

APPENDIX 3

2003 SAMPLING SITES FOR METALS AND RADIONUCLIDES

Sample ID	Description	Sample date	Growth rate/month	Approx age of sample	avg start height	life of stack (months)	Comments
GO_BS	old gyp - base of stack 1/2 Ramp	02/07/2003	0.89	35 months		30	cell 1
GO_MS	old gyp - middle of stack 1/2 Ramp	03/07/2003	0.89	18-23 months	275.51	26	cell 2. 11.57 approx sample height
GO_TS	old gyp - top of stack	04/07/2003	0.89	4 months		28	Average Sep01 to Feb02
GN_C4	new gyp - cell 4	05/07/2003	0.76	<1 week			
HH_2	hemihydrate	06/07/2003	n/a	<1 hour			
PGS_RN	slurry - radionuclides - Cell 4 spigot	27/08/2003 After shutdown					

APPENDIX 4

SURVEYED PG STACK GROWTH RATES

	Cell 1			
Level No.	North	West	South	East
1	275.57	275.47	275.61	275.63
2	275.57	275.41	275.79	275.73
3	275.73	275.24	276.21	275.77
4	275.70	275.16	276.26	275.84
5	275.77	275.24	276.15	275.71
6	275.94	275.35	276.28	275.58
7	275.96	275.33	275.92	275.61
8	276.20	275.31	275.91	275.57
9	276.44	275.32	276.01	275.43
10	276.51	275.49	275.97	275.56
11	276.49	275.26	275.93	275.64
12	276.49	275.06	276.02	275.67
13	276.51	275.37	275.88	275.64
14	276.80	275.82	275.98	275.63
15	276.83	275.88	275.85	275.59
16	276.75	275.94	275.84	275.51
17	276.73	275.35	275.65	275.46
18	276.45	275.43		275.48
19	276.21	275.44		275.44
20	276.05	275.37		275.47
21	275.93	275.37		275.47
22	275.80	275.27		275.46
23		275.27		275.38
24		275.33		275.35
25		275.31		275.34
26		275.36		275.41
27		275.34		275.52
28		275.35		275.61
29		275.30		275.72
30		275.28		275.70
31		275.26		275.69
32		275.45		275.65
Average	276.2006	275.379	275.956	275.5705

Monthly Gypsum Stack Wall Levels – Aug 00 (early stages Cell 1)

	Cell 1			
Level No.	North	West	South	East
1		299.72	299.64	300.87
2		299.80	299.63	300.90
3		299.79	299.64	300.95
4		299.94	299.62	300.81
5		300.02	299.75	300.57
6		300.23	299.65	300.46
7		300.20	299.68	300.21
8		300.24		300.16
9		300.33		300.24
10		300.49		300.06
11		300.43		299.92
12		300.46		299.85
13				299.59
14				
15				
Average	280.82	300.14	299.66	300.35

280.820 299.522 299.138 299.371

0.62 0.52 0.98

Date Surveyed: 30/03/2003

Monthly Gypsum Stack Wall Levels - Mar 03 (end of Cell 1)

Cell 2				
Level No.	North	West	South	East
1	274.88	275.87		
2	274.96	275.80		
3	275.13	275.68		
4	275.13	275.65		
5		275.54		
6		275.63		
7		275.56		
8		275.57		
9		275.38		
10		275.25		
11		275.14		
12		275.05		
13		274.94		
14		274.83		
15		274.93		
Average	275.026 8	275.388 7		

Last Month

Change for Month

**Monthly Gypsum Stack Wall Levels –
Jan 01 (start of Cell 2)**

Cell 2				
Level No.	North	West	South	East
1	300.09	300.56		300.36
2	300.17	300.62		300.55
3	300.00	300.99		300.39
4	300.14	300.65		300.34
5	300.16	300.72		300.46
6	300.15	300.50		300.59
7	300.39	300.59		300.76
8	300.43	300.55		300.92
9	300.45	300.26		300.96
10	300.47	300.22		300.99
11	300.36	300.13		301.12
12		300.04		301.19
13		300.23		301.37
14		300.30		301.64
15		300.09		301.32
Average	300.26	300.43	280.90	300.86

