



Consolidated Edison Company of New York, Inc.
Indian Point Station
Broadway & Bleakley Avenue
Buchanan, New York 10511-1099

October 21 1986
EH&S (RP) 86-179

Ms. Jean Cioffi
United States Nuclear Regulatory Commission
Region 1
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Ms. Cioffi:

Attached is a listing of exposures as determined by us using dosimeters which were irradiated by the Department of Energy, Idaho Operations Office.

Dosimeters numbered 0009605, 0009612, 0009619, 0009621, 0009630 were the test controls, and dosimeters 0009616, 0009617, 0009625, 0009634, 0009648 were the transit controls.

Please contact me at (914) 526-5250 if you require further information.

Sincerely,

A handwritten signature in cursive script that reads "Richard Martucci".

Richard Martucci
Dosimetry Supervisor

RM:eos

Attachment

8704150366 870409
PDR ADOCK 05000247
G PDR

The following magazines were not processed:

Time: 11:17:39 Badges read: 30 Adjectives: NRC CROSS /86ECK
 Common parameters:
 s1600224S0028610050005000000098793782200100194861010 e^m NOUSE

 #####
 #####

Time: 11:12:56 Badges read: 10 Adjectives: NRC CROSS /86ECK
 Common parameters:
 s1600213S0018610050005000000098393781800100064861010 ez

Machine correction factors:

Reader: 2
 Date: 86-10-10
 PRCF = 1.0288
 FRCF = 1.0066
 Ca/Li (low) = .9945
 EML = 6.5 mR
 EMC = 7.8 mR
 Cross-over point = 1167.7 mR

Transit exposures:

Average for element 1 = 0.0 mR
 Average for element 2 = 0.0 mR
 Average for element 3 = 0.0 mR
 Average for element 4 = 0.0 mR

BADGE ID, type	E1	E2	E3	E4	GAMMA	NEUTRON	BETA COMP	DEEP	SHALLOW	TYPE
0009619,2	28.2	25.0	26.2	36.7	25.0	0.0	0.0	25.0	25.0	Gamma
0009621,2	21.0	24.3	35.9	36.2	24.3	0.0	0.0	24.3	24.3	Gamma
0009605,2	29.5	23.0	21.7	28.3	23.0	0.0	0.0	23.0	23.0	Gamma
0009612,2	31.0	26.8	26.3	29.0	26.8	0.0	0.0	26.8	26.8	Gamma
0009630,2	29.0	25.5	29.7	25.2	25.2	0.0	6.4	25.2	31.6	B+G
0009634,2	28.1	27.7	21.8	27.0	27.7	0.0	0.0	27.7	27.7	Gamma
0009616,2	27.6	21.4	23.4	29.1	21.4	0.0	0.0	21.4	21.4	Gamma
0009625,2	29.7	26.6	22.9	28.3	26.6	0.0	0.0	26.6	26.6	Gamma
0009617,2	30.1	23.2	30.3	31.4	23.2	0.0	0.0	23.2	23.2	Gamma
0009648,2	34.6	27.1	18.4	26.6	26.6	0.0	13.6	26.6	40.2	B+G

Time: 11:17:39 Badges read: 30 Adjectives: NRC CROSS /B6ECK

Common parameters:
 s16002245002061005000500000098793782200100194861010 e~

Machine correction factors:

Reader: 2
 Date: 86-10-10
 PBCF = 1.0288
 FBCF = 1.0066
 Ca/Li (low) = .9945
 EML = 6.5 mR
 EMC = 7.8 mR
 Cross-over point = 1167.7 mR

Transit exposures:

Average for element 1 = 28.0 mR
 Average for element 2 = 25.0 mR
 Average for element 3 = 28.0 mR
 Average for element 4 = 31.0 mR

