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Appendix 3.

Radiometric data

Exposure rate readings for environmental data
and assay readings for geophysical data

Area near manganese dump

Traverse A

	Easting	Northing	TC/s	K%	Uppm	Thppm
23 (1-2)	397037	7706998	654	2.7	208.9	84.0
24 (2-3)			1338	4.8	438.9	170.6
25 (3-4)	397005	7706921	713	3.7	218.3	101
(5-6)			X			
(6-7)			X			
(7-8)			X			
			uSv/hr	uR/hr	uGy/hr	
20 (1-2)	396982	7706966	1.37	137	1.2	
21 (2-3)			2.45	245	2.15	
22 (3-4)			1.2	120	1.05	
19 (5-6)			0.91	91	0.8	
17 (6-7)			2.7	270	2.37	
18 (7-8)	397055	7706886	0.96	96	0.85	

Waste pile W of Pit

Taverse B

	Easting	Northing	uSv/hr	uR/hr	uGy/hr
(1-2)	396460	7705611	1.11	111	0.97
(2-3)			2.7	270	2.37
(3-4)			1	100	0.88
(5-6)	396471	7705648	1.17	117	1.03
(6-7)			2.7	270	2.4
(7-8)			1.7	179	1.57

Dump near crusher and plant

Traverse C

	Easting	Northing	TC/s	K%	Uppm	Thppm	uSv/hr	uR/hr	uGy/hr
			Around base of waste rock pile						
(1-2)	396799	7706718	501	2.8	152.9	85.8	1.09	109	0.95
(2-3)	396828	7706716	X				1.91	191	1.67
(3-4)	396847	7706722	X				2.8	280	2.44
(4-5)	396836	7706699	X				1.77	177	1.55
			From base out to 100m						
(6-7)	396833	7706684	262	2.5	76.6	43.8	0.66	65	0.58
(7-8)	396756	7706699	244	2.9	68.6	39	0.65	65	0.57
(8-9)	396768	7706674	288	2.1	87.7	47.2	0.69	69	0.61
(9-10)	396776	7706680	266	2.7	77.8	45.3	0.69	69	0.57
(10-11)	396772	7706680	217	2.1	60.3	39.2	0.58	58	0.51
(11-12)	396761	7706656	199	2.7	48.8	34.4	0.51	51	0.44

SUMP

Traverse D

	Easting	Northing	TC/s	K%	Uppm	Thppm
1 (1-2)	396485	7707990	246	2.4	61.4	61.4
2 (2-3)	396480	7707994	309	2.3	78.9	81.8
3 (3-4)	396441	7707977	268	2.7	59.4	82.1
4 (4-5)	396464	7707980	232	2.6	55.8	61.4
5 (6-7)	396451	7707948	218	2.6	48.7	61.4
6 (7-3)	396458	7707939	268	2.0	65.1	75.5
7 (3-8)	396451	7707952	295	2.2	80.6	70.1
8 (8-9)	396501	7707967	215	1.8	50.9	63.7
			uSv/hr	uR/hr	uGy/hr	
1 (1-2)	396485	7707990	0.53	53	0.46	
2 (2-3)	396480	7707994	0.59	59	0.52	
3 (3-4)	396441	7707977	0.51	51	0.45	
4 (4-5)	396464	7707980	0.39	39	0.34	
5 (6-7)	396451	7707948	0.39	39	0.34	
6 (7-3)	396458	7707939	0.47	47	0.41	
7 (3-8)	396451	7707952	0.45	45	0.39	
8 (8-9)	396501	7707967	0.35	35	0.31	

Fire station

Traverse E

	Easting	Northing	uSv/hr	uR/hr	uGy/hr
1	393682	7702038	0.3	30	0.27
2	393670	7702033	0.73	73	0.64
3	393676	7702073	0.12	12.6	0.11
4	393654	7702075	0.12	11.5	0.1
5	393659	7702044	0.68	68	0.6

PZ21 west of tailings dam

Traverse F

	Easting	Northing	uSv/hr	uR/hr	uGy/hr
1	395320	7708590	0.15	15	0.131
2			0.14	14.6	0.128
3			0.13	13	0.14
4			0.98	9.8	0.86