298.686 299.935 280.900 299.109

1.57 0.49 1.75

**Monthly Gypsum Stack Wall Levels -
Mar 03 (end of Cell 2)**

Cell 4				
Level No.	North	West	South	East
1	275.72	276.07	275.46	275.81
2	276.00	276.14	275.56	275.67
3	276.21	276.22	275.71	275.32
4	276.31	276.12	275.65	275.56
5	275.89	276.08	275.65	275.62
6	275.76	275.97	275.44	275.55
7	275.76	275.93	275.50	275.63
8	275.72	275.73	275.43	275.76
9	275.93	275.64	275.51	276.05
10	275.70	275.59	275.47	275.96
11	275.52	275.52	275.69	275.95
12	275.34	275.49	275.81	276.05
13	275.66	275.36	275.84	276.28
14	275.65	275.47	275.84	276.46
15	275.75	275.17	275.72	276.75
Average	275.79	275.76	275.62	275.89

**Monthly Gypsum Stack Wall Levels –
May 03 (start of Cell 4)**

Cell 4				
Level No.	North	West	South	East
1	279.35	280.37	279.37	279.25
2	279.30	280.28	279.35	279.29
3	278.90	280.16	279.29	279.21
4	278.95	279.73	279.37	279.24
5	278.96	279.71	279.01	279.33
6	279.03	279.52	279.19	279.80
7	279.30	279.53	279.13	279.76
8	279.50	279.53	279.26	279.50
9	279.74	279.29	279.18	279.24
10	279.97	279.59	279.50	279.52
11	280.81	279.50	279.65	279.40
12	280.04	279.88	279.78	279.55
13	279.79	279.71	280.10	279.77
14	279.60	279.57	280.17	279.35
15	279.41		280.33	279.37
Average	279.51	279.74	279.51	279.44

**Monthly Gypsum Stack Wall Levels -
Sep 03**

Cell 1	Date surveyed	Average mRL	Growth	Avg growth per month
Cell 1	Aug-00	275.71		
	Mar-03	300.12	24.41	0.813666667
Cell 2	Jan-01	275.31		
	Mar-03	300.54	25.23	0.970384615
Cell 4	May-03	275.768		
	Sep-03	279.547	3.779	0.7558
Total average growth/month all stacks:				0.846617094

0.892026 Average growth of Cells 1/2

Monthly Gypsum Stack Wall Levels - Aug 00 (early stages Cell 1)

Cell 1				
Level No.	North	West	South	East
1	275.57	275.47	275.61	275.63
2	275.57	275.41	275.79	275.73
3	275.73	275.24	276.21	275.77
4	275.70	275.16	276.26	275.84
5	275.77	275.24	276.15	275.71
6	275.94	275.35	276.28	275.58
7	275.96	275.33	275.92	275.61
8	276.20	275.31	275.91	275.57
9	276.44	275.32	276.01	275.43
10	276.51	275.49	275.97	275.56
11	276.49	275.26	275.93	275.64
12	276.49	275.06	276.02	275.67
13	276.51	275.37	275.88	275.64
14	276.80	275.82	275.98	275.63
15	276.83	275.88	275.85	275.59
16	276.75	275.94	275.84	275.51
17	276.73	275.35	275.65	275.46
18	276.45	275.43		275.48
19	276.21	275.44		275.44
20	276.05	275.37		275.47
21	275.93	275.37		275.47
22	275.80	275.27		275.46
23		275.27		275.38
24		275.33		275.35
25		275.31		275.34
26		275.36		275.41
27		275.34		275.52
28		275.35		275.61
29		275.30		275.72
30		275.28		275.70
31		275.26		275.69
32		275.45		275.65
Average	276.2006	275.379	275.9562	275.5705

