



June 8, 2000
696-3241

Mr. Wayne L. Britz
Fuel Cycle/Decommissioning Branch
Division of Nuclear Materials Safety
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

**Subject: Docket No. 70-734; License No. SNM-696: Responses to Questions
Regarding Hot Particles at the Hot Cell Site**

Dear Mr. Britz:

A response to your questions regarding hot particles at GA's Hot Cell site has been prepared by GA (see enclosure).

If you should have any questions regarding the responses, please do not hesitate to call me at (858) 455-2823 or Laura Q. Gonzales at (858) 455-2758.

Very truly yours,

A handwritten signature in cursive script that reads "Laura Q. Gonzales" followed by a small flourish.

Dr. Keith E. Asmussen, Director
Licensing, Safety and Nuclear Compliance

Responses to NRC Questions Regarding Hot Particles at the Hot Cell Site

The following are the NRC questions regarding Hot Particles on GA's Hot Cell Site followed by GA's corresponding response.

NRC Question (a): How Many?

GA Response to Question (a): GA found many hot particles during D&D and post D&D. A total of about 153,000 ft³ of building material (mainly concrete), debris and soil was removed from the Hot Cell site due primarily to Cs-137 and/or Co-60 soil concentrations above the release limits and disposed of as radioactive waste.

The total number of hot particles found during scanning the surface using a 2" x 2" NaI (TI) gamma detector during the final surveys and GA's internal confirmatory survey is known and is provided below:

First Scan	89 hot particles
Second Scan	11 hot particles
Third Scan	53 hot particles
Fourth Scan	4 hot particles
Confirmatory Scan	10 hot particles

In each case, the particles were found after investigation of radiation levels $> 25 \mu\text{R/hr}$ on the surface of the soil. Either the particle was removed or soil was removed until radiation levels were below 25 microR/hr on the surface

NRC Question (b): Where in the Hot Cell Facility area were the particles found?

GA Response to Question (b): Most of them were found within the original Radiation Restricted Area boundary and a few were found outside the original Radiation Restricted Area. This is one of the reasons GA is surveying all surfaces in areas surrounding the Hot Cell Site as part of other decommissioning projects being performed.

NRC Question (c): Were there areas where particles were more concentrated than others?

GA Response to Question (c): Yes, the major areas were as follows (see Figure 4 in the Radiological Survey Report for grid locations):

1. Area East of the Depression Area: Grids C5, C6, D5, D6, D7, E6, and E7.
2. Area West of the Utility Shed - North of the TRIGA facility: Grids C1, D1, and E1.
3. In Grids F4, G4, G5, H3, H4 and H5.
4. Area South of the Utility Shed: Grids D2, D3, E3, F2, F3, F4 G3, and G4.

Responses to NRC Questions Regarding Hot Particles at the Hot Cell Site (Cont.)

5. Along the original Restricted Area fence line - Grids F1, G1, H1, I1, J1, J2, K2, L2, M2, M3, M4, M5, L6, L7, K7, J7, I7, H7, G7, F7, E7, D7, C7, C6, C5, C4, C3, D2, D3, and E2.

NRC Question (d): How do you detect the particles, scanning or in soil samples?

GA Response to Question (d): GA has detected particles both by scanning and by sampling the soil. However, GA has found that scanning the surface using a 2" x 2" NaI (TI) gamma detector was more effective in detecting hot particles. These detectors are able to identify hot particles on the surface and subsurface. (Surface scans with large area gas flow proportional detectors picked up hot particles but they were not as effective in subsurface soil or on rough terrain).

NRC Question (e): How did you separate the particles from the rest of the sample?

GA Response to Question (e):

In the field, when elevated radiation levels were measured ($> 25 \mu\text{R/hr}$) on the surface of the soil, an investigation began to see if hot particles could be located. If the source was discovered (hot particle or a small amount of soil), the particle and or soil was removed using hand tools until radiation levels were $\leq 25 \mu\text{R/hr}$.

Once the exposure rate measurement was below $25 \mu\text{R/hr}$, a soil sample was collected and analyzed. There was no attempt to find and remove a hot particle which could be in a soil sample from the rest of the soil in the sample if the radioactive concentrations measured by gamma spectroscopy indicated radiation levels less than the soil release criteria.

NRC Question (f): Did you analyze the particles for identification and activity?

GA Response to Question (f): Yes. Initially, hot particles were analyzed by gamma spectroscopy. The results were consistent, Cs-137 was the major contaminant, with Co-60 detected on occasion in much smaller concentrations. Afterwards, contaminated soil was placed directly into radioactive waste packages without further analyses.

NRC Question (g): What was the predominate radionuclide?

GA Response to Question (g): The predominate radionuclide was Cs-137.

NRC Question (h): What was the range of the activity?

GA Response to Question (h): A table showing the results of 19 hot particles analyzed by gamma spectroscopy is attached showing the range of activity.

**Attachment to
GA's Responses to NRC Questions Regarding Hot Particles at the Hot Cell Site**

Hot Cell Site Hot Particles (Analyzed in May, 2000)				
Sample ID	Approximate Activity in nCi			Dose rate at contact (~1") (μR/hr)
	¹³⁷ Cs	¹³⁴ Cs	⁶⁰ Co	
Particle-1	4.78 ± 0.14	ND	ND	30
Particle-2	617.0 ± 4.0	2.55 ± 0.45	ND	210
Particle-3	950.0 ± 6.7	34.38 ± 1.34	0.54 ± 0.35	230
Particle-4	249.0 ± 3.0	1.21 ± 0.23	ND	110
Particle-5	48.15 ± 0.43	0.18 ± 0.05	0.03 ± 0.03	32
Particle-6	116.0 ± 0.9	0.47 ± 0.08	ND	45
Particle-7	7,310.0 ± 15	27.33 ± 3.58	ND	5,000
Particle-8	23.65 ± 0.28	0.07 ± 0.02	ND	35
Particle-9	12.57 ± 0.23	0.07 ± 0.05	ND	34
Particle-10	386.0 ± 2.0	1.30 ± 0.18	ND	80
Particle-11	35.00 ± 0.32	0.07 ± 0.02	ND	37
Particle-12	347.0 ± 2.0	1.31 ± 0.15	ND	90
Particle-13	802.0 ± 5.0	2.83 ± 0.39	ND	170
Particle-14	163 ± 0.98	0.63 ± 0.08	ND	50
Particle-15	359.0 ± 5.0	0.90 ± 0.37	ND	120
Particle-16	161.0 ± 1.0	0.60 ± 0.08	ND	60
Particle-17	57.09 ± 0.69	0.28 ± 0.08	ND	42
Particle-18	667.0 ± 3.0	2.57 ± 0.32	ND	220
Particle-19	1,280.0 ± 10.0	5.44 ± 1.08	ND	500

Note: Results are in Nano-Curies, multiply by 1000 to get Pico-Curies.