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Barta's pre-filed testimony]

U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of US ARMY (JEFFERSON PROVING GROUND)
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NRC Staff _____ Other _____
IDENTIFIED on _____ Witness/Panel _____
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**Ebinger, M. and W. Hansen. 1996. JPG Data Summary
and Risk Assessment. Submitted to the U.S. Army
Test and Evaluation Command by Los Alamos National
Laboratory, New Mexico.**

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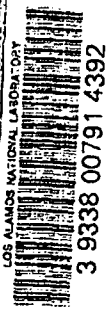
JEFFERSON PROVING GROUND DATA SUMMARY AND RISK ASSESSMENT

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Jefferson Proving Ground Data Summary and Risk Assessment

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**Prepared for
U. S. Army
Test and Evaluation Command
Aberdeen Proving Ground, Maryland**

FINAL REPORT

February, 1996

Vegetation Data

Only 17 analyses were reported for vegetation samples from JPG. Eight samples were lichens and nine samples were of leaf litter. Preoperational leaf litter samples showed about 1.5 pCi/g of U and were among the highest concentrations reported. Table 14 shows the vegetation data with the calculated $^{234}\text{U}/^{238}\text{U}$ ratios. The ratio suggests that the highest concentration, 91 pCi/g in a lichen sample, was from DU. The ratios from the remaining samples suggest natural U except one lichen sample (0.2 pCi/g) which suggests a DU source. All data were collected in 1984 except for the two lichen samples with ratios of 0.43 that were collected in 1990.

From the limited data there appears to be little contamination of vegetation in the impact area. A larger data set is required, however, before more certain conclusions about DU contamination of vegetation can be discussed. Continued monitoring of vegetation for DU and U concentrations is recommended.

Table 14. Total activity and $^{234}\text{U}/^{238}\text{U}$ ratios for vegetation samples from JPG. L-samples are lichens, others are leaf litter.

Year	Sample ID	^{234}U (pCi/g)	^{238}U (pCi/g)	Total U (pCi/g)	$^{234}\text{U}/^{238}\text{U}$
1984	Preop. 1	0.7	0.77	1.47	0.91
1984	Preop. 2	0.79	0.82	1.61	0.96
1984	Postop 1	0.68	0.72	1.4	0.94
1984	W-S	0.116	0.133	0.249	0.86
1984	W-MID	0.31	0.289	0.599	1.1
1984	W-N	0.287	0.284	0.571	1.01
1984	E-S	0.095	0.082	0.177	1.2
1984	E-MID	0.332	0.316	0.648	1.1
1984	E-N	0.111	0.113	0.224	0.98
1984	L-7	0.9	0.85	1.75	1.1
1984	L-8	0.76	0.92	1.68	0.81
1984	L-9	0.88	0.98	1.86	0.89
1984	L-23	0.97	0.91	1.88	1.1
1984	L-28	0.93	0.98	1.91	0.95
1984	L-37	0.93	0.97	1.9	0.96
1990	L-1	0.06	0.14	0.2	0.43
1990	L-2	27.3	63.7	91	0.43

Animal Samples

Animal samples were mainly deer tissue and organs including kidney and liver samples. Other animal samples were raccoon muscle and fresh water clam tissue. The highest concentration was reported from one sample of deer kidney and was about 2 pCi/g of fresh tissue. All other concentrations were less than 0.1 pCi/g fresh tissue. The data for the animal samples is presented in Appendix H.

Conclusions

The data from 1983 through 1994 from soil, surface water, sediment, animal, and vegetation samples indicate the presence of DU in the impact area but not without uncertainty. DU migration through soils to groundwater and surface water is not strongly supported from these data. Groundwater, surface water, and sediment data suggest that DU moved into these media in about 1990 and 1991. However, there is additional information about sample analysis and processing that strongly suggests that the high concentrations reported were an artifact of the analytical process. Measured values also returned to low concentrations in 1992 through 1994. Information on the samples from 1983 through 1994, overall, suggests that continued monitoring at the sampling locations should continue to establish the amount of DU transporting through the soil and water in the impact area.

