

September 15, 1994

Pat Scofield
Oakridge National Laboratory
Fax # (616) 674 - 4084

Dear Ms. Scofield,

This letter is in response to your call to Kate Roughan, RSO, AMERSHAM Corporation - Sentinel Division requesting information regarding the potential exposure from empty industrial radiography devices containing Depleted Uranium (DU) shields.

Please find enclosed the raw exposure data for 1993 from two of Sentinel's employees for which the only exposure to radioactive materials is their handling of DU shields. As this is their only use of radioactive materials it is assumed that the dose reported on the film badge report is attributed to exposure to DU. The data is broken down by month and shows the whole body and extremity dose for each month, the number of shields worked on during the month, and the time spent actually working on the shields. All of this information was obtained from film badge reports and from DU Logs which are completed after each use of Depleted Uranium.

In addition to the raw exposure data, monthly averages, average exposure per hour worked, Average dose per shield, and the dose rates recorded from an empty DU device have been included. Also included are the standard weights for each model shield and its' dimensions which are a length measurement and a radius (from the outer edge of the "S" tube to the edge of the shield) measurement. These shields are generally football shaped and the dimensions/weight are inspected to assure consistency.

During assembly the assembler works in close contact with the DU device. The devices are hand built at a distance of one to two feet from the body. As a result the exposure received to the extremities should be proportional to the dose rate observed at the surface of the device and the whole body exposure should fall between the DU device dose rate at the surface and the DU device dose rate at 1 meter. This relationship shows to be true when the averages are compared. In this comparison the extremity dose rate (1.97 mRem/Hr) is equivalent to the device dose rate at the surface (2.0 mRem/Hr). The Average whole body dose (.812 mRem/Hr) is also shown to be consistent since it falls between the surface dose rate (2.0 mRem/Hr) and the 1 meter dose rate (.10 mRem/Hr) of the DU device.

I hope this is all the information you need. If anything else is necessary please call me at (617) 272-2000 extension *230.

Sincerely,

Erik Okvist

Erik Okvist
Health Physicist

*Varies a optimum Shielding
↓ the levels + portable device
may still take no direct line out
of part-center-track.*

Depleted Uranium Exposure Data

1993														
User Name	Category	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Employee A	Body dose	20	20	20	20	30	30	10	30	20	10	30	10	20.8
	Rt. Hand Dose	70	50	60	30	30	100	30	90	40	60	40	30	52.5
	Lt. Hand Dose	30	60	40	30	30	110	0	80	40	80	50	30	44.3
	# Shields	122	114	94	88	30	184	41	148	14	82	36	34	80.4
	Shield Type	660	660	660	460, 660	460, 660	460, 660	660	460, 660	660	460, 660	660	660	660
	Time Spent (Hrs.)	35.5	43	40	21	10.5	42	4.5	47.5	9	34	12.5	8	25.6
Employee B	Body dose	0	0	10	0	0	10	0	0	0	0			2.0
	Rt. Hand Dose	0	60	0	0	0	30	0	0	0	0			9.0
	Lt. Hand Dose	0	0	0	0	0	30	0	0	0	0			3.0
	# Shields	0	0	5	2	1	4	0	0	3	1			1.6
	Shield Type	0	0	741, 660	741, 719	660	660	0	0	741, 660	741			
	Time Spent (Hrs.)	0	0	5	3.5	1	4	0	0	4	1			66.9

Depleted Uranium Weights / Dimensions			
Device Model #	Weight	Length	Radius
<u>IR-192 Devices</u>			
460	22 lbs	7.44 in.	1.36 in.
660	35 lbs	8.50 in.	1.64 in.
<u>CO-60 Devices</u>			
660	265 lbs	13.0 in.	3.90 in.
664	200 lbs	12.63 in.	3.70 in.
741	150 lbs	11.44 in.	3.25 in.

Exposure Averages
(Using Employee A Data Only)

Avg. Body Dose / Shield = .259 mRem / Shield
 Avg. Extremity Dose / Shield = .627 mRem / Shield (to each hand)
 Avg. Body Dose / Time Spent Working with DU = .612 mRem / Hour
 Avg. Extremity Dose / Time Spent Working with DU = 1.97 mRem / Hour
 Model 660 Device Dose Rate at Surface = 2.0 mRem / Hour
 Model 660 Device Dose Rate at 1 Meter = .10 mRem / Hour