Area C

Traverse G

	Easting	Northing	uSv/hr	uR/hr	uGy/hr
trav1	393969	7701578	0.12	12.4	0.1
trav2	393956	7701566	0.09	9.1	0.08
trav3	393985	7701580	0.04	0.43	0.03
trav4			0.04	0.42	0.03
trav5			road		
trav6	394010	7701658	0.15	15.1	0.133

Creek upstream from sump area (lunch road)

Traverse H

	Easting	Northing	uSv/hr	uR/hr	uGy/hr	
14 (1-2)	396382	7707301	0.15	14.8	0.13	
15 (2-3)	396401	7707318	0.26	26	0.23	
(3-4)	396402	7707326	road			
16 (4-5)	396429	7707329	0.11	11.1	0.97	
17 (5-6)	396422	7707351	0.12	12.1	0.11	
			TC/s	K %	U ppm	Th ppm
14 (1-2)	396382	7707301	149	1.3	29.1	53.6
15 (2-3)	396401	7707318	107	1.8	16.6	37.5
(3-4)	396402	7707326	road			
16 (4-5)	396429	7707329	37	0.6	7.6	7

Laundry

Point readings

	Easting	Northing	uSv/hr	uR/hr	uGy/hr
1	393727	7701888	0.16	15.8	0.14
2	393746	7701937	0.15	15.0	0.13
3	393699	7701959	0.39	39	0.35

Mary Kathleen Open Pit and Haul Road Radiometric Data

GR-320 Spectrometer with a 512 channel spectrometer and a sodium-iodide detector

Surveyed by Dr P Ashley and Dr B Lottermoser.

KEY

R0-1	Measurements from R* to R** approx 50m
	(GPS errors within pit)
X	Concentrations too high to measure with GR-320
	The GR-320 will measure accurately up to
	2500 ppm Th 1000 ppm U 100% K
	The numbers are based on a maximum count rate of about 25000 cps

Radiometric readings	K %	U ppm	Th ppm	TC cps	µR/hr	nSv/hr	nGy/hr
1080 bench							
R0-1	2.2	6.9	12.9	150	10.9	109	96
R1-2	1.3	12.1	22.1	200	14.3	143	125
R2-3	1.7	11.9	40.2	170	14.1	141	124
R3-4	1.4	7.2	9.1	190	12.7	127	112
R4-5	2.0	13.6	20.1	230	16.9	169	148
R5-6	1.8	6.7	15.4	190	13.1	131	115
R6-7	2.2	10.7	11.0	230	14.7	147	129
R7-8	2.8	10.4	15.7	270	17.3	173	152
R8-9	1.0	39.5	38.7	370	30.0	300	260
R9-10	0.8	23.5	21.1	340	21.2	212	186
R10-11	0.8	24.9	27.2	300	22.3	223	196
R11-12	1.4	15.7	18.7	220	16.3	163	143
R12-13	0.9	15.6	19.3	220	16.9	169	148
R13-14	1.2	18.1	19.2	220	17.9	179	157
1048 bench							
R15-16	3.1	28.4	28.1	300	25.0	250	222
R16-17	3.1	13.6	17.2	230	17.2	172	151
R17-18	5.6	11.3	14.0	340	20.0	200	176
R18-19	4.0	17.8	17.6	380	22.8	228	200
R19-20	2.9	13.2	18.1	520	28.0	280	242
R20-21	3.4	32.7	23.0	530	30.0	300	260
R21-22	2.5	50.4	34.1	690	49.0	490	430
R22-23	0.7	142.3	82.4	1300	94.0	940	820
R23-24	2.9	352.0	128.4	2000	194.0	1940	1700
R24-25	0.6	78.4	41.3	650	46.0	460	400
R25-26	0.3	36.1	35.3	400	31.0	310	280
R26-27	1.4	21.1	24.1	360	22.5	225	197