BADGE ID, type	E1	E2	E3	E4	GAMMA	NEUTRON	BETA COMP	DEEP	SHALLOW	TYPE
0009620,2	133.1	119.2	125.2	128.0	94.2	0.0	0.0	94.2	94.2	Gamma
0009622,2	230.4	77.5	76.9	76.3	45.3	0.0	279.1	45.3	324.4	B+G
0009615,2	.117E+4	.521E+3	.442E+3	.276E+3	.245E+3	.000E+0	.793E+3	.245E+3	.104E+4	B+G
0009627,2	126.3	123.5	121.5	139.8	98.5	0.0	0.0	98.5	98.5	Gamma
0009629,2	102.0	81.4	87.6	77.3	46.3	0.0	22.1	46.3	68.4	B+G
0009632,2	.197E+4	.190E+4	.200E+4	.220E+4	.188E+4	.000E+0	.000E+0	.188E+4	.188E+4	Gamma
0009647,2	136.1	110.5	129.4	135.9	85.5	0.0	0.0	85.5	85.5	Gamma
0009633,2	121.6	125.6	118.4	125.6	100.6	0.0	0.0	100.6	100.6	Gamma
0009650,2	102.4	98.3	80.9	87.7	56.7	11.7	0.0	68.3	68.3	N+G, Df1t
0009626,2	115.3	87.1	80.2	72.1	41.1	0.0	37.0	41.1	78.1	B+G
0009628,2	.207E+4	.194E+4	.204E+4	.215E+4	.191E+4	.000E+0	.000E+0	.191E+4	.191E+4	Gamma
0009646,2	110.4	90.3	77.7	86.4	55.4	0.0	21.6	55.4	77.0	B+G
0009637,2	.206E+4	.193E+4	.200E+4	.216E+4	.190E+4	.000E+0	.000E+0	.190E+4	.190E+4	Gamma
0009603,2	.216E+4	.194E+4	.197E+4	.206E+4	.192E+4	.000E+0	.000E+0	.192E+4	.192E+4	Gamma
0009641,2	.194E+4	.202E+4	.207E+4	.220E+4	.200E+4	.000E+0	.000E+0	.200E+4	.200E+4	Gamma
0009635,2	.194E+4	.190E+4	.200E+4	.221E+4	.187E+4	.000E+0	.000E+0	.187E+4	.187E+4	Gamma
0009624,2	.106E+4	.531E+3	.467E+3	.287E+3	.256E+3	.000E+0	.624E+3	.256E+3	.881E+3	B+G
0009645,2	.119E+4	.524E+3	.452E+3	.289E+3	.258E+3	.000E+0	.837E+3	.258E+3	.110E+4	B+G
0009640,2	.153E+4	.236E+3	.226E+3	.225E+3	.194E+3	.000E+0	.248E+4	.194E+3	.268E+4	B+G
0009636,2	.154E+4	.213E+3	.223E+3	.233E+3	.202E+3	.000E+0	.256E+4	.202E+3	.276E+4	B+G
0009642,2	.217E+4	.185E+4	.201E+4	.217E+4	.183E+4	.000E+0	.000E+0	.103E+4	.183E+4	Gamma
0009631,2	.195E+4	.190E+4	.204E+4	.217E+4	.188E+4	.000E+0	.000E+0	.188E+4	.188E+4	Gamma
0009623,2	.163E+4	.219E+3	.223E+3	.245E+3	.214E+3	.000E+0	.270E+4	.214E+3	.291E+4	B+G
0009614,2	.120E+4	.533E+3	.444E+3	.268E+3	.257E+3	.000E+0	.818E+3	.257E+3	.107E+4	B+G
0009618,2	.200E+4	.194E+4	.204E+4	.216E+4	.191E+4	.000E+0	.000E+0	.191E+4	.191E+4	Gamma
0009639,2	135.6	126.5	122.6	127.5	96.5	0.0	8.9	96.5	105.4	B+G
0009644,2	.122E+4	.550E+3	.431E+3	.287E+3	.256E+3	.000E+0	.808E+3	.256E+3	.106E+4	B+G
0009613,2	.146E+4	.206E+3	.221E+3	.244E+3	.213E+3	.000E+0	.237E+4	.213E+3	.258E+4	B+G
0009643,2	.213E+4	.189E+4	.201E+4	.219E+4	.187E+4	.000E+0	.000E+0	.187E+4	.187E+4	Gamma
0009638,2	.156E+4	.212E+3	.227E+3	.235E+3	.204E+3	.000E+0	.263E+4	.204E+3	.283E+4	B+G

Attachment B

Summary of Performance Test Data

A.	Shallow Dose	B	S	L
	1. Gamma Irradiation Only			
	Cs-137	-0.04	±0.07	0.11
	2. Mixed Beta-Gamma Irradiation Beta/Gamma = 0.1			
	a. Cs-137 and U-Slab	-0.13	±0.025	0.155
	b. Cs-137 and Tl-204	-0.158	±0.015	0.173
	3. Mixed Beta-Gamma Irradiation Beta/Gamma = 10			
	a. Cs-137 and U-Slab	-0.53	±0.04	0.57*
	b. Cs-137 and Tl-204	+0.158	±0.049	0.207
B.	Deep Dose			
	1. Gamma Exposure Only			
	Cs-137	-0.06	±0.058	0.118
	2. Mixed Beta-Gamma Irradiation Beta/Gamma = 0.1			
	a. Cs-137 and U-Slab	-0.044	±0.025	0.069
	b. Cs-137 and Tl-204	-0.064	±0.019	0.083
	3. Mixed Beta-Gamma Irradiation Beta/Gamma = 10			
	a. Cs-137 and U-Slab	+0.26	±0.027	0.287
	b. Cs-137 and Tl-204	+0.012	±0.041	0.053

* Asterisk indicates failure to meet ANSI N13.11 criterion that $L \leq 0.5$.

NOTE: Cobalt-60 data not reported.