APPENDIX 5

RESULTS OF DH PG LEACHING EXPERIMENTS CARRIED OUT BY ENVIRONMENTAL GEOCHEMISTRY INTERNATIONAL FOR IN-PIT DISPOSAL TRIAL

ANC = 0kg H2SO4/t
 Paste pH = 2.3
 Paste EC = 5.6 dS/m

Parameters	Unit	Detection Limit	Concentration in Solution						
			4	8	12	16	20	24	
Week			1	2	3	4	5	6	
Collection No.									
Volume leached	l	1	0.304	0.266	0.269	0.273	0.269	0.263	
Cumulative volume	l		0.304	0.571	0.84	1.113	1.382	1.644	
Leaching fraction	l/kg		0.122	0.228	0.336	0.445	0.552	0.657	
pH	-	0.1	1.7	2	2.4	2.7	3	3.4	
EC	dS/m	0.01	15.8	10.3	7	4.3	3.4	3.5	
Alkalinity	mg/l	1	-	-	-	-	-	-	
Acidity	mg/l	1	15221	6597	4443	1833	924	765	
Al	mg/l	0.1	670.9	335.3	91.9	17.1			
B		0.1	0.8	-	-	-			
Ca		0.1	1588	1167	900	728			
Cl		2	100	70	50	1430			
Cr		0.1	1.2	-	-	-			
Cu		0.1	1.5	-	-	-			
F		10	2350	1100	240	70			
Fe		0.1	42.6	21.3	8.7	2.9			
K		1	206	121	81	69			
Mg		0.1	74	60	28	61			
Mn		0.1	71.8	55.3	27.9	9.5			
Na		1	368	303	217	940			
Ni		0.1	1.1	-	-	-			
N-NO3		0.1	-	-	0.6	0.5			
P		1	4452	-	-	-			
P-PO4		1	4500	3240	1640	560			
Si		0.5	311.7	113.4	40.8	24.3			
SO4		1	2208	-	-	-			
V		0.1	1.8	1.2	0.6	0.2			
Zn		0.1	8.1	5.7	2.5	0.8			
Ag	ug/l	0.2	1	-	-	-			
As		2	377	282	139	48			
Ba		1	8221	-	-	-			
Be		2	106	-	-	-			
Bi		0.1	<0.1	-	-	-			
Cd		0.5	183.1	140.5	64.4	21.5			
Ce		0.05	684.9	-	-	-			
Co		2	459	-	-	-			
Hg		2	<2	-	-	-			
Mo		1	77	-	-	-			
Pb		10	300	-	-	-			
Sb		0.2	32.8	-	-	-			
Se		10	40	-	-	-			
Sn		2	<2	-	-	-			
Sr		0.5	19373	14765	12047	7804			
Tl		0.2	29.9	-	-	-			
U		0.1	1540	957	423	120			
W		0.5	3.2	-	-	-			

