Objective

The objective of the EADN Report is to provide guidance for those needing an introduction to the topic as well as an up to date review and bibliography.

This information is of interest to those people who are relative newcomers to this field, who may not be completely up-to-date on (a) the phenomenology and mechanisms of the various modes of degradation and (b) the effect of various interactions of material, environment and, in many cases, stress on the extent of degradation. Such information is relevant to the development and implementation of effective mitigation actions which impact on the specifications for materials procurement, mitigation methods applied in service and water chemistry.

The EADN Report covers the range from basic information to current plant experience. The EADN Report is written and explained in such a way that those not familiar with the topic can easily follow and can find and grasp the appropriate information.
Contents:

1. Introduction and background
   1.1 Scope of report
   1.2 Historical overview of environmentally-assisted degradation of nickel-base alloys

2. Physical metallurgy of nickel-base alloys
   2.1 History of development of nickel-base alloys
   2.2 Nickel-base alloys in water cooled nuclear reactors
      2.2.1 Relationship between nickel-base alloys, carbon & low alloy steels, and SSs
      2.2.2 The rationale for the initial choice of nickel-base alloys for use in LWRs
      2.2.3 Wrought nickel-base alloys
      2.2.4 Nickel alloy weldments
      2.2.5 Dissimilar metal welds
      2.2.6 Precipitation hardened nickel-base alloys

3. Corrosion basics of nickel-base alloys
   3.1 Corrosion potentials in LWR primary circuits
      3.1.1 PWR primary circuit
      3.1.2 PWR secondary circuit
      3.1.3 BWR primary circuit
      3.2 General corrosion
      3.2.1 Thermodynamics
      3.2.2 Surface oxide films

4. Laboratory and service experience of SCC of nickel-base alloys in BWRs
   4.1 Experience of IGSCC of nickel-base alloys in BWR plant
      4.1.1 Creviced components
      4.1.2 Uncreviced assemblies
      4.1.3 High strength components
   4.2 Chronology of SCC development
   4.3 Parametric dependencies for SCC of nickel-base alloys in BWRs
      4.3.1 Tensile stress
      4.3.2 Material
      4.3.3 Corrosion potential and temperature
      4.3.4 Dissolved anions and cations
   4.4 Mechanistic understanding
   4.5 Summary

5. IGSCC in primary PWR coolant (PWSCC)
   5.1 Field experience of PWSCC in Alloy 600 and weld metals
      5.1.1 Alloy 600 SG tubes
      5.1.2 Thick section Alloy 600 components
   5.2 PWSCC of nickel-base weld metals
   5.3 Laboratory studies of PWSCC of Alloy 600 and weld metals
      5.3.1 Hydrogen partial pressure and PWR primary water chemistry
      5.3.2 Temperature
      5.3.3 Stress, crack tip stress intensity and strain rate
      5.3.4 Microstructure of Alloy 600
      5.3.5 Cold work
      5.3.6 Weld composition and microstructure
      5.3.7 Weld residual stress and weld defects
      5.3.8 Influence of weld surface finish
5.4 Empirical models for Alloy 600 component life prediction
5.5 Mechanisms of PWSCC of Alloy 600 and weld metals
5.6 Mitigation of PWSCC in Alloy 600 and weld metals
5.7 PWSCC of high strength nickel-base alloys

6. Degradation of Alloy 600 SG tubes in secondary PWR coolant
   6.1 Operating experience of IGA/IGSCC
   6.2 Comparison with Alloy 800 operating experience
   6.3 Local environments leading to tube degradation
   6.4 Degradation modes of SG tubes on the secondary side of SGs
       6.4.1 Thinning or wastage
       6.4.2 Denting
       6.4.3 Pitting
       6.4.4 IGA/IGSCC and TGSCC
       6.4.5 Mechanical damage
       6.4.6 Distribution of damage modes in SGs
   6.5 IGA/IGSCC of Alloy 600 – laboratory results
       6.5.1 General trends of IGA/IGSCC in concentrated prototypical environments
       6.5.2 IGA/IGSCC in caustic environments
       6.5.3 IGA/IGSCC in acidic to slightly alkaline sulphate + chloride environments
       6.5.4 IGA/IGSCC in “complex” near neutral environments
       6.5.5 Corrosion in “contaminated” (“doped”) steam
       6.5.6 Corrosion by low valence sulphur environments
       6.5.7 Degradation of Alloy 600 in environments containing lead (PbSCC)
       6.5.8 Modelling IGA/IGSCC of Alloy 600
   6.6 Mitigation of secondary side corrosion of SG tubes
       6.6.1 Water chemistry
       6.6.2 SG design
       6.6.3 SG tubes

