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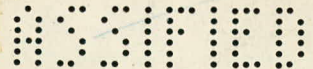
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372-1



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Thermal Neutron Flux Beyond the Bottom Shield Mockup

An experiment was performed to obtain data for the determination of the most desirable location of thermal neutron detectors for control instrumentation in the region immediately below the bottom shield.

A mockup of the bottom shield as shown in Fig. 1 was placed in the Lid Tank and thermal measurements were made beyond three lead thicknesses. The beryllium slab consisted of pellets (average density of slab 1.23 gm/cc) in a steel container (0.32 cm wall). The remaining components of the mockup were placed in a steel tank (0.32 cm wall) so that they would remain dry. The water in the dry tank was contained in a thin wall (0.32 cm) aluminum tank. Iron slabs (2.22 cm each) and lead slabs (3.81 cm each) were used to mockup the remaining components of the shield. The lead thickness was essentially the only variable in the mockup; however, for configuration 1, a 1-1/2 in. air filled void resulted which was filled with lead for configurations 2 and 3. The amounts of extraneous water between the various components of the mockup are shown in Fig. 1.

Thermal neutron data was taken along the axis of the source, and also along traverses parallel to the shield. This data is presented in Figs. 2 and 3. A tabulation of all the data taken with the various instruments is presented in Tables 1, 2, and 3.

TABLE 1
 Configuration 1
 1-1/2 in. Pb

Distance From Source	Thermal Flux Normalized to mrep/hr		Distance From Y = 0	Thermal Flux Normalized to mrep/hr
Z ₉₀ (cm)	12-1/2" BF ₃	8" BF ₃	Y (cm)	8" BF ₃ Z ₉₀ = -72.8 cm
71.2		1.038 x 10 ²	+ 50	4.423 x 10 ¹
80.0		1.175 x 10 ¹	+ 40	6.183 x 10 ¹
90.0	7.193 x 10 ⁻¹	6.872 x 10 ⁻¹	+ 30	7.702 x 10 ¹
100.0	6.646 x 10 ⁻²		+ 20	8.714 x 10 ¹
110.0	1.163 x 10 ⁻²		+ 10	9.150 x 10 ¹
120.0	2.870 x 10 ⁻³		0	8.978 x 10 ¹
130.0	8.312 x 10 ⁻⁴		- 10	8.043 x 10 ¹
140.0	2.625 x 10 ⁻⁴		- 20	6.806 x 10 ¹
			- 30	5.326 x 10 ¹
			- 40	3.832 x 10 ¹
			- 50	2.529 x 10 ¹
			- 60	1.587 x 10 ¹

TABLE 2

Configuration 2

3 in. Pb

Distance From Source Z_{SO} (cm)	Thermal Flux Normalized to Mrep/hr				Distance From $Y = 0$ Y (cm)	Thermal Flux Normalized to Mrep/hr	
	12-1/2" BF_3	8" BF_3	3" Fission	12-1/2" BF_3 (DB)		12-1/2" BF_3 $Z_{SO} = 92.2$ cm	8" BF_3 $Z_{SO} = 80.0$ cm
70.0			1.380×10^2		+ 80	3.226×10^{-2}	1.136×10^0
72.6		9.089×10^1			+ 70	6.363×10^{-2}	2.124×10^0
80.0		1.560×10^1	1.301×10^1		+ 60	1.157×10^{-1}	3.778×10^0
90.0	9.947×10^{-1}	8.432×10^{-1}			+ 50	1.941×10^{-1}	6.202×10^0
100.0	6.387×10^{-2}	6.720×10^{-2}		6.272×10^{-2}	+ 40	2.919×10^{-1}	9.518×10^0
110.0	1.027×10^{-2}	1.180×10^{-2}		1.082×10^{-2}	+ 30	3.941×10^{-1}	1.227×10^1
120.0	2.300×10^{-3}			2.836×10^{-3}	+ 20	4.698×10^{-1}	1.452×10^1
130.0	6.657×10^{-4}				+ 10	5.058×10^{-1}	1.545×10^1
140.0	1.907×10^{-4}				0	5.287×10^{-1}	1.541×10^1
					- 10	4.945×10^{-1}	1.409×10^1
					- 20	4.257×10^{-1}	1.182×10^1
					- 30	3.346×10^{-1}	9.126×10^0
					- 40	2.353×10^{-1}	6.230×10^0
					- 50	1.505×10^{-1}	3.886×10^0
					- 60	8.931×10^{-2}	2.181×10^0
					- 70	5.123×10^{-2}	1.371×10^0
					- 80	2.827×10^{-2}	7.747×10^{-1}