Attachment C

A. Gamma Irradiation Only

Cs-137 Point Source

<u>Dosimeter #</u>	<u>RESL</u>		<u>Licensee's</u>	
	<u>Delivered Dose (mrem)</u>		<u>Reported Dose (mrem)</u>	
	<u>Shallow</u>	<u>Deep</u>	<u>Shallow</u>	<u>Deep</u>
0009647	101	101	85.5	85.5
0009639	101	101	96.5	105.4
0009627	101	101	98.5	98.5
0009633	101	101	100.6	100.6
0009620	101	101	94.2	94.2

Bias	=	B	=	- 0.06	-0.04
Standard Deviation	=	S	=	± 0.058	±0.007
Tolerance = B ± S	=	L	=	0.118	0.11

* Asterisk indicates failure to meet ANSI N13.11 criterion that $L \leq 0.5$

B. Beta Irradiation and Gamma Irradiation;
Beta/Gamma Ratio = 0.1

1. Cs-137=2002 mrad and Tl-204=220mrad

<u>Dosimeter #</u>	<u>RESL</u> <u>Delivered Dose (mrem)</u>		<u>Licensee's</u> <u>Reported Dose (mrem)</u>	
	<u>Shallow</u>	<u>Deep</u>	<u>Shallow</u>	<u>Deep</u>
0009642	2222	2002	1830	1830
0009635	2222	2002	1870	1870
0009637	2222	2002	1900	1900
0009643	2222	2002	1870	1870
0009603	2222	2002	1920	1920
	Bias =	B =	-0.158	-0.064
	Standard Deviation =	S =	±0.015	±0.019
	Tolerance = B + S =	L =	0.173	0.083

* Asterisk indicates failure to meet ANSI N13.11 criterion that $L \leq 0.5$.

2. Cs-137=2002 mrad and U-slab = 200 mrad

<u>Dosimeter #</u>	<u>RESL</u> <u>Delivered Dose (mrem)</u>		<u>Licensee's</u> <u>Reported Dose (mrem)</u>	
	<u>Shallow</u>	<u>Deep</u>	<u>Shallow</u>	<u>Deep</u>
0009631	2202	2002	1880	1880
0009618	2202	2002	1910	1910
0009632	2202	2002	1880	1880
0009628	2202	2002	1910	1910
0009641	2202	2002	2000	2000
	Bias =	B =	-0.13	-0.044
	Standard Deviation =	S =	±0.025	±0.025
	Tolerance = B + S =	L =	0.155	0.069

* Asterisk indicates failure to meet ANSI N13.11 criterion that $L \leq 0.5$.

C. Beta Irradiation and Gamma Irradiation;
Beta/Gamma Ratio = 10

1. Cs-137=203 mrem and Tl-204=2197 mrem

<u>Dosimeter #</u>	<u>RESL Delivered Dose (mrem)</u>		<u>Licensee's Reported Dose (mrem)</u>	
	<u>Shallow</u>	<u>Deep</u>	<u>Shallow</u>	<u>Deep</u>
0009636	2400	203	2760	202
0009640	2400	203	2680	194
0009638	2400	203	2830	204
0009623	2400	203	2910	214
0009613	2400	203	2580	213
	Bias =	B =	+0.158	+0.012
	Standard Deviation =	S =	±0.049	±0.041
	Tolerance = B + S =	L =	0.207	0.053

* Asterisk indicates failure to meet ANSI N13.11 criterion that $L \leq 0.5$.

2. Cs-137=203 mrem and U-Slab = 2000 mrem

<u>Dosimeter #</u>	<u>RESL Delivered Dose (mrem)</u>		<u>Licensee's Reported Dose (mrem)</u>	
	<u>Shallow</u>	<u>Deep</u>	<u>Shallow</u>	<u>Deep</u>
0009644	2203	203	1060	256
0009624	2203	203	881	256
0009645	2203	203	1100	258
0009615	2203	203	1040	254
0009614	2203	203	1070	257
	Bias =	B =	-0.53	+0.26
	Standard Deviation =	S =	±0.04	±0.027
	Tolerance = B + S =	L =	0.57*	0.028

* Asterisk indicates failure to meet ANSI N13.11 criterion that $L \leq 0.5$.

ATTACHMENT D

PROTOCOL FOR IP-2 DOSIMETRY PERFORMANCE TEST

Test 1: Comparison of Cobalt-60/Cesium-137 Gamma Ray Response

Expose 5 dosimeters to 100 mR of cesium-137 gamma rays.

Expose 5 dosimeters to 100 mR of cobalt-60 gamma rays.

Test 2: Uranium Slab/Cesium-137 Response

Expose 5 dosimeters to 200 mrad uranium betas and 2000 mR cesium-137 gammas.

Expose 5 dosimeters to 2000 mrad uranium betas and 200 mR cesium-137 gammas.

Test 3: Thallium-204/Cesium-137 Response

Expose 5 dosimeters to 200 mrad Tl-204 betas and 2000 mR cesium-137 gammas.

Expose 5 dosimeters to 2000 mrad Tl-204 betas and 200 mR cesium-137 gammas.

All tests should be performed while the dosimeters are in hangers supplied by the licensee and while the dosimeters are mounted on a suitable phantom. Doses given should be reported in mrem under 7 mg/cm² for surface dose and 1000 mg/cm² for deep dose.