Documentation of Remaining Hazardous Substances/Dangerous Wastes in B Plant

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TABLE 2: Radioactive Contamination in the Cells From the GammaCam™ Survey

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
221-B						
1-2	Floor	.08	11	16	Spill	Most likely resin ARC-259
4	East side in container	74	12	18	Internal	Sr 220 mg, Cs 340 mg, Mg 62 mg, Ca 100 mg, Ba 350 mg, Al 69 mg, Fe 140 mg, Na 59 mg
4	Northeast corner in box	39	6.3	9.5	Internal	Sr 120 mg, Cs 180 mg, Mg 33 mg, Ca 54 mg, Ba 190 mg, Al 37 mg, Fe 76 mg, Na 31 mg
4	Drum Inventory per letter #16A00-BAS-004 Jan 13, 1999	NA	10654	21669	Internal	NA
5	Southwest corner on floor	6800	1100	1600	Spill	Al 330 mg, Ba 1.5 g, Ca 44 g, Cd 27 mg, Cr 320 mg, Fe 2.1 g, Mg 24 g, Mn 47 g, Na 17 g, Ni 220 mg, Pb 150 mg, La 340 mg, Si 69 mg, Sr 22 g, Zr 560 mg, Nd 110 mg
5	North end of E-5-3	270	27	40	Internal	Al 13 mg, Ba 61 mg, Ca 1.8 g, Cd 1 mg, Cr 13 mg, Fe 82 mg, Mg 0.95 g, Mn 1.9 g, Na 0.68 g, Ni 9 mg, Pb 6 mg, La 10 mg, Nd 4 mg, Si 3 mg, Sr 0.86 g, Zr 22 mg, Cs 0.77 g
5	Southeast outlet pipe of E-5-2	850	140	200	Internal	Al 41 mg, Ba 190 mg, Ca 5.5 g, Cd 3 mg, Cr 40 mg, Fe 260 mg, Mg 3.0 g, Mn 5.9 g, Na 2.1 g, Ni 27 mg, Pb 19 mg, La 43 mg, Si 8 mg, Sr 2.7 g, Zr 69 mg, Nd 14 mg
6	Floor	17	2.8	4.2	Spill	Same as cell 7
6	In Tanks	9.7	1.5	2.3	Internal	Same as Cell 7
7	Southwest corner on wall	8.8	1.4	2.1	Spill	Sr 30 mg, Ba 1 mg, Na 3 mg, Cs 40 mg
7	In TK-7-2	3.9	0.6	0.9	Internal	Sr 10 mg, Na 1 mg, Cs 20 mg
7	Northwest corner on floor	8.5	1.4	2.1	Spill	Sr 30 mg, Ba 1 mg, Na 3 mg, Cs 40 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
7	In TK-7-1	5.8	0.9	1.4	Internal	Sr 20 mg, Na 2 mg, Cs 30 mg
8	Floor	17	2.8	4.2	Spill	Same as cell 7
8	In Tanks	9.7	1.5	2.3	Internal	Same as Cell 7
9	Southeast corner on wall	230	37	55	Spill	Na 13 g, Al 66 g, Fe 18 g, Be 42 mg, Cr 2.3 g, Ni 1.4 g, C 2.3 g, Ca 0.14 g, Cu 0.32 g, Mg 0.11 g, Mn 0.28 g, Si 0.89 g, Cs 1.0 g,Sr 0.72 g
9	On TK-9-2	67	11	16	Spill	Na 3.9 g, Al 20 g, Fe 5.4 g, Be 12 mg, Cr 0.69 g, Ni 0.42 g, C 0.67 g, Ca 40 mg, Cu 94 mg, Mg 33 mg, Mn 82 mg, Si 0.26 g, Cs 0.31 g, Sr 0.21 g