Vegetation and animal sampling at JPG was conducted but the data set is not as complete as for the abiotic media. From the reported data there does not appear to be an adverse impact on the vegetation and animals at JPG. One lichen sample showed a high concentration, probably from DU in resuspended soil collecting on the lichen surface. Additional sampling would confirm this result as usual or not, and would provide a more complete coverage of the impact area. Deer samples and tissue samples from raccoon and freshwater clams show that little U, either natural or from DU, was found in the tissues. A similar result was found at Aberdeen Proving Ground in deer samples from the impact area. Thus, low concentrations in deer samples at JPG should be expected. Continued sampling of vegetation and animals at JPG is recommended.

Appendix H.

Data from Animal Samples

Table H-1. Data from animal samples. Sample numbers in parentheses correspond to a soil sample location.

year	half (of year)	sample #	U-234	error4	U-238	error8	notes
1984	1	8322120 (57)	0.016	0.007	0.024	0.008	Liver, 4.7 % ash. Area 57 deer (number in parens)
1984	1	8322120 (57)	-0.032		-0.0022		Kidney, 6.1% ash
1984	1	8322120 (57)					Bone, no sample
1984	1	8322121 (6)	-0.032		-0.0022		Liver, 2.2 % ash, composite of 2 deer
1984	1	8322121 (6)	0.056	0.027	-0.0022		Kidney, 6.2% ash
1984	1	8322121 (6)	-0.032		0.0003	0.0004	Bone 53.1 % ash
1984	1	8322122 (57)	-0.032		0.0003	0.0004	Liver 4.8% ash
1984	1	8322122 (57)	-0.032		-0.0022		Kidney, 4.9 % ash
1984	1	8322122 (57)	-0.032		-0.0022		Bone, 56.8% ash
1984	1	8322123 (57)	0.054	0.014	0.04	0.013	Liver, 4.5% ash
1984	1	8322123 (57)					Kidney, No sample
1984	1	8322123 (57)					Bone, no sample
1984	1	8322124 (54)	0.017	0.008	0.005	0.005	Liver, 4.7% ash
1984	1	8322124 (54)	-0.032		0.049	0.022	Kidney, 3.7% ash
1984	1	8322125 (54)					Bone, no sample
1984	1	8322125 (57, 80)	0.021	0.009	0.035	0.012	Liver, 4.4% ash, composite of 2 deer
1984	1	8322125 (57, 80)	-0.032		-0.0022		Bone, 61.2 % ash, composite of 2 deer
1984	1	8322125 (57,80)	0.021	0.01	0.016	0.008	Kidney, 5.3% ash, composite of 2 deer
1984	1	8322126 (57)	-0.032		0.013	0.004	Liver, 4.2% ash
1984	1	8322126 (57)	-0.032		-0.0022		Kidney, 5.7% ash
1984	1	8322126 (57)	-0.032		0.0002	0.0005	Bone, 49.7 % ash
1984	1	8322127 (57)	0.028	0.01	0.028	0.1	Liver, 4.4 % ash
1984	1	8322127 (57)					Kidney, no sample
1984	1	8322127 (57)	-0.32		0.0002	0.0004	Bone, 53.5% ash
1984	1	8322128	-0.0323		-0.0223		Raccoon muscle, 3.8% ash
1984	1	8322129	-0.0323		-0.0223		Raccoon muscle, 3.8% ash
1984	1	8322130	-0.0323		-0.0223		Raccoon muscle, 4.0% ash
1984	1	8322131	-0.032		-0.0223		Raccoon muscle, 4.0% ash
1984	1	8322132	-0.32		-0.0223		Raccoon muscle, 3.3% ash
1984	1	8322133	-0.32		-0.0223		Raccoon muscle, 4.1% ash
1984	1	8322134	-0.323		-0.0223		Raccoon muscle, 4.1% ash
1984	1	8322436	0.35	0.03	0.31	0.02	Clim soft tissue, 30.7% ash
1984	1	Deer #1	-0.001		-0.001		Deer, unspecified location or body part, 430 g wet, 144 g dry
1984	1	Deer #2	-0.001		-0.001		Deer, unspecified location or body part, 594 g wet, 238 g dry
1984	1	Deer #3	-0.001		-0.001		Deer, unspecified location or body part, 624 g wet, 270 g dry
1984	1	Deer #4	-0.001		-0.001		Deer, unspecified location or body part, 697 g wet, 295 g dry
1987	2	deer, area 52	0.0007	0.0004	0.0001	0.0002	bone, 1 yr, ASH, 26.86 ash wt, 10 analysis wt, discrepancy: LDL 0.01 pCi
1987	2	deer, area 52	0.0004	0.0002	0.0001	0.0001	bone, 1 yr, DRY, 51.10 dry wt, 10 analysis wt, discrepancy: LDL is 0.01 pCi
1987	2	deer, area 52	-0.01	0	0.0005	0.0004	bone, 1.5 yr, ASH, 41.98 ash wt, 10 analysis wt, discrepancy: -.0001 +-.0001 on data sheet

