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NEUTRON PHYSICS DIVISION

ATTENUATION IN WATER OF RADIATION FROM THE BULK SHIELDING REACTOR: MEASUREMENTS OF THE GAMMA-RAY DOSE RATE, FAST-NEUTRON DOSE RATE, AND THERMAL-NEUTRON FLUX

Prepared by the staff of the
Bulk Shielding Facility

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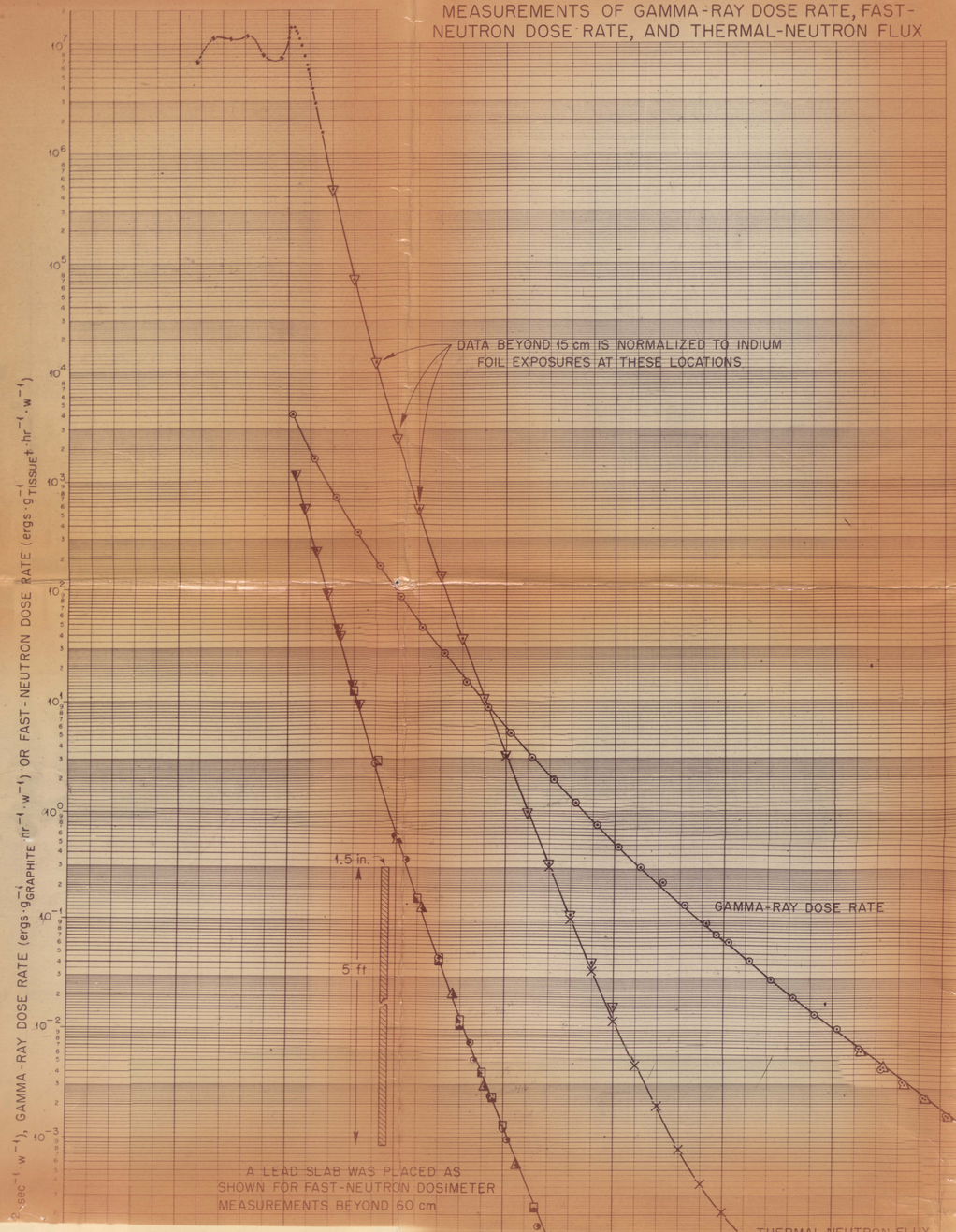
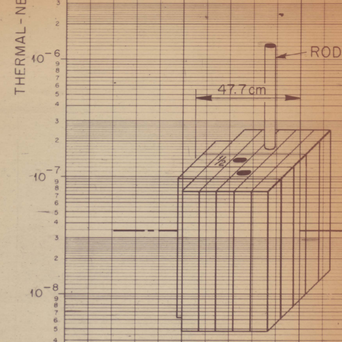
ATTENUATION IN WATER OF RADIATION FROM THE BULK SHIELDING REACTOR