7. Alloy 690 and associated weld metals
   7.1 Specifications
       7.1.1 SG tubes
       7.1.2 Pressure vessel nozzles
       7.1.3 Other Alloy 690 thick components
   7.2 Manufacturing
       7.2.1 SG tubes
       7.2.2 SGs
       7.2.3 Pressure vessel nozzles
   7.3 Field experience
   7.4 Laboratory test results
       7.4.1 PWR primary water
       7.4.2 PWR secondary side of SG tubes

8. LTCP

9. Impact of degradation of Nickel-Base Alloys on LWR water chemistries
   9.1 PWR primary system chemistry guidelines and corrosion control
   9.2 PWR secondary system chemistry guidelines and corrosion control
   9.3 BWR reactor coolant system chemistry guidelines and corrosion control
The Authors

Dr. Peter Scott received his B.Sc. in chemistry from the University of Sheffield in England in 1965 and then his Ph.D. in physical chemistry from the same university in 1968. He spent two years as a Post Doctoral Fellow in the Department of Applied Chemistry of the National Research Council of Canada before starting his career in the nuclear industry in the Materials Development Division at the Harwell Laboratory of the UKAEA. During 18 years at Harwell, he became a section head and a recognised expert in corrosion of metallic materials, particularly concentrating on the phenomena of corrosion fatigue and stress corrosion cracking in thermal and fast reactor systems. He entered the Framatome Group (now AREVA NP) in 1989 and was named ‘Expert Principal’ (or Senior Corrosion Consultant) in 1993 and AREVA International Expert in 2003. In this capacity, he represented the company on several international working groups dealing with problems of stress corrosion cracking of materials mainly in light water reactors.

During his period with Framatome/AREVA NP he also served as a member of the editorial board of the NACE Corrosion Journal. He is the author or co-author of over 100 scientific publications and in 2000 he received the F. N. Speller Award from the NACE for outstanding contributions to the practice of corrosion engineering.

Dr. Pierre Combrade received his first degree from the Ecole Nationale Supérieure des Mines de Paris, in 1967 and earned his doctorate degrees with a thesis on solidification of refractory eutectic alloys for aero engine turbine blades in 1972.

He spent 22 years in Creusot-Loire (then Usinor) company where he was involved in the study of stress corrosion cracking and localised corrosion of corrosion resistant alloys as well as in the development of a laboratory devoted to the study of corrosion problems in light water reactors. With his team, he joined FRAMATOME (now AREVA NP) in 1994 as Head of the “Corrosion and Chemistry Department” in the Technical Center in Le Creusot and, since 2003, was an AREVA “International Expert”. He retired from AREVA NP in January 2007.

His main field of activity regarding light water reactors are:

- IGSCC of Ni-base alloys in caustic solutions, and in primary and secondary PWR coolants.
- Corrosion-fatigue of low alloy steels.
- Oxidation of Ni-base alloys in high temperature water.
- Formation of deposits in high temperature water.
- Electrochemistry in high temperature water.

He is the author of over 50 technical papers and several reviews as well as book chapters on stress corrosion cracking and crevice corrosion. He is co-author of a book of metallurgy published in 1997 and re-edited in 2002.

He has also been involved in teaching activities in the Ecole des Mines de Paris and in the Ecole des Mines de Saint Etienne, as well as directing several thesis students working on SCC, oxidation in HT water and fretting-corrosion problems.
Dr. Peter Ford received his doctoral degree from Cambridge University. He has been associated with the nuclear power industry for over 35 years with a focus on, first, understanding the factors controlling materials degradation and then, developing mitigation methods. He worked initially with the Central Electricity Generating Board (UK) and then for 23 years with the General Electric Corporate Research and Development Center (GE-CRD) where he was manager of the Corrosion Mitigation and Coatings Laboratory. This laboratory interacted closely with General Electric Nuclear Energy, with seminal contributions to a wide range of materials-related problems including: Choice of structural materials for current and future reactors; Fuel cladding degradation; Radioactivity build-up; Life prediction codes for environmentally-assisted cracking of materials both in and out of core; Water chemistry mitigation methods including Noble Metal Technology and finally, underwater repair and cladding techniques. Since retirement from GE, he served for 4 years as a member of the Advisory Committee for Reactor Safeguards at the US Nuclear Regulatory Commission.

Dr. Ford is active in various societies and international cooperative groups in the field of nuclear materials degradation, including consultancies with reactor vendors, utilities, universities and national labs, etc. He has authored or co-authored 90 papers and patents and is a Fellow and recipient the Willis Rodney Whitney Award from NACE International for “outstanding contributions to the science of corrosion”.

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