UC Davis/ MNRC In-Tank Irradiation Facilities

Date: 02/01/2007

UNPERTURBED neutron fluxes and heating at 1.5 MW operating power (TRIGA reactor).

Facility	Thermal < .1 eV ($n/cm^2.s$)	Fast > 1 MeV ($n/cm^2.s$)	Heating in Aluminum (W/g)	Diameter (cm)	Length (cm)
CIF† **(Al)** (818)	**$1.5 * 10^{13}$**	$7.6 * 10^{12}$	0.16	4.4	38
PTS‡ **(Void)** (903)	**$7.6 * 10^{12}$**	$3.7 * 10^{12}$	0.084	1.5	10
NTD – E1 (Void) (745)	**$4.6 * 10^{11}$**	$1.7 * 10^{10}$	0.0041	8.8	22

CIF: Central Irradiation Facility.
PTS: Pneumatic Transfer System.
NTD: Neutron Transmutation Doping. (> 10 locations).
φ_{fast}/ $\varphi_{thermal}$: CIF 50%, PTS 50%, and NTD 3.6%.

† **Maximum value**. Active length of TRIGA fuel is 15". Dependent on the control rod elevation, thermal flux could decrease to **~60% of $1.5 * 10^{13}$ $n/cm^2.sec$** at 7.5" away from reactor core center.

Flux/ dose information strongly dependent on water/ void volume ratio.

‡ **Average value**. Maximum $8.9 * 10^{12}$ $n/cm^2.sec$ at the bottom and minimum $6.0 * 10^{12}$ $n/cm^2.sec$ on the top.

NTD – E1: w/ boral container, 6-mm in thickness: **at 1.5 MW operating power**
Usable space 5.7 cm (2.25") in diameter and 20 cm (8") in length

$\varphi_{1\ MeV\ eq.} \cong$ **$4.1 * 10^{10}$ $n/cm^2.sec$**
$D_{fast\ neutrons > 0.1\ MeV}$ (Si) ≅ 110 Gy/hr

$\varphi_{thermal} \cong$ **1% of $\varphi_{1\ MeV\ eq.}$**
$D_{gamma\ rays}$ (Si) ≅ 1.8×10^4 Gy/hr

NIF: Neutron Irradiation Facility: **at 1.0 MW operating power**
Usable space 17 cm (7") in diameter and 22 cm (9") in length

$\varphi_{1\ MeV\ eq.} \cong$ **$1.5 * 10^{10}$ n/cm^2.sec** $\varphi_{thermal} \cong$ **1% of $\varphi_{1\ MeV\ eq.}$**
$D_{fast\ neutrons > 0.1\ MeV}$ (Si) ≅ 40 Gy/hr $D_{gamma\ rays}$ (Si) ≅ 130 Gy/hr

Pulsing: Typical pulse reactivity **$1.60** (or $0.60 prompt reactivity)
Peak power ≈ **400 MW**
FWHM ≈ **30 msec**
Total energy release ≈ **14 - 15 MW-sec**

UC Davis/ MNRC Neutron Radiography Irradiation Facilities

Date: 06/20/2006

Typical unperturbed thermal neutron fluxes in the radiography bays at 1.5 MW operating power (TRIGA reactor).

Facility	Thermal < .1 eV (n/cm^2.s)	Beam Aperture (inch)	L/D Ratio	Time to Reach 10^9 n/cm^2 Fluence (min)
Bay 1	**$4.2 * 10^6$**	1.40	200	4.0
Bay 2	**$4.2 * 10^6$**	1.40	200	4.0
Bay 3	**$5.6 * 10^6$**	1.54	175	3.0
Bay 4	**$3.8 * 10^5$**	1.25 x 1.25	270	44

Typical thermal ~$1.7 * 10^7$ n/cm^2.sec corresponding to L/D = 100 at 1.5 MW operating power
~$4.2 * 10^6$ n/cm^2.sec corresponding to L/D = 200