9	Northwest corner on wall	49	8	12	Spill	Na 2.9 g, Al 14 g, Fe 4.0 g, Be 9 mg, Cr 0.51 g, Ni 0.31 g, C 0.50 g, Ca 30 mg, Cu 70 mg, Mg 25 mg, Mn 61 mg, Si 0.19 g, Cs 0.23 g, Sr 0.15 g
9	Southwest corner on wall	513	83	124	Spill	Na 30 g, Al 150 g, Fe 41 g, Be 95 mg, Cr 5.3 g, Ni 3.2 g, C 5.1 g, Ca 0.31 g, Cu 0.72 g, Mg 0.26 g, Mn 0.62 g, Si 2.0 g, Cs 2.4 g, Sr 1.6 g
10	Floor	.32	525	772	Spill	Sludge in bottom of open tank
11	Southwest corner on floor	470	76	110	Spill	Na 160 g, Al 680 g, Fe 91 g, Be 1.3 g, Cr 12 g, Ni 6.6 g, C 52 g, Ca 950 mg, Cu 1.4 g, Mg 1.3 g, Mn 1.4 g, Si 8.8 g, Cs 2.2 g
11	Northwest corner on floor	660	110	160	Spill	Na 230 g, Al 970 g, Fe 130 g, Be 1.8 g, Cr 18 g, Ni 9.5 g, C 75 g, Ca 1.4 g, Cu 2.0 g, Mg 1.8 g, Mn 2.0 g, Si 12 g, Cs 3.1 g
12	Floor	164	37	55	Spill	Same as Cell 14
13	Floor	164	37	55	Spill	Same as Cell 14
14	Northwest corner on wall	75	12	18	Spill	Sr 240 mg, Ca 7.2 g, Mg 4.4 g, Mn 17 g, Fe 120 mg, Al 87 mg, Nd 76 mg, Cs 350 mg, La 230 mg
14	Southwest corner on wall	76	12	18	Spill	Sr 0.24 g, Ca 7.2 g, Mg 4.4 g, Mn 17 g, Fe 0.12 g, Al 87 mg, La 0.17 g, Nd 59 mg, Cs 0.35 g
14	West side on wall	22	4	5	Spill	Sr 70 mg, Ca 2.1 g, Mg 1.3 g, Mn 4.9 g, Fe 34 mg, Al 25 mg, La 50 mg, Nd 17 mg, Cs 0.1 g

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
14	Northeast corner on wall	17	3	4	Spill	Sr 50 mg, Ca 1.5 g, Mg 0.92 g, Mn 3.5 g, Fe 24 mg, Al 18 mg, La 36 mg, Nd 12 mg, Cs 80 mg
14	On TK-14-2	39	6	10	Spill	Sr 0.13 g, Ca 3.9 g, Mg 2.4 g, Mn 9.1 g, Fe 63 mg, Al 47 mg, La 93 mg, Nd 32 mg, Cs 0.18 g
15	South end of cell	3.9	0.6	0.9	Spill	Cs 20 mg, Sr 10 mg
16	Northwest end of cell	1000	160	240	Spill	Cs 4.6 g, Al 170 mg, Fe 410 mg, K 28 g, Mg 250 mg, Mn 100 mg, Na 25 g, Pb 360 mg, Rb 70 mg, Sr 3.2 g
16	Southwest end of cell	1400	230	340	Spill	Cs 6.5 g, Al 0.24 g, Fe 0.58 g, K 39 g, Mg 0.35 g, Mn 0.14 g, Na 35 g, Pb 0.51 g, Rb 96 mg, Sr 4.5 g
16	West side of cell	260	43	64	Spill	Cs 1.2 g, Al 45 mg, Fe 0.11 g, K 7.4 g, Mg 65 mg, Mn 27 mg, Na 6.6 g, Pb 95 mg, Rb 18 mg, Sr 0.84 g
16	Northeast middle of the cell	360	59	87	Spill	Cs 1.7 g, Al 62 mg, Fe 0.15 g, K 10 g, Mg 89 mg, Mn 37 mg, Na 9.1 g, Pb 0.13 g, Rb 25 mg, Sr 1.2 g
16	Northeast end of cell	600	97	145	Spill	Cs 2.8 g, Al 100 mg, Fe 240 mg, K 17 g, Mg 150 mg, Mn 61 mg, Na 15 g, Pb 220 mg, Rb 40 mg, Sr 1.9 g