Radiometric readings	K %	U ppm	Th ppm	TC cps	µR/hr	nSv/hr	nGy/hr
1000 bench							
R28-29	3.6	44.3	39.6	500	41.0	410	360
R29-30	3.1	17.8	27.8	380	23.2	232	204
R30-31	2.6	28.3	31.6	300	24.9	249	218
R31-32	3.1	14.9	23.7	270	20.5	205	180
R32-33	4.9	17.7	21.1	280	22.1	221	194
R33-34	5.2	17.6	24.4	270	22.3	223	196
R34-35	4.3	18.9	23.4	280	22.5	225	198
R35-36	3.4	22.0	26.5	280	22.2	222	195
R36-37	2.4	25.9	28.6	400	28.0	280	246
R37-38	4.0	58.5	37.9	600	42.0	420	370
R38-39	3.2	124.4	48.3	1000	69.0	690	610
R28-40	3.1	37.8	29.5	360	27.0	270	223
R40-41	2.9	22.8	32.8	380	23.1	231	203
R41-42	2.9	31.8	28.3	440	29.0	290	250
R42-43	3.2	31.8	24.3	410	28.0	280	244
R43-44	3.7	31.6	21.8	520	34.0	340	290
R44-45	2.3	111.0	51.6	1400	78.0	780	690
R45-46	x	x	x	1700	109.0	1090	950
R46-47	x	x	x	1800	153.0	1530	1340
R47-48	x	x	x	2500	141.0	1410	1240
R48-49	x	x	x	2200	183.0	1830	1610
R49-50	x	x	x	2200	156.0	1560	1370
R50-51	x	x	x	2300	163.0	1630	1430
R51-52	3.3	157.8	91.3	1100	96.0	960	840
R52-53	3.5	35.7	36.7	420	31.0	310	270
R53-54	4.6	41.1	31.9	450	36.0	360	320
R54-39	2.9	51.3	28.4	450	37.0	370	330
960 bench							
R55-56	5.7	70.2	43.1	550	20.9	209	183
R56-57	3.8	78.3	42.9	550	20.9	209	183
R57-58	3.3	31.5	26.1	450	29.0	290	260
R58-59	3.4	69.5	42.5	900	65.0	650	570
R59-60	3.7	253.5	99.6	2300	122.0	1220	1070
R60-61	x	x	x	3200	222.0	2220	1940
R61-62	x	x	x	3400	270.0	2700	2340
R62-63	x	x	x	2400	189.0	1890	1660
R63-64	3.2	220.9	122.8	1600	118.0	1180	1030
R64-65	x	x	x	3300	250.0	2500	2200
R65-66	x	x	x	3300	290.0	2900	2500
R66-67	x	x	x	1100	101.0	1010	880
R67-68	6.1	35.3	33.5	480	36.0	360	320

Radiometric readings	K %	U ppm	Th ppm	TC cps	µR/hr	nSv/hr	nGy/hr
R57-69	3.2	54.5	33.1	700	43	430	370
R69 dump	x	x	x	1500	122	1220	1070
R57-70	3.8	50.8	31.3	600	29	290	250
R70-71	4.0	84.5	48.0	720	61	610	540
R71-72	3.4	89.9	50.1	750	59	590	510
R72-73	4.6	96.6	53.6	850	62	620	550
R73-74	5.2	103.2	52.1	1000	68	680	590
R74-75	5.3	40.1	30.0	550	36	360	320

Grab samples (measured for 60 seconds in a lined lead bin at JCU)

X	Concentrations too high to measure with GR-320 The GR-320 will measure accurately up to 2500 ppm Th 1000 ppm U 100% K The numbers are based on a maximum count rate of about 25000 cps

Note: Lower radiometric readings are to be expected as the volume of the sample is smaller

