I am a materials and corrosion consultant with over 40-years of experience in materials evaluation, selection, and specification for a wide variety of end-user industrial applications with an emphasis on oil and gas production and petroleum refining with ancillary contributions in areas of chemical processing, transportation, and aerospace. This body of work has culminated in over 200 technical publications, books, and patents along with participation in technical standards writing activities for NACE (AMPP), ASTM, ISO and API.

My Style

Much of my professional career has been focused on utilizing my knowledge of material structure-property relationships to fill the gaps between materials research and corrosion engineering. My work has utilized laboratory testing, corrosion modeling and field corrosion monitoring to develop and define corrosion and environmental cracking (HEC, SCC, LME) operating envelops that define the limits of existing and newly developed materials in applications with exposure to hydrogen sulfide, carbon dioxide, naphthenic acid, high-pressure and cathodic hydrogen, alkaline sour water, fuel grade ethanol, and amine solvents.

Greatest Contribution

My greatest contribution was the ability to provide effective solutions for materials selection and corrosion prevention using simulated corrosion data and/or predictive software. This approach, once questioned, became the standard in the petroleum industry to provide enterprise-distributed tools for companies to use for corrosion assessment, and definition of operating envelops for materials of construction.

Pinnacle Moment

My pinnacle moment has been in a state of flux my entire career starting with my early days working at Exxon where I pioneered the use of high strength steels and highly alloyed corrosion resistant alloys in sour oil and gas applications. This work has continued to evolve with the development of predictive software tools to improve the selection of these alloys. Twenty years later, my attention was turned to refinery applications involving exposure to naphthenic acids and I was successfully able to provide data and predictive software to aid in

materials selection. Later still, my attention was shifted to the problem of SCC of steel in fuel grade ethanol where I was able to develop guidelines for prevention and mitigation of SCC.

Advice to Industry

As material and corrosion problem solvers, we need to continue to evolve new and more modern tools that bring quicker and more direct solutions for corrosion assessment and mitigation. To do this, we need people to develop a good working knowledge of corrosion science fundamentals while staying abreast of the needs of industry. These must be combined with an inquisitive spirit seeking out new technical advances that can be applied to reducing both corrosion failures and the overall costs of corrosion to major industry sectors.