372

4

- 4 -

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TABLE 3

Configuration 3

6 in. Pb

Distance From Source	Thermal Flux Normalized to Mrep/hr			Distance From Y = 0	Thermal Flux Normalized to Mrep/hr	
	Z _{so} (cm)	12-1/2" BF ₃	12-1/2" BF ₃ (DB)		3" Fission	12-1/2" BF ₃ Z _{so} = 102.6 cm
80				+ 70	1.542 x 10 ⁻²	4.635 x 10 ⁰
90	4.311 x 10 ⁰	3.000 x 10 ⁰	5.535 x 10 ¹	+ 60	2.721 x 10 ⁻²	8.129 x 10 ⁰
100	2.478 x 10 ⁻¹	1.772 x 10 ⁻¹	3.690 x 10 ⁰	+ 50	4.467 x 10 ⁻²	1.294 x 10 ¹
110	1.893 x 10 ⁻²	1.642 x 10 ⁻²		+ 40	6.455 x 10 ⁻²	1.862 x 10 ¹
120	2.811 x 10 ⁻³	3.010 x 10 ⁻³		+ 30	8.465 x 10 ⁻²	2.386 x 10 ¹
				+ 20	9.966 x 10 ⁻²	2.846 x 10 ¹
				+ 10	1.103 x 10 ⁻¹	3.120 x 10 ¹
				0	1.140 x 10 ⁻¹	3.162 x 10 ¹
				- 10	1.085 x 10 ⁻¹	2.897 x 10 ¹
				- 20	9.506 x 10 ⁻²	2.524 x 10 ¹
				- 30	7.458 x 10 ⁻²	1.984 x 10 ¹
				- 40	5.395 x 10 ⁻²	1.396 x 10 ¹
				- 50	3.582 x 10 ⁻²	9.140 x 10 ⁰
				- 60	2.152 x 10 ⁻²	5.497 x 10 ⁰
				- 70	1.191 x 10 ⁻²	

