

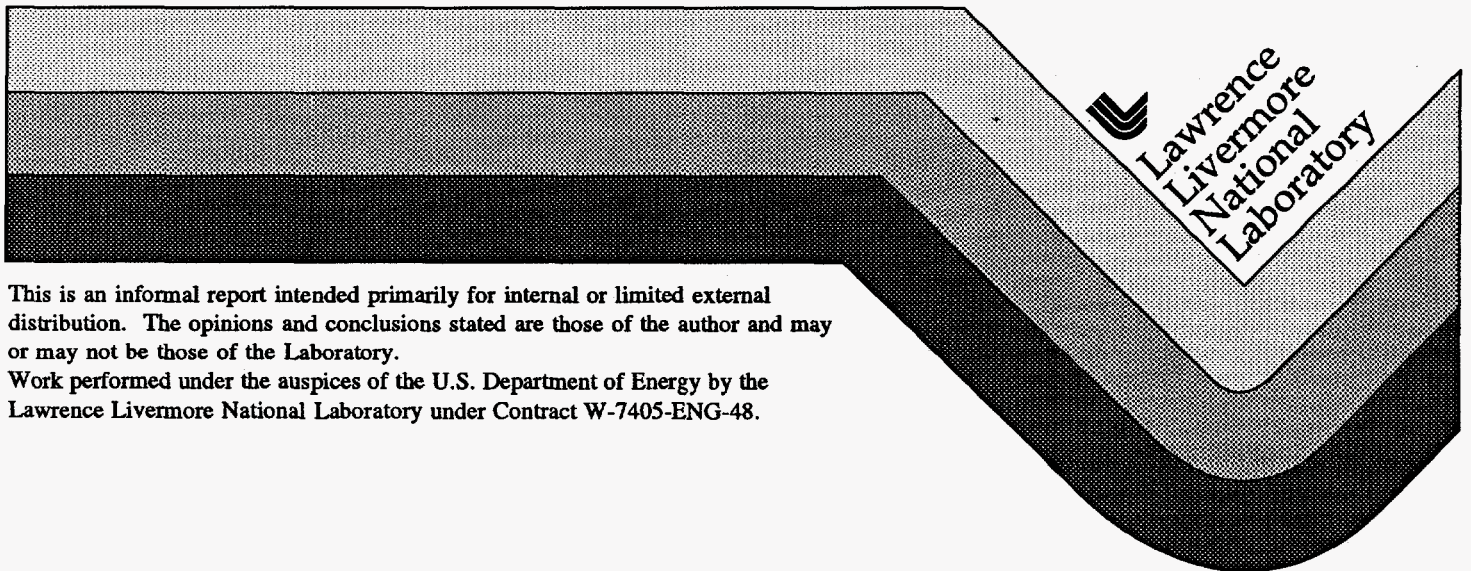
# Sensitivities of Currently Available Neutron Detectors, and Some Typical Count Rates Observed During Tory II-AR

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G. St. Leger Barter

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 No. 1 of 1 copies. Series MIC.

August 31, 1962.

Naval Applications Memo No 5.

TO: J. Hadley

FROM: C. Barnett, G. St. Leger Barter

SUBJECT: Sensitivities of Currently Available Neutron Detectors, and  
 Some Typical Count Rates Observed During Tory II-A Runs.

This memo is a response to your recent request for information concerning sensitivities of detectors that might be used during the boost phase.

The data on detectors were taken from manufacturers' catalogues, and don't represent what could be done but what has been done rather routinely.

The data from Tory II-A are taken from pages 108 to 111 of Classified Notebook No. CN-128; this is the logbook used during Tory II-A runs. The count rate data are for a cold wet run which was made before any significant core burnup.

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TABLE I

## Characteristics of Available Types of Detectors

\* Detectors Used on Tory II-A

BF<sub>3</sub> Counters

2" d x 5 1" L	2 1/2 lb.	200 cps/nv	good to
* 2" d x 17" L	1 lb.	20 cps/nv	about 10 <sup>5</sup> to
1" d x 8" L	1/2 lb.	2 cps/nv	5 x 10 <sup>5</sup> cps

## fission chamber as counters

2" d x 12" L	1 3/4 lb.	1 cps/nv	good to about
1" d x 8" L	3/4 lb.	.1 cps/nv	10 <sup>5</sup> to 3x 10 <sup>5</sup> cps
1/4" dx 6" L	1/4 lb.	.01 cps/nv	above 5 cps

fission chamber as ionization chamber; only uncompensated are available.

* 2" d x 12" L	1 3/4 lb.	n	3x10 <sup>-14</sup> amp/nv
		γ	3x10 <sup>-11</sup> amps/R/hr
		α	background 3x10 <sup>-9</sup> amp
			max current 10 <sup>-4</sup> - 10 <sup>-3</sup> a
2" d x 12" L	2 lb.	n	2x10 <sup>-13</sup> amp/nv
		γ	4x10 <sup>-11</sup> amp/R/hr
		α	background 1x10 <sup>-8</sup> amps
			max current 10 <sup>-3</sup> - 10 <sup>-2</sup> a

BF<sub>3</sub> filled ionization chambers; only uncompensated available; limited life, about 0.1 of other types

2" d x 12" L	1 1/2 lb.	n	$3 \times 10^{-13}$ amp/nv
		$\gamma$	$5 \times 10^{-12}$ amp/R/hr
3" d x 14" L	2 1/2 lb.	n	$1 \times 10^{-12}$ amp/nv
		$\gamma$	$2.3 \times 10^{-11}$ amp/R/hr

B<sup>10</sup> lined uncompensated ionization chambers

3" d x 13" L	5 lb.	n	$2 \times 10^{-14}$ amp/nv
		$\gamma$	$2 \times 10^{-11}$ amp/R/hr
			current range $10^{-10}$ to $10^{-3}$ amp

B<sup>10</sup> lined ionization chambers, fixed compensation

3" d x 11" L	4 lb.	n	$2 \times 10^{-14}$ amp/nv
		comp. $\gamma$	$3 \times 10^{-13}$ amp/R/hr
		uncomp. $\gamma$	$5 \times 10^{-12}$ amp/R/hr
			current range $10^{-11}$ to $10^{-3}$ amp

B<sup>10</sup> lined ionization chambers, electrically adjustable comp.

3" d x 23" L	5 1/2 lb.	n	$4 \times 10^{-14}$ amp/nv
		comp. $\gamma$	negligible
		uncomp. $\gamma$	$3 \times 10^{-11}$ amp/R/hr

TABLE IICOUNT RATES OBSERVED DURING A TORY II-A RUN

	Counter S <sub>1</sub>	Counter S <sub>2</sub>
	c/min	c/min
Reflectors Open	352	435
Reflectors Closed	973	1130
Vanes 40°	1384	1527
60°	4367	4883
65°	14,090	14,512
Critical Angle	67.5°	