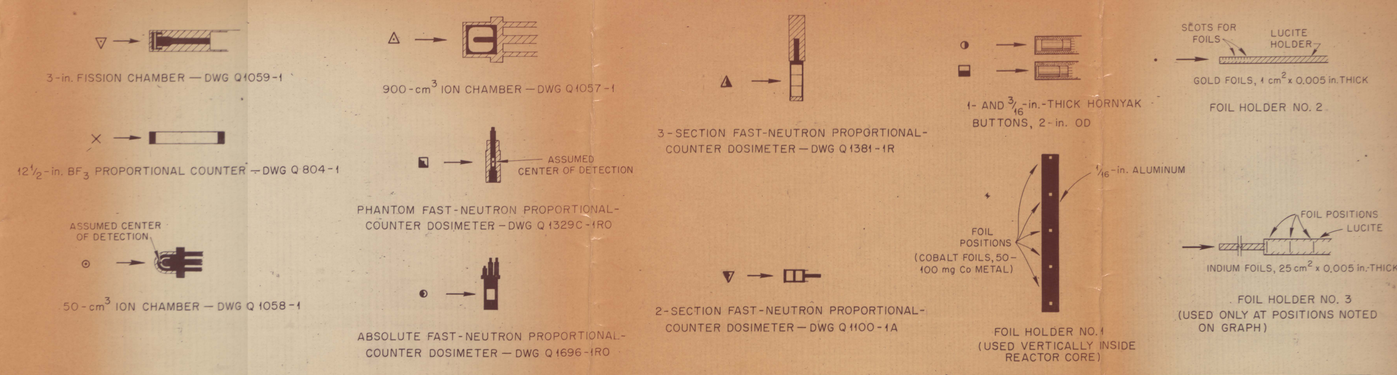
MEASUREMENTS OF GAMMA-RAY DOSE RATE, FAST-NEUTRON DOSE RATE, AND THERMAL-NEUTRON FLUX





REACTOR LOADING (NO. 33) USED IN THE ATTENUATION MEASUREMENTS. FOIL EXPOSURES WERE MADE ALONG CENTERLINE SHOWN. THE REACTOR POWER WAS DETERMINED FROM THE DATA REPORTED IN ORNL CF 57-11-30.

KEY TO PLOTTING SYMBOLS AND DETECTORS USED: ARROW INDICATES DIRECTION FROM REACTOR. OPEN AREA REPRESENTS SENSITIVE REGION. HATCHED AREA REPRESENTS LUCITE OR OTHER PLASTIC, WHILE SOLID AREA REPRESENTS ALL OTHER CONSTRUCTIONAL MATERIALS. THE SCALE IS THE SAME AS THE SCALE ON THE ABSCISSA.



FAST-NEUTRON DATA:

ORNL CF 51-5-61, *FAST NEUTRON DOSIMETER MEASUREMENTS FOR EXPERIMENT NO. 1 IN THE BULK SHIELDING FACILITY*, R. G. COCHRAN AND H. E. HUNGERFORD, MAY 7, 1951 (0 - 32.7 cm)

ORNL 2081, *APPLIED NUCLEAR PHYSICS DIVISION ANNUAL REPORT FOR PERIOD ENDING SEPT. 10, 1956*, CHAPTER 36, T. V. BLOSSER, PAGES 151 - 153.

THERMAL-NEUTRON DATA:

ORNL CF 57-11-30, *POWER DISTRIBUTION IN LOADING 33 OF THE BSR*, E. B. JOHNSON, DEC. 1, 1957 (COBALT FOIL DATA FROM MINUS 42 TO 0 cm (INSIDE LATTICE) AND GOLD FOIL DATA FROM 0 TO 15.5 cm)

ORNL 1891, *ATTENUATION BY WATER OF RADIATION FROM A SWIMMING-POOL-TYPE REACTOR*, F. C. MAIENSCHEIN, G. M. ESTABROOK, J. D. FLYNN, E. B. JOHNSON, AND K. M. HENRY, SEPT. 1955

GAMMA-RAY DATA:*

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‡THE THERMAL NEUTRON FLUX IS TAKEN TO BE THE THERMAL NEUTRON DENSITY IN NEUTRONS PER CM³ MULTIPLIED BY A CONSTANT VELOCITY OF $2/\sqrt{\pi} \times 2.2 \times 10^5$ cm/sec. DETAILS OF THE FLUX MEASUREMENTS, SUCH AS THE FLUX DEPRESSION CORRECTIONS AND THE CADMIUM COVER THICKNESSES MAY BE FOUND IN ORNL 1147, APPENDIXES F & L; ORNL 1820, p 8; ORNL 1027, p 7; AND ORNL 1438, APPENDIX E.

*FOR GAMMA-RAY DATA, *w* WAS TAKEN AS 32.9 ev PER ION PAIR. NO CORRECTION WAS MADE FOR ABSORPTION IN THE ION CHAMBER WALL (50-cm³ ION CHAMBER). EQUAL MASS STOPPING POWERS WERE ASSUMED FOR C AND CO_2.

†"TISSUE" IS DEFINED IN THE *BRITISH JOURNAL OF RADIOLOGY*, SUPPLEMENT NO. 6, PAGE 25 (1956)

TABLE OF ESTIMATED TYPICAL STANDARD DEVIATIONS

	STATISTICAL (%)	RELATIVE▼ (%)	ABSOLUTE (%)
THERMAL NEUTRON FLUX	1 - 2	3	5
FAST-NEUTRON DOSE RATE	≤8	6	9
REACTOR POWER	1	2	6

▼PRIMARILY DUE TO NORMALIZATION BETWEEN INSTRUMENTS

**AT THE LARGEST SEPARATION DISTANCES DEVIATIONS ARE SHOWN ON EACH POINT

FROM FACE OF REACTOR TO INSTRUMENT'S ASSUMED CENTER OF DETECTION (cm)

ALE IS 1/10 SO THAT MM GRAPH PAPER MAY BE USED FOR INTERPOLATION

ISSUED AS ORNL - 2518

PREPARED BY THE STAFF OF THE BULK SHIELDING FACILITY OF THE APPLIED NUCLEAR PHYSICS DIVISION, OAK RIDGE NATIONAL LABORATORY

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