372

5

- 5 -

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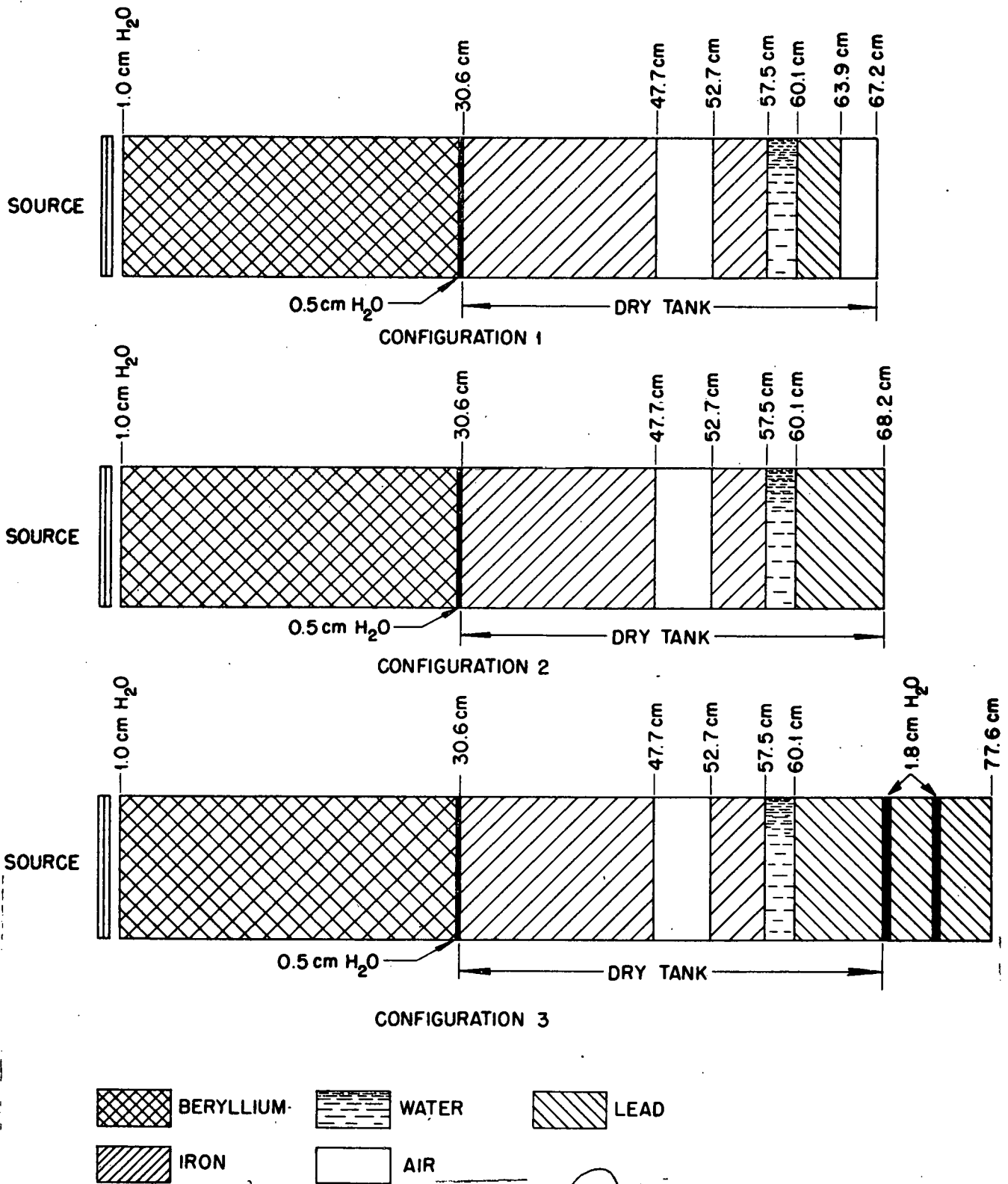
