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OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER

DATE: July 30, 1948
SUBJECT: Shadow Shield Experiment,
ARUO Program

CLASSIFICATION ~~CANCELLED~~ 49

DATE **FEB 12 1959**

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A-00528

Human Studies Project

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OAK RIDGE NATIONAL LABORATORY
Division of
Carbide and Carbon Chemicals Corporation
Oak Ridge, Tennessee

Subject: Shadow Shield Experiment, ARDU Program.

This experiment was requested by Project RAND in a letter from E. H. Plesset to W. A. Noyes, Jr., AEC, dated July 16, 1948. The experiment was described as follows:

"The shield and dosimeter should be separated by 10 meters, as shown below. The shield should be a flat circular lead plate of about one meter diameter and about 15 cm thick. It should be half buried in the ground. The center of source should be level with the ground. Dosage measurements should be made at the following source - shield separations: 10 cm, 50 cm, 1 meter, 5 meters, and 10 meters. Anticipated values of dosages are still under preparation but should be available within a few days."

With the oral agreement of Dr. Plesset, the lead shield was buried to a depth of only 10 cm instead of 50 cm. The portion of the shield above ground was a semi-cylinder of radius 50 cms and thickness 20 cms.

The source used in this experiment was the 1300 curie* RaLa source prepared for a previous ARDU experiment. The barium separation was completed at 8:00 A.M. on July 12, 1948.

Lauritsen electroscopes were used for the dosage rate measurements. In addition to the requested measurement at 10 meters from the shield, measurements were made at 50 and 100 meters from the shield.

The dosage rate due to the unshielded source was measured at 600 and 800 feet to compare experimentally the strength of the source on July 29 with the strength measured on July 17. From this measurement the source was at 63% of its strength on July 17. The relative amount of La, calculated from decay rate, was 61%. This calculated value of 61% was used to compute intensities of the unshielded source, together with the results of the experiment on July 17, 1948.

The observed intensities, for each position of the shield and instrument, are given in Table 1. It is difficult to estimate the relative accuracy of the measurements, which depend on several factors. The accuracy of timing of electroscopie discharge is better than 2%. Calibration inaccuracy may be as great as 5%. The source was aligned on the axis of the semi-cylinder as carefully as was possible under field conditions; foresight did not predict the desirability of investigating the effect of misalignment. The "guesstimated" probable error is 10%.

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* The value of 1300 curies is based on an analytical determination of the barium content at the time of separation.

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TABLE 1

Instrument to Shield (Meters)	10		50		100	
	Observed (r/hr)	Shielded Unshielded	Observed (r/hr)	Shielded Unshielded	Observed (r/hr)	Shielded Unshielded
Source to Shield (Meters)						
0.1	0.084	.011	.0090	.071	.0025	.041
0.5	0.130	.018	.0180	.064	.0053	.087
1.0	0.178	.027	.0256	.092	.0082	.136
5.0	0.200	.057	.0760	.153	.0117	.212
10.0	0.155	.080	.0356	.184	.0123	.247

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