NOTE: SAMPLE PG TYPE, SAMPLING SITE AND SAMPLING DATE NOT SPECIFIED

APPENDIX 6

APPROXIMATE PIT VOID VOLUMES: CALCULATIONS

Pit	Crest RL	Toe/F W RL	Avg Depth (m):	Pit	Crest RL	Toe/F W RL	Avg Depth (m):	Pit	Crest RL	Toe/F W RL	Avg Depth (m):	Pit	Crest RL	Toe/F W RL	Avg Depth (m):
T15	265.9	235.7	25.52746212	T16	266.4	245.5	24.238095	T17	278.5	256.2	27.41	T18	267.8	261.8	18.193506
	265	234.8			266	252.3			261.1	251.4			272.8	254.1	49
			Avg Length (m):				Avg Length (m):				Avg Length (m):				Avg Length (m):
	263.8	239.6			265.8	255.2			278.1	242.8			269.3	269.6	
	265.5	256.1	397		265.7	235.9	500		260.6	240.2	500		266.6	240.2	374
	265	242.6			263.9	237.9			277.6	226.4			266.8	263.5	
			Avg Width (m):				Avg Width (m):				Avg Width (m):				Avg Width (m):
	261.3	224.2			266.1	237			260.8	224.6			265.5	254.1	
	260.3	238.6	263.4		261	230.2	458.2		275.5	255.3	462.2		274.6	260.1	326.8
	259.9	245.4			262.8	232.1			260.5	243.7			270.9	253.2	
			Approx Vol (m3):				Approx Vol (m3):				Approx Vol (m3):				Approx Vol (m3):
	261.3	247.4			266.4	233.1	5552947.6		274.8	248.6			268.7	250.5	2223668.5
	262.1	228.2	2669401.609		263.1	250.3	19		260.8	239	6334451		268	235.9	83
	262	230.9			263.7	246.5			275.3	232.3			268.4	268.7	
	262.7	239.6			266.5	259.1			260.7	234.1			269.03	244.5	
	263.2	231			263	240.7			274	241.2166	67			258.4	
	263.3	224.3			262.2	242.7			270.6					249.8	
	263.7	226.1			264.4	237.9	71429		260.5					241.9	
	264.7	232.9				229.2			268.62	67				236.8	
	263.10	250.2				233.1								258.4	
	63	249.3				225.5								248	
		231.9				240.23	333							249.8	
		229												228.1	
		Total length													
		230 1:	1776												240.3
		Avg length													250.84
		240.6 T15-18:	1771												29
		237.7 Average:	5												
		240.6					TOTAL	1773							
		235.8					LENGTH	.5							
		231					AVG	377.							
		256.9					WIDTH	65							
		249.3					AVG	23.8							
		230.1					DEPTH	4							
		227.2						1596							
		250.3					APPROX	7132							
		243.6					VOL (M3)	.6							
		229.2													
		237.57													
		879													

GALAH PIT

Crest RL	Toe/FW RL	Avg Depth (m):
264.7	250	35.05
265.7	246.1	
265.6	215.4	Avg Length (m):
264.1	218.7	705.7
263.3	250	
262.8	215.5	Avg Width (m):
263	238.1	359.2
263.1	215.5	
265.1	217.1	Approx Vol (m3):
264.1556	212.3	8884734.772
	249.4	
	234.9	
	215.5	
	218.7	
	251	
	234.9	
	220.4	
	220.4	
	229.1056	

BROLGA PIT

Crest RL	Toe/FW RL	Avg Depth (m):
265.8	258.2	26.11908
263.7	244.5	
263.3	233.9	Avg Length (m):
263.7	224.96	436.6
264.1	225.1	
266.9	220.1	Avg Width (m):
264.7	235.9	252.8
264.9	249.4	
265.7	224.1	Approx Vol (m3):
266.9	232.8	2882828
267.7	232.9	
268.1	245.5	
267.5	236.9	
266.5	216.2	
265.6786	230.99	
	229.9	
	256.3	
	236.7	
	253.4	
	248.5	
	251.4	
	256.3	
	242.6	
	246.5	
	251.5	
	249.5	
	240.7	
	231.9	
	257.3	
	243.6	
	228.97	
	245.6	
	254.4	
	242.7	
	231.9	
	223.1	
	242.7	
	238.8	
	227.1	
	239.5595	

CORELLA PIT

Crest RL	Toe/FW RL	Avg Depth (m):
249.3	263.1	24.00004
253.8	253.5	
265.7	241.6	Avg Length (m):
267.1	241.7	594
265.7	209.3	
255.4	234.9	Avg Width (m):
265.8	226.1	226.3
265.97	259.2	
269.4	259.4	Approx Vol (m3):
268.6	241.7	3226138
272.2	253.3	
261.4	230	
270.9	231.8	
263.9438	249.6	
	261.2	
	236.9	
	207.5	
	246.5	
	227.9	
	253.5	
	239.8	
	255.3	
	235.9	
	247.5	
	248.6	
	225	
	252.6	
	254.4	
	249.6	
	243.6	
	227.1	
	223.1	
	246.6	
	233.8	
	226	
	251.5	
	230.9	
	236.8	
	214.3	
	246.6	
	229.97	
	229.97	
	239.9438	

JABIRU PIT