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WANL-TME-1145

PRELIMINARY TEST SPECIFICATION FOR  
DOSIMETRY TEST EXPERIMENT RE-3.

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INFORMATION CATEGORY

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PRELIMINARY TEST SPECIFICATION FOR  
DOSIMETRY TEST EXPERIMENT RE-3

I. EXPERIMENT IDENTIFICATION

- |                            |            |
|----------------------------|------------|
| A. Test Plan Reference No. | RE-3       |
| B. Sponsor                 | WANL       |
| C. Testing Agency          | PBRF       |
| D. Test Date               | June, 1965 |

II. PURPOSE OF EXPERIMENT

To determine the spatial and energy distribution of the neutron flux in the W-2 capsule located in HT-1 of the Plum Brook Reactor.

III. DRAWINGS

- |   |  |
|---|--|
| A. Dosimeter                            | To be supplied in Final Test Specification |
| B. Test Details and Assembly            | To be supplied in Final Test Specification |
| C. Coolant Flow Path with Thermocouples | To be supplied in Final Test Specification |
| D. W-2 Capsule                          | To be supplied in Final Test Specification |

IV. EQUIPMENT LIST

- |   |                                   |
|---|-----------------------------------|
| A. To be provided by WANL Radiation Effects |                                   |
| 1. One sample fixture                       | 4. Two special dosimeter sets     |
| 2. One sample holder                        | 5. Four experiment thermo-couples |
| 3. 28 NSEC dosimeter sets                   |                                   |

B. To be provided by PBRF

None

#### V. TEST ENVIRONMENT

A. Temperature	125°F (Ambient water temperature)
B. Pressure	130 psi (Nominal water pressure)
C. Fast Neutron Flux	$2.3 \times 10^{13}$ n/cm <sup>2</sup> sec (E > 1 Mev)
D. Thermal Neutron Flux	$1.4 \times 10^{14}$ n/cm <sup>2</sup> sec (E < 0.48 ev)
E. Gamma Flux	$9.7 \times 10^{10}$ ergs/g(C)hr
F. Integrated Fluxes	
Neutron (fast)	$8.3 \times 10^{17}$ n/cm <sup>2</sup> (E > 1 Mev)
Neutron (thermal)	$5.0 \times 10^{18}$ n/cm <sup>2</sup> (E < 0.48 ev)
Gamma Flux	$9.7 \times 10^{11}$ ergs/g(C)
G. Fluid Environment	Test items submerged in coolant water
H. Duration	10 hours
I. Power Level	30 megawatts (constant power)
J. Controlling Bank Position	25 inches from core bottom

#### VI. ANALYTICAL

Analysis of the heating rate and radioisotope inventory will be supplied in the Final Test Specification.

#### VII. FACILITY REQUIREMENTS

A. Electrical	115 VAC
B. Pneumatic	None
C. Hydraulic	Primary Coolant Water

- |                      |      |
|----------------------|------|
| D. Special Fluids    | None |
| E. Special Shielding | None |

VIII. DATA HANDLING REQUIREMENTS

Data will be recorded manually by WANL personnel.

IX. TEST PROCEDURE

A. System Description

For the test under consideration, 28 NSEC dosimeter sets and two special dosimeter sets are attached with wrapping wire to a sample fixture and sample fixture tube. Each NSEC dosimeter set contains a sulfur pellet for fast flux measurement ( $E > 2.9$  Mev) and a cadmium-covered and a bare cobalt wire for epithermal ( $2.9 \text{ Mev} < E < 0.48 \text{ ev}$ ) and thermal ( $E < 0.48 \text{ ev}$ ) flux measurements. Each special dosimeter set contains a Ni foil and a U-238 foil in a cadmium cover, and a sulfur pellet. Each dosimeter set will be identified by number.

B. WANL Water Loop Test Procedure

Install the test fixture (sample fixture and sample holder) in the WANL water test capsule and establish a flow rate of 75 gpm for 10 hours.

C. Pre-Irradiation Test Procedure

Repeat the procedure described in Paragraph B above with the test fixture installed in the WANL (PBRF) test capsule.

D. Irradiation Test Procedure

Establish a steady power level of 30 megawatts with the controlling rod bank position at about 25 inches from the core bottom, and confirm operating conditions discussed in Section V. Using the charging machine,

insert the test fixture and test capsule into HT-1 for a 10 hour irradiation. Remove the test fixture from HT-1 to the hot cell area for post-irradiation dismantling.

E. Post-Irradiation Test Procedure

In the hot cell each of the dosimeter sets will be removed from the test fixture, the dosimeter sets will be dismantled, and the individual dosimeters will be placed in approved containers\* for shipment to Nuclear Science and Engineering Corporation or Waltz Mills for analysis. Each individual dosimeter must be marked with the test number and the dosimeter set number, the latter indicating the location on the test fixture.

X. HAZARDS

No hazards are anticipated with this irradiation. The hazards evaluation will be included in the Design Manual and Hazards Report which will be issued prior to the test.

XI. DATA REDUCTION REQUIRED

None

XII. DISPOSITION OF HARDWARE

Dosimeters will be shipped to Nuclear Science and Engineering Corporation or Waltz Mills as described in Section IX.E.

XIII. SHIPPING AND RECEIVING INSTRUCTIONS

None

\* These containers must be padded to prevent movement of the dosimeters within.