17	Southwest corner on wall	800	130	200	Spill	Cs 3.7 g, Al 140 mg, Fe 330 mg, K 22 g, Mg 200 mg, Mn 82 mg, Na 20 g, Pb 290 mg, Rb 55 mg, Sr 2.6 g
17	Southwest corner on floor	80	13	19	Spill	Cs 8.3 g, Al 310 mg, Fe 740 mg, K 50 g, Mg 440 mg, Mn 180 mg, Na 45 g, Pb 650 mg, Rb 120 mg, Sr 5.7 g
17	In TK-17-1	2600	420	630	Internal	Sr 8.2 g, Ca 250 g, Mg 150 g, Mn 580 g, Fe 4.0 g, Al 3.0 g, La 7.9 g, Cs 12 g, Nd 2.6 g
17	Northwest corner on floor	610	99	150	Spill	Sr 2.0 g, Ca 59 g, Mg 36 g, Mn 140 g, Fe 940 mg, Al 710 mg, La 1.9 g, Cs 2.8 g, Nd 620 mg
17	On TK-17-2	830	130	200	Spill	Cs 3.8 g, Al 0.14 g, Fe 0.34 g, K 23 g, Mg 0.20 g, Mn 85 mg, Na 21 g, Pb 0.3 g, Rb 57 mg, Sr 2.6 g

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
17	Southeast corner on wall	320	52	78	Spill	Cs 1.5 g, Al 55 mg, Fe 0.13 g, K 8.9 g, Mg 78 mg, Mn 33 mg, Na 8.0 g, Pb 0.12 g, Rb 22 mg, Sr 1.0 g
18	Southwest corner on floor	80	13	20	Spill	Sr 250 mg, Ca 7.5 g, Mg 4.6 g, Mn 18 g, Fe 120 mg, Al 91 mg, La 240 mg, Cs 370 mg, Nd 80 mg
18	West wall	67	11	16	Spill	Sr 210 mg, Ca 6.3 g, Mg 3.8 g, Mn 15 g, Fe 100 mg, Al 76 mg, La 200 mg, Cs 310 mg, Nd 67 mg
19	In TK-19-1	1400	230	340	Internal	Cs 6.5 g, Al 240 mg, Fe 570 mg, K 39 g, Mg 340 mg, Mn 140 mg, Na 35 g, Pb 100 mg, Rb 100 mg, Sr 4.4 g
20	South end of wall	720	120	180	Spill	Cs 3.4 g, Al 0.12 g, Fe 0.3 g, K 20 g, Mg 0.18 g, Mn 74 mg, Na 18 g, Pb 0.26 g, Rb 49 mg, Sr 2.3 g
20	Southwest corner on floor	6400	1000	1600	Spill	Cs 30 g, Al 1.1 g, Fe 2.6 g, K 180 g, Mg 1.6 g, Mn 0.65 g, Na 160 g, Pb 2.3 g, Rb 0.44 g, Sr 20 g
20	Northeast outlet pipe of E-20-2	2500	400	600	Internal	Cs 11 g, Al 0.42 g, Fe 1.0 g, K 68 g, Mg 0.6 g, Mn 0.25 g, Na 61 g, Pb 0.88 g, Rb 0.17 g, Sr 7.8 g
20	Northeast corner on pipes	2300	380	560	Spill	Cs 11 g, Al 0.4 g, Fe 0.95 g, K 65 g, Mg 0.57 g, Mn 0.24 g, Na 58 g, Pb 0.84 g, Rb 0.16 g, Sr 7.4 g
20	Southeast corner on floor	2000	323	485	Spill	Cs 9.2 g, Al 340 mg, Fe 820 mg, K 56 g, Mg 490 mg, Mn 200 mg, Na 50 g, Pb 720 mg, Rb 140 mg, Sr 6.3 g
20	West wall	2500	400	610	Spill	Cs 12 g, Al 420 mg, Fe 1.0 g, K 70 g, Mg 610 mg, Mn 250 mg, Na 62 g, Pb 900 mg, Rb 170 mg, Sr 7.9 g
