Reading List for New Corrosion Engineers in the Nuclear Industry

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Prepared by: ICorr CED Nuclear Corrosion Working Group
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Our Reference
ICorr/CED/002 Issue 1 Draft A

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Front cover images (left: Dungeness-B Power Station; right Hunterston B View) courtesy of British Energy Group plc.

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<tr>
<td>Approved by</td>
<td>###, Chair of Corrosion Engineering Division</td>
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Executive Summary

This document has been prepared to provide a reading list of documents related to corrosion issues in the nuclear industry, for new entrants into the industry. It was prepared by the Nuclear Corrosion Working Group of the Institute of Corrosion's Corrosion Engineering Division.
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1 Introduction

This document was prepared by the members of the Nuclear Corrosion Working Group of the Institute of Corrosion's Corrosion Engineering Division. The aim of preparing the document was to compile a list of references and sources of information that new entrants to the industry can use, whilst be a valuable resource for more experienced corrosion engineers. The aim is for it to be a live document, which develops over time with input from members of the nuclear corrosion working group.

2 Introduction to corrosion


3 Corrosion during nuclear fuel manufacture

4 Corrosion in nuclear power stations

4.1 General nuclear corrosion


4.2 Water-cooled reactors

4.2.1 Primary water chemistry


4.2.2 PWR water chemistry

4.3 Gas-cooled reactors

Gas chemistry in nuclear reactors

4.4 Boiler chemistry

4.5 Radiation chemistry

5 Corrosion during nuclear waste processing

5.1 Corrosion on reprocessing plant

6 Corrosion during nuclear waste storage and disposal

6.1 Corrosion during pond storage

6.2 Corrosion during dry storage

6.3 Corrosion during waste disposal

6.3.1 Surface storage

6.3.2 Corrosion in a geological disposal facility


7 Types of corrosion affecting nuclear facilities

7.1 Localised corrosion

7.1.1 Pitting

7.1.2 Crevice corrosion

7.1.3 Stress corrosion cracking

7.2 Microbially influenced corrosion


7.3 Radiation-induced corrosion


7.4 Galvanic corrosion
7.5 Erosion corrosion

7.6 Hydrogen embrittlement

7.7 Flow-assisted corrosion


7.8 Marine corrosion


Copper Alloys for Marine Environments, Copper Development Association, Publication 206. 2011

8 Corrosion of specific metals and alloys during nuclear operations

8.1 Carbon steel

8.2 Cast iron

8.3 Stainless steels


8.4 Nickel alloys

8.5 Titanium

8.6 Copper and copper alloys
9 Corrosion affecting specific types of nuclear equipment

10 Modelling corrosion in nuclear applications

11 EDF Energy recommended reading

11.1 Technical advice on corrosion engineering


11.2 Assessment and management of seawater corrosion

- *ASME Handbook on Water Technology for Thermal Power Systems*, Chapter 9
- A.D. Mercer, *Corrosion in Seawater Systems*, Ellis Horwood

12 Other sources of information

12.1 Trade associations, manufacturers

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<tr>
<td>Nickel Institute</td>
<td><a href="http://www.nickelinstitute.org/">http://www.nickelinstitute.org/</a></td>
<td>Range of downloadable reports on corrosion of stainless steel.</td>
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<tr>
<td>British Stainless Steel Association (BSSA)</td>
<td><a href="http://www.bssa.org.uk/">http://www.bssa.org.uk/</a></td>
<td></td>
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<tr>
<td>Outukompu</td>
<td><a href="http://www.outokumpu.com/en/Pages/default.aspx">http://www.outokumpu.com/en/Pages/default.aspx</a></td>
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12.2 Waste management organisations

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<tr>
<td>NACE</td>
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<td>COR-AB database holds many corrosion abstracts</td>
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<td>Australian Corrosion Association</td>
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12.4 Bibliographic databases

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13 Suppliers of corrosion services to the nuclear industry


National Nuclear Laboratory: [http://www.nnl.co.uk/](http://www.nnl.co.uk/)
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