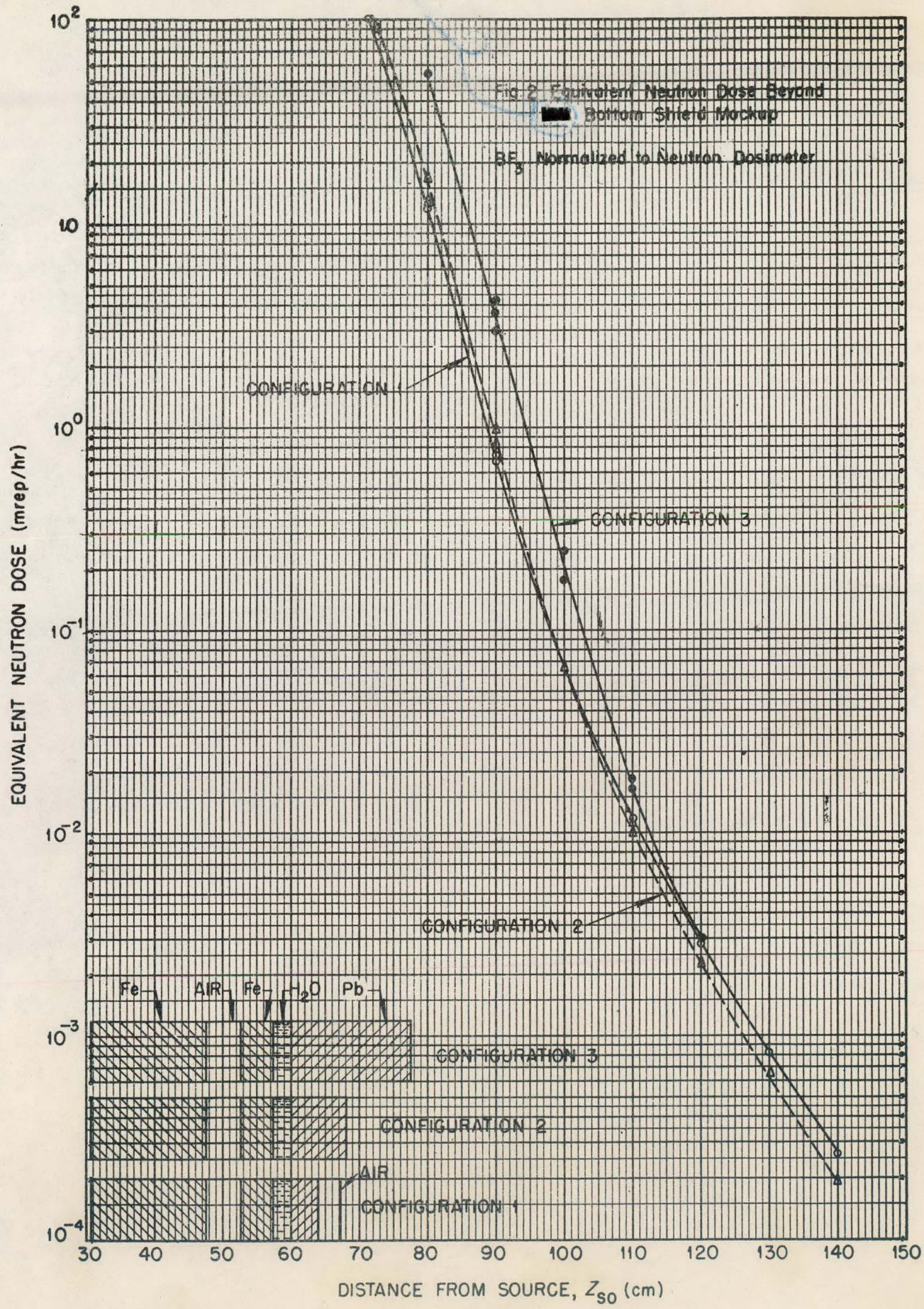
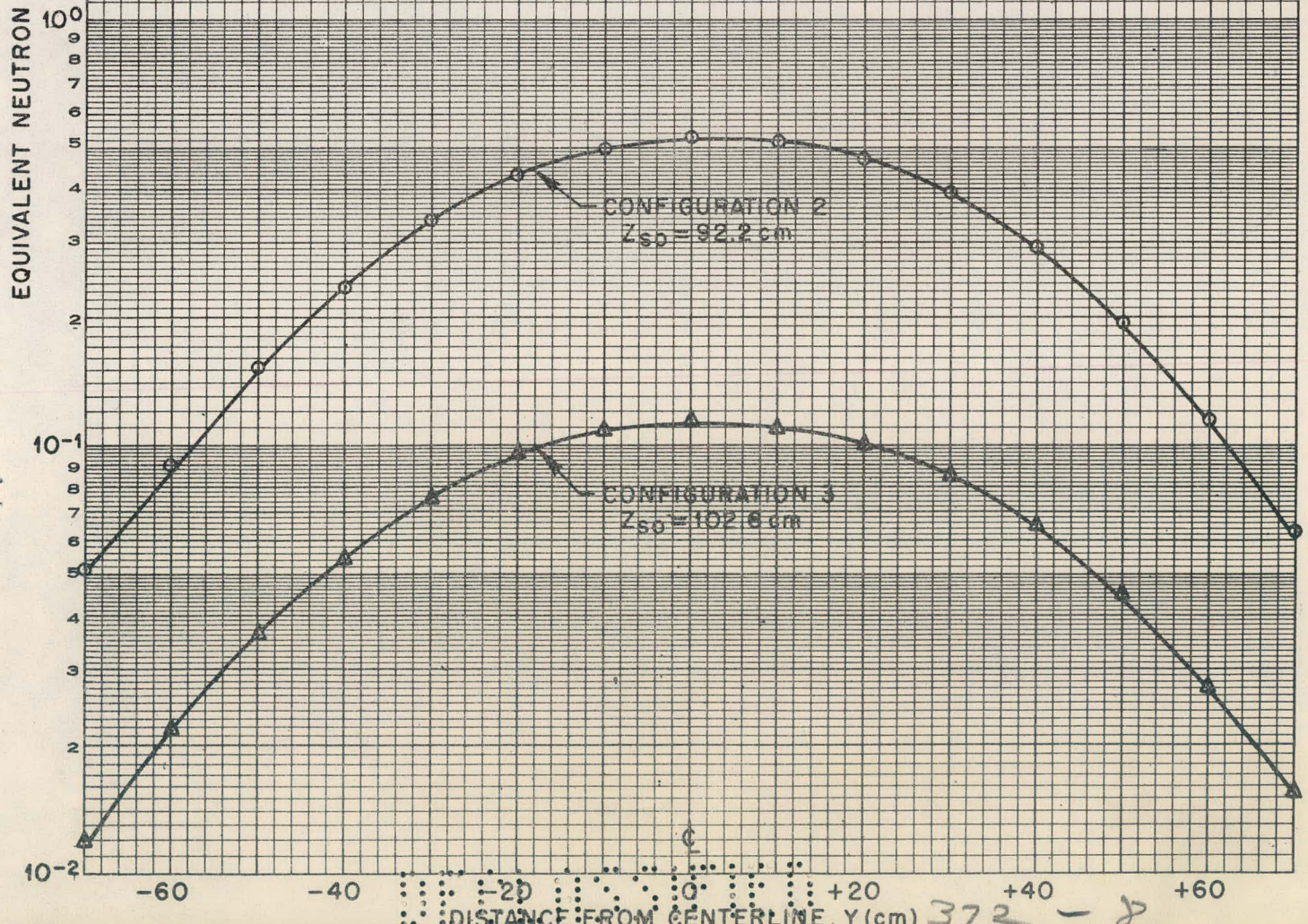
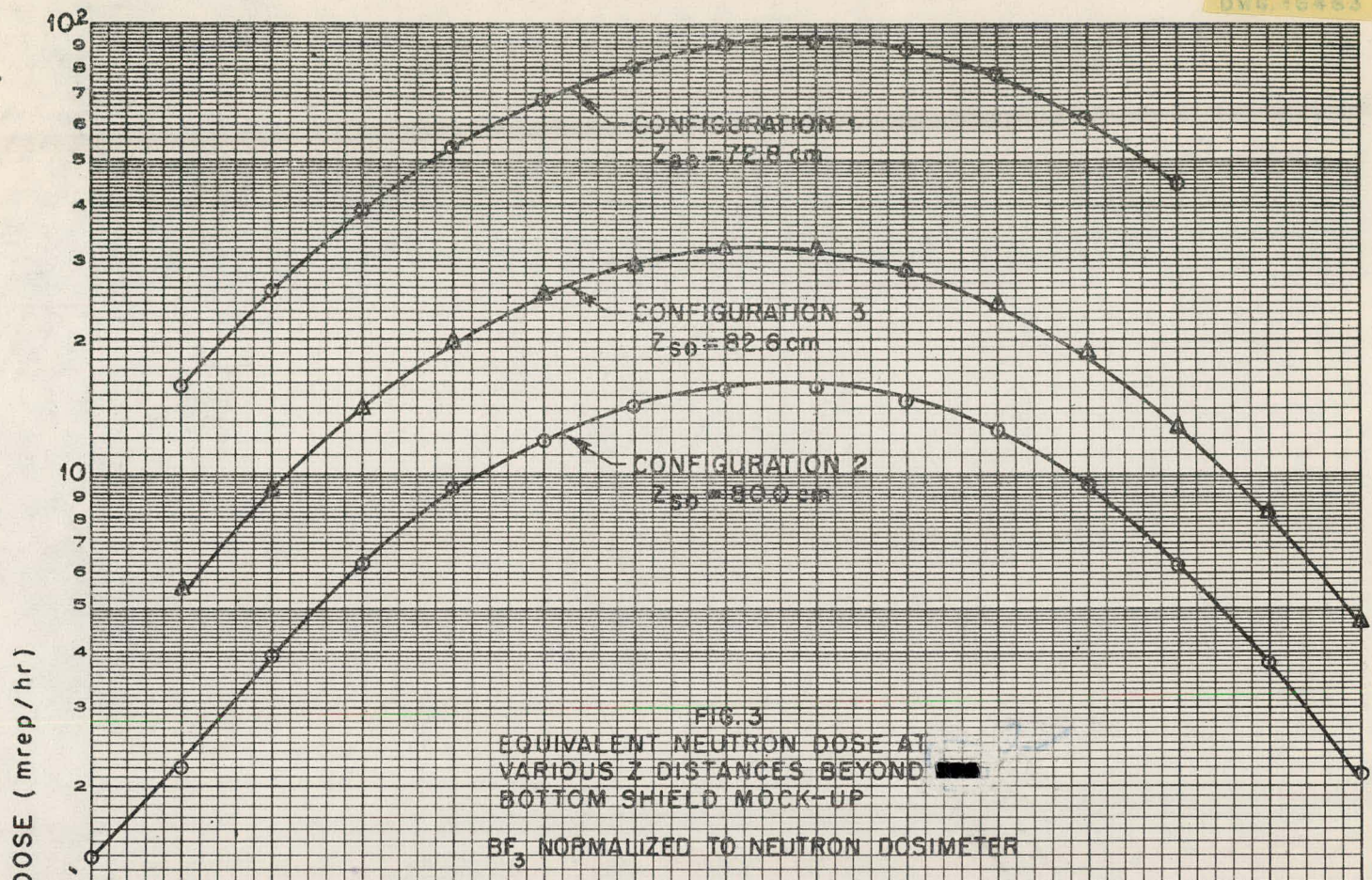


Fig. 1 Schematic Diagram of Bottom Shield Mockup.



372-7

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