21	Southeast corner on floor	25	4	6	Spill	Cs 0.11 g, Al 4 mg, Fe 10 mg, K 0.66 g, Mg 6 mg, Mn 2 mg, Na 0.59 g, Pb 9 mg, Rb 2 mg, Sr 80 mg
22	Outlet pipe of F-22-8-1	150	24	36	Internal	Sr 470 mg, Cs 710 mg, Mg 130 mg, Ca 220 mg, Ba 740 mg, Al 140 mg, Fe 300 mg, Na 120 mg
22	Outlet pipe of F-22-5	47	8	11	Internal	Sr 220 mg, Cs 330 mg, Mg 61 mg, Ca 100 mg, Ba 340 mg, Al 68 mg, Fe 140 mg, Na 57 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
23	South wall in pipes	6.8	1	2	Internal	Sr 20 mg, Na 570 g, Ca 370 mg, Al 34 mg, Cr 47 mg, Zr 83 mg, Pb 85 mg, Ba 12 mg, Cd 10 mg, Fe 5.0 mg, Mg 2.0 mg, Mn 5.0 mg, Ni 5.0 mg, Cs 30 mg, La 13 mg, Nd 4.0 mg
23	Northwest corner on floor	5.4	0.9	1.3	Spill	Sr 20 mg, Na 570 g, Ca 370 mg, Al 34 mg, Cr 47 mg, Zr 83 mg, Pb 85 mg, Ba 12 mg, Cd 10 mg, Fe 5.0 m, Mg 2.0 mg, Mn 5.0 mg, Ni 5.0 mg, Cs 20 mg, La 13 mg, Nd 4.0 mg
23	Northeast corner on wall	0.70	0.1	0.2	Spill	Sr 2 mg, Na 57 g, Ca 37 mg, Al 3 mg, Cr 5 mg, Zr 8 mg, Pb 9 mg, Ba 1 mg, Cd 1 mg, Fe 1 mg, Mn 1 mg, Ni 1 mg, La 1 mg, Cs 4 mg
24	Southwest corner on box	35	6	8	Spill	Na 2.0 g, Al 10 g, Fe 2.8 g, Be 6 mg, Cr 0.36 g, Ni 0.22 g, C 0.34 g, Ca 21 mg, Cu 49 mg, Mg 17 mg, Mn 42 mg, Si 0.14 g, Cs 0.16 g, Sr 0.11 g
24	East side on floor of box	100	16	24	Spill	Na 5.8 g, Al 29 g, Fe 8.0 g, Be 18 mg, Cr 1.0 g, Ni 0.62 g, C 0.99 g, Ca 60 mg, Cu 0.14 g, Mg 50 mg, Mn 0.12 g, Si 0.39 g, Cs 0.46 g, Sr 0.32 g
25	East side on floor	9	1	2	Spill	Cs 40 mg, Na 280 g, Sr 30 mg
25	West side on floor	23	4	6	Spill	Co 0.5 mg, Cs 110 mg, Na 760 g, Sr 2.9 g
26	East side of cell	2	0.3	0.5	Spill	Al 750 mg, Ca 11 g, Fe 110 mg, Mg 8.0 mg, Mn 2.3 g, Sr 10 mg, Cs 10 mg
26	Middle of cell	3	0.5	0.7	Spill	Al 750 mg, Ca 11 g, Fe 110 mg, Mg 8.0 mg, Mn 2.3 g, Sr 10 mg, Cs 10 mg
27	In TK-27-3	2.2	0.4	0.5	Internal	Al 71 mg,Ca 1.1 g,Fe 23 mg,Mg 1 mg,Mn 0.23 g,Sr 10 mg, Cs 10 mg
28	Northwest corner on wall	0.82	0.1	0.2	Spill	Al 3 mg, Ca 53 mg, Fe 1 mg, Mg 5 mg, Mn 17 mg, Na 3 mg, Sr 2mg, Cs 4 mg,
28	Outlet pipe of TK-28-3	5.3	0.9	1.3	Internal	Al 31 mg, Ba 1.0 mg, Ca 530 mg, Fe 8.0 mg, Mg 50 mg, Mn 170 mg, Na 26 mg, Sr 20 mg, Cs 20 mg
28	Southwest corner on floor	4.4	0.7	1.1	Spill	Al 15 mg, Ba 0.5 mg, Ca 260 mg, Fe 4.0 mg, Mg 25 mg, Mn 85 mg, Na 13 mg, Sr 10 mg, Cs 20 mg