year	half (of year)	sample #	U-234	error4	U-238	error8	notes
1987	2	deer, area 52	-0.01	0	0.0003	0.0002	bone, 1.5 yr, DRY, 69.02 dry wt, 10 analysis wt, discrepancy: LDL is 0.01, 0 +- .0001 on data sheet
1987	2	deer, area 52	-0.01	0	0.0062	0.011	kidney, 1.5 yr, ASH, .21 ash wt, .21 analysis wt, discrepancy: LDL is 0.01, -.0048 +- .0048 was data
1987	2	deer, area 52	-0.01	0	0.0003	0.0005	kidney, 1.5 yr, DRY, 4.22 dry wt, .21 analysis wt, discrep: LDL is 0.01, -.0002 +- .0002 was data
1987	2	deer, area 52	0.0023	0.0034	0.0025	0.0034	liver, 1 yr, ASH, 1.41 ash wt, 1.41 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 52	0.0001	0.0002	0.0001	0.0002	liver, 1 yr, DRY, 30.47 dry wt, 1.41 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 52	0.0088	0.0049	0.0079	0.0046	liver, 1.5 yr, ASH, 1.21 ash wt, 1.21 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 52	0.0003	0.0002	0.0003	0.0002	liver, 1.5 yr, DRY, 30.85 dry wt, 1.21 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 63	0.0003	0.0003	0.0005	0.0004	bone, 2.5 yr, ASH, 46.05 ash wt, 10 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 63	0.0002	0.0002	0.0003	0.0002	bone, 2.5 yr, DRY, 74.54 dry wt, 10 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 63	0.0105	0.0082	0.0124	0.0095	kidney, 2.5 yr, ASH, .38 ash wt, .38 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 63	0.0006	0.0005	0.0007	0.0005	kidney, 2.5 yr, DRY, 6.92 dry wt, .38 analysis wt, discrepancy: LDL is 0.01
1987	2	deer, area 63	0.0175	0.0092	0.0016	0.0038	liver, 2.5 yr, ASH, 0.77 ash wt, 0.77 analysis wt
1987	2	deer, area 63	0.0008	0.0004	0.0001	0.0002	liver, 2.5 yr, DRY, 16.73 dry wt, 0.77 analysis wt, discrepancy: LDL is 0.01 pCi
1992	1	Deer 48K	-0.0003		-0.0003		Kidney sample
1992	1	Deer 48L	-0.001		-0.002		Liver sample
1992	1	Deer 60 L	-0.002		-0.002		Liver sample
1992	1	Deer 60K	-0.0009		-0.0009		Kidney Sample
1992	1	Deer 62K	-0.0003		-0.0003		Kidney sample
1992	1	Deer 62L	-0.001		-0.0008		Liver sample
1993	2	DK1	-0.01		-0.01		74 g wet, 18.4 g dry (Kidney?)
1993	2	DK2	-0.02		-0.02		127 g wet, 57.6 g dry (Kidney?)
1993	2	DK3	-0.02		-0.02		161 g wet, 99.2 g dry (kidney?)
1993	2	DK4	-0.01		-0.01		180 g wet, 71 g dry (kidney?)
1993	2	DK5	-0.01		-0.01		280 g wet, 151.6 g dry (kidney?)