Nuclear Training Course 228
TIMS Ref. 22008

Materials

June 1993

ABSTRACT OF CURRENT REVISION

June 1993 ⇔

Revision number removed from page bottoms and placed at end of each module with revision date. Answer lines removed from assignment questions. Minor rewording of some questions required as a result.

Module 2,	Page 8	Changed "inelastic" in first summary point to"anelastic" – the proper term.
Module 4,	Page 2	Footnote added to define F–centre as Farbe centre.
	Page 3	Further explanation included in first footnote.
	Page 6	Example of neutron capture by Cobalt 59 added. Two footnotes added to indicate reference material.
	Page 7	Clarified explanation of soap–based binder in grease.
	Page 8	Clarified explanation of radiation damage to plastic. Last sentence on page reworded.
	Page10	Clarified details of two types of water in concrete .
Module 5	Page 4	Reworded first sentence of second last paragraph.
	Page 6	Clarified explanation of pressure tube cracks at Bruce unit 2.
	Page 7	Reworded statement on hydrogen pick–up in pressure tubes. Two footnotes added.
	Page 8	Footnote added to explain principal stress in tube. Principal stress direction added to Figure 5.4. Term "platelets" removed from caption in figure.
	Page 9	Information on DHC prevention added from 233–6. Oxygen addition explanation clarified.
	Page 10	Oxygen addition explanation clarified. Footnote added. Hydrogen addition explanation clarified.
	Page 11	Last summary statement reworded to reflect change on page 9.
	Page 12	Summary statements reworded to reflect changes on pages 9 and 10.

ABSTRACT OF PREVIOUS REVISION

August 1992 ⇔

Format changed to current standard. Added abstracts of current and previous revision. Added introduction module to the course. General revision to correct grammatical errors. Minor changes made for clarity. Summaries of key concepts added throughout.

Module 1, Page 2	Definition of strength and stress clarified.
Page 5	Figure 1.4 added to illustrate permanent deformation.
Page 10	Added description of hexagonal, close–packed crystal structure of metals.
Page 13–14	Questions reworded to match objectives.
Throughout	Captions added to all Figures.
Module 2, Page 1	Divided some objectives into separate statements.
Page 3	Footnote added to refer reader to 234 course for further information on turbine unbalance.
Page 6	Caption added to Figure 2.2.
Page 8	Added more information on use of ice plugs.
Page 8	Footnote added regarding location of ice plugs.
Page 9	Clarification of design and maximum allowable working pressures. footnote added.
Page 15	Footnote added to indicate pressure tube creep is discussed in a later module of the course.
Page 20	Added question to address objective 2.7.
Module 3, Page 1	Restated objective 3.2. The intent of the original objective remains.
Page 2	Deleted module introduction.
Page 5	Deleted reference to early pressure tubes at NPD from pressure tube discussion. No longer relevant.
Page 6	Footnote added to refer reader to a later module for more information on DHC.
Page 6	Footnote added to explain a material designation.
Page 7	Footnote added to refer reader to 224 course for more information on corrosion control.

NOTES & REFERENCES

Module 3, Page 12	Added question to address objective 3.2.
Module 4	Rewritten to be relevant to training needs of SSITs and ANOITs. Original objectives, except for 4.5 c) have been retained. Objective 4.5 c) referred to radiation damage to electronic components. These items are not intentionally exposed in CANDU units.
Module 5	Rewritten to be current and technically correct. The intent of the original objectives has been adhered to.

June 1984 ⇔ Initial issue of course by A. Wadham.

NUCLEAR TRAINING COURSE 228

MATERIALS

TABLE OF CONTENTS

Module 228–0

INTRODUCTION TO THE COURSE

AUDIENCE AND PREREQUISITES

This course is for Authorized Nuclear Operators in Training (ANOITs) and Shift Supervisors in Training (SSITs) taking the conventional general part of their authorization training.

There is no prerequisite for this course.

COURSE CONTENTS

This course covers general material properties and the approach to material selection for CANDU reactors. It describes various failure modes of materials, both mechanical and radiation–induced. There is a complete module on pressure tube problems. A list of the major topics covered by the course is provided in the table of contents at the beginning of the course notes.