29	South end on floor	240	38	58	Spill	Al 92 mg, Ba 200 mg, Ca 740 mg, Cd 21 mg, Cr 1.0 g, Fe 1.1 g, Mg 66 mg, Na 2.2 g, Sr 750 mg, Cs 1.1 g, La 2.0 g, Nd 680 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
29	Pipe leaving east wall	110	17	26	Internal	Al 41 mg, Ba 90 mg, Ca 340 mg, Cd 9.0 mg, Cr 470 mg, Fe 500 mg, Mg 30 mg, Na 1.0 g, Sr 340 mg, Cs 490 mg, La 920 mg, Nd 310 mg
29	Pipe leaving west wall	310	51	76	Internal	Al 0.12 g, Ba 0.26 g, Ca 0.99 g, Cd 28 mg, Cr 1.4 g, Fe 1.4 g, Mg 88 mg, Na 3.0 g, La 2.0 g, Nd 0.70 g, Sr 1.0 g, Cs 1.5 g
30	South end on floor	44	7	11	Spill	Ca 16 mg, Cd 7.0 mg, Cr 300 mg, Cu 120 mg, Fe 27 g, Mg 1.0 mg, Mn 7.0 g, Na 200 g, Ni 1.1 g, Pb 1.3 g, Sr 140 mg, Cs 200 mg, La 1.1 g, Nd 370 mg
30	Northwest corner on floor	35	6	8	Spill	Ca 13 mg, Cd 5.0 mg, Cr 240 mg, Cu 90 mg, Fe 21 g, Mg 1.0 mg, Mn 5.5 g, Na 150 g, Ni 880 mg, Pb 1.0 g, Sr 110 mg, Cs 160 mg, La 880 mg, Nd 290 mg
31	Outlet pipe of TK-31-3	1.7	0.3	0.4	Internal	Al 3 mg, Fe 3 mg, Mn 1 mg, Na 8 mg, Sr 10 mg, Cs 10 mg
31	Outlet pipe from west wall	1.5	0.2	0.4	Internal	Al 3 mg, Fe 3 mg, Mn 1 mg, Na 8 mg, Sr 5 mg, Cs 10 mg
32	Middle of cell	0.83	0.1	0.2	Spill	Al 1 mg, Fe 1 mg, Mn 1 mg, Na 3 mg, Sr 2 mg, Cs 4 mg
32	Middle of cell	1.2	0.2	0.3	Spill	Al 3 mg, Fe 3 mg, Mn 1 mg, Na 8 mg, Sr 5 mg, Cs 10 mg
32	Middle of cell	1.5	0.2	0.4	Spill	Al 1 mg, Fe 2 mg, Mn 1 mg, Na 4 mg, Sr 3 mg, Cs 5 mg
33	Southwest corner on wall	94	15	23	Spill	Na 160 g, Sr 300 mg, Cs 430 mg
33	South end of box	144	23	35	Spill	Sr 460 mg, Cs 670 mg, Mg 120 mg, Ca 200 mg, Ba 690 mg, Al 140 mg, Fe 280 mg, Na 120 mg
34	Between TK-34-2 and TK-34-1 on floor	540	88	132	Spill	Na 3.3 g, Cs 2.5 g, K 1.7 g, Fe 430 mg, Al 170 mg, Rb 98 mg
35	Middle of cell on floor	760	120	180	Spill	Sr 2.4 g, Ba 61 mg, Ca 14 mg, La 2 mg, Nd 1 mg, Zr 1 mg, Cs 3.5 g
35	South end of cell	350	57	85	Spill	Sr 1.1 g, Ba 28 mg, Ca 7 mg, La 1 mg, Cs 1.6 g
36	West side on floor	14	2.3	3.4	Spill	Sr 40 mg, Ba 0.9 mg, Ca 0.2 mg, Cs 60 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
36	In TK-36-1	30	4.9	7.3	Internal	Sr 0.10 g, Ba 3 mg, Ca 1 mg, Cs 0.14 g
37	In TK-37-2	18300	3000	4400	Internal	Fe 5.6 kg, Al 270 g, Na 3.3 kg, Cr 330 g, Ni 220 g, Ca 17 g, Sr 58 g, Cs 85 g, Zr 130 g
