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October 12, 1979

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AUGUST-SEPTEMBER BI-MONTHLY STATUS LETTER: LWR PRESSURE VESSEL IRRADIATION SURVEILLANCE DOSIMETRY PROGRAM

The objective of this program is to make measurements in neutron fields ["Benchmark" and reactor "Test and Surveillance Regions"] for the subsequent validation/calibration of available state-of-the-art data and procedures of dosimetry and damage analysis for light-water reactor [LWR] pressure vessel [PV] steel test irradiation and surveillance programs. The task includes selection of the neutron fields, the validation/calibration of dosimetry and damage exposure and correlation procedures in these fields, and the establishment of a set of fifteen ASTM recommended standard practices, guides, and methods.

PROGRAM REVIEW AND DEFINITION

W. N. McElroy, G. L. Guthrie, and R. L. Simons of Westinghouse Hanford attended the IAEA Technical Committee Meeting on Accuracies in Correlation between Property Change and Exposure Data From Reactor Pressure Vessel Steel Irradiation held in Jülich, Germany, September 24-27, and will proceed from there to Ispra, Italy, to participate in the Third ASTM-Euratom Symposium on Reactor Dosimetry October 1-5, 1979. F. H. Ruddy will join this group in Ispra, Italy.

A number of manuscripts have been prepared for presentation at the Third ASTM-Euratom Symposium:

1. "Advances in SSTR Techniques for Dosimetry and Radiation Damage Measurements," R. Gold, J. H. Roberts, and F. H. Ruddy.

1215 108

2. "Reactor Gamma-Ray Spectrometry: Status," R. Gold and B. J. Kaiser.

3. "Solid State Track Recorder Measurements in the Poolside Critical Assembly," F. H. Ruddy, R. Gold, and J. H. Roberts.

4. "Development and Testing of Standardized Procedures and Reference Data for Light Water Reactor Surveillance," W. N. McElroy, R. Gold, E. P. Lippincott, J. A. Grundl, C. M. Eisenhauer, and E. D. McGarry.

5. "Statistical Analysis of the Effects of Chemistry Variations on Charpy Test Results for Irradiated Reactor Pressure Vessel Steels," G. L. Guthrie.

6. "Re-evaluation of Damage Functions for Changes in Ductile Brittle Temperature in Ferritic Steels," R. L. Simons.

TASK A - NEUTRON FIELDS

ORNL-PCA Dosimetry PV Mockup Validation/Calibration Studies

A schedule for irradiation of Solid State Track Recorders (SSTR) has been formulated for the 4/12 configuration at the Pool Critical Assembly (PCA) Pressure Vessel mockup. Mica SSTR and associated fission deposits have been assembled and delivered to ORNL for irradiation. These irradiations will provide data for more accurate assessment of exposures to be obtained in the longer irradiation of metallurgical specimens in a similar configuration in the PSF.

Dosimeter irradiations were made at the PCA reactor during the period 9/20-28/79. Analyses were made of Al and Ni dosimeters located at the front of the thermal shield (TSF), back of the thermal shield (TSB), and 1/4T positions in the 7/8 configuration; also Rh and In dosimeters located in TSF, TSB, 1/4T, 1/2T, 3/4T, and Void Box (VB) positions were irradiated in the 7/8 configuration. The analyses were performed by HEDL and MOL, and additional interlaboratory comparisons were made by submitting In and Rh dosimeters irradiated in TSF, 1/4T, and VB locations to EG&G Ortec for analysis. HEDL analyses were also made for In and Rh dosimeters irradiated in the TSF, TSB, Pressure Vessel Surface (PSF), 1/4T, 1/2T, 3/4T, and VB positions in the 12/13 configuration. Final reduction of the HEDL analytical data obtained from the various test configurations and locations has been started.

TASK C - DAMAGE EXPOSURE AND CORRELATIONS PROCEDURES

ORNL-PSF Metallurgical PV Mockup Validation/Calibration Studies

All HEDL dosimetry packages have been assembled and delivered to ORNL for insertion in the PSF experiment. Also, the metallurgical samples for joint

studies between Electric Power Research Institute (EPRI), Naval Research Laboratory (NRL), and Hanford Engineering Development Laboratory (HEDL) have been prepared and delivered. These specimens consist of compression plugs (NRL-HEDL and EPRI-HEDL), hardness-test specimen (EPRI-HEDL), and transmission electron microscopy disks (EPRI-NRL-HEDL).

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1215 110

LWR PRESSURE VESSEL IRRADIATION SURVEILLANCE

DOSIMETRY PROGRAM BI-MONTHLY STATUS LETTER

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L. D. Blackburn	W/A-40
D. G. Doran	W/A-57
R. Gold	W/C-39
G. R. Guthrie	W/C-39
B. R. Hayward	W/A-62
J. J. Holmes	W/A-58
L. A. James	W/A-40
R. L. Knecht	W/A-40
J. J. Laidler	W/JAD-8
E. P. Lippincott	W/C-39
W. N. McElroy (4)	W/C-39
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W. E. Roake	W/C-16
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T. A. Strom	W/A-21
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1215 111