37	Southeast corner on wall	1500	250	370	Spill	Fe 470 g, Al 23 g, Na 280 g, Cr 28 g, Ni 18 g, Ca 1.5 g, Sr 4.8 g, Cs 7.1 g, Zr 11 g
38	Outlet pipes of west wall	2100	330	500	Spill	Cs 6.9 g, Al 0.25 g, Fe 0.60 g, K 41 g, Mg 0.36 g, Mn 0.14 g, Na 37 g, Pb 0.53 g, Rb 0.10 g, Sr 6.5 g
38	Northeast corner on floor	1000	160	240	Spill	Cs 4.6 g, Al 170 mg, Fe 400 mg, K 28 g, Mg 240 mg, Mn 94 mg, Na 24 g, Pb 350 mg, Rb 67 mg, Sr 3.2 g
39	South end on floor	11300	1800	2700	Spill	Cs 52 g, Al 42 mg, Ba 1.1 g, Fe 0.5 mg, K 2.2 g, Mg 5.0 mg, Mn 2 mg, Na 11 g, Pb 6.0 mg, Rb 7.0 mg, Sr 36 g
40	Piping	N/A	4.9	7.3	Internal	Same as Cell 36
TOTALS			12000	18000		

TABLE 3: Radiation on the Deck

DECK	LOCATION in DECK	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs
221-B				
7	West walkway	0.1	0.02	0.03
10	Next to pipe	3.7	0.6	0.9
13	3rd coverblock from north	0.3	0.05	0.07
14	West walkway	0.3	0.05	0.07
14	East walkway	0.5	0.08	0.1
15	3rd coverblock from north	0.2	0.04	0.06
17	4th coverblock from north	0.7	0.1	0.2
18	West walkway	0.3	0.04	0.06
19	West walkway	0.3	0.06	0.04
19	1st coverblock from north	0.2	0.03	0.05
20	4th coverblock from north	0.1	0.02	0.03
23	4th coverblock from north	0.1	0.02	0.03
32	Walkway	2.3	0.4	0.6
32	2nd coverblock from north	1.5	0.2	0.4
34	Walkway	52	8.4	12.6
34	On extra coverblock	34	5.5	8.2
35	Walkway	35	5.6	8.4

DECK	LOCATION in DECK	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs
36	3rd coverblock from north	1.6	0.2	0.4
37	3rd coverblock from north	4.0	0.6	1.0
37	South end	1.3	0.2	0.3
38	Northwest walkway	9.0	1.4	2.2
38	Walkway	2.2	0.4	0.5
39	East side	9.1	1.5	2.2
39	South end	1.5	0.2	0.4
39	1st coverblock from north	4.5	0.7	1.1
39	1st coverblock from north	2.3	0.4	0.6
Pipe Trench[1]	Piping	N/A	53	81
Wind Tunnel[2]	Floor/walls	N/a	20000	40000
Waste Cask[3]	On Deck	N/Am	1	2
Tk-100[4]	On deck	N/A	43	73

1. Curies in the pipe trench were assumed to be the same as for cell 6 for the 35 cells covered by the length of the pipe trench.
2. Curies in the Wind tunnel are assumed to be equal to the cell inventory.
3. Curies in the waste cask are assumed to be minimal.
4. Curies are reference from HNF-2730.