SAMPLE	X	Y	K %	U ppm	Th ppm	TC /min	TC/sec	mR/hr	nSv/hr	nGy/hr
MKSS1	397043	7704687	0.6	41.7	8.8	6861	114.35	11.5	115	101
MKSS2	396578	7706494	1.1	42.2	11.6		0.00	7.9	79	69
MKSS3	396338	7705713	0.4	33.2	6.1		0.00	5.7	57	50
MKSS4	396471	7706554	0.8	33.7	10.6	6181	103.02	6.3	63	55
MKSS5	396833	7706669	1.3	31.9	7.3	6219	103.65	7.1	71	62
MKSS6	396341	7706484	0.9	65.2	9.7	10335	172.25	11.5	115	101
MKSS7	396147	7706471	0.6	58.8	8.8	8882	148.03	11.5	115	101
MKSS8	396322	7706769	1	61.9	6.9	9238	153.97	11.8	118	103
MKSS9	396452	7707330	1.2	71	8.8	11281	188.02	11.6	116	102
MKSS10	395640	7708195	0.8	52.1	9.3	8193	136.55	9.3	93	82
MKSS11	395696	7708390	1.2	63.7	8.7	10509	175.15	11.8	118	104
MKSS12	396317	7709224	0.5	55.8	9.5	8557	142.62	10.9	109	96
MKSS13	396317	7709224	1	68.3	7.9	11219	186.98	12	120	105
MKSS14	396207	7708810	0.5	54.2	7.9	8323	138.72	12	120	105
MKSS15	395970	7708524	X	X	X	X		9.5	95	84
MKSS16	395902	7708410	1	66.9	7	10898	181.63	11.1	111	98
MKSS17	395878	7708353	1.2	67.3	6.9	10783	179.72	11.5	115	101
MKSS18	395878	7708353	0.6	63.8	5.6	10125	168.75	12.4	124	109
MKSS19	396496	7707969	0.9	39	7.8	6691	111.52	7.3	73	64
MKSS20	396510	7709455	0.9	38.1	8.8	X		6	60	53
MKSS21	394234	7704053	0.6	36.2	8.7	5892	98.20	11.4	114	100
MKSS22	394250	7703960	0.3	53.4	6.7	7884	131.40	9	90	79
MKSS23	394531	7707430	0.5	42.2	6.4	6670	111.17	11	110	96
MKSS24	394782	7707324	0.5	54.6	5.6	8151	135.85	8.5	85	74
MKSS25	396444	7707696	0.6	52.6	6.4	8087	134.78	10.1	101	89
MKSS26	396436	7709725	0.5	49.4	11.7	7893	131.55	7.9	79	69
MKSS27	395316	7708382	0.4	45.5	7	7142	119.03	9.2	92	81
MKSS28	395363	7709142	1	53.5	7.7	8417	140.28	8.2	82	72
MKSS29	395320	7709300	0.9	56.2	7.4	8702	145.03	7.4	74	65
MKSS30	395883	7709371	0.4	52.4	6.4	7899	131.65	11.3	113	99
MKSS31	397410	7716154	1.1	55.7	2.9	8513	141.88	8.8	88	77
MKSS32	397962	7717382	1.2	49.5	8.1	8134	135.57	8.4	84	73
MKSS33	396417	7710415	1.6	63.7	10	10818	180.30	11.8	118	104
MKSS34	396714	7709525	0.5	53.7	5.9	8040	134.00	11.3	113	99
MKS1	397202	7704984	0.9	35.1	8.6	6152	102.53	7.7	77	67
MKS2	397273	7705284	X	X	X	X		13.7	137	120
MKS3	397273	7705284	0.3	44.4	8.1	7354	122.57	8.2	82	72
MKS4	397203	7705681	1.1	39.8	7.8	7101	118.35	7.1	71	62
MKS5	396925	7705508	1.2	42.9	8.9	7614	126.90	7.3	73	64

SAMPLE	X	Y	K%	Uppm	Thppm	TC /min	TC/sec	mR/hr	nSv/hr	nGy/hr
MKS6	397096	7705269	0.5	51.8	10.9	8563	142.72	9.1	91	80
MKS7	396670	7706737	1.1	34.2	10.3	6490	108.17	6.6	66	58
MKS8	396724	7706663	X	X	X	X		X	X	X
MKS9	396636	7706860	0.5	56.4	10.4	9062	151.03	13.5	135	118
MKS10	396384	7706640	0.9	35.4	5.9			6.8	68	60
MKS11	397086	7706995	0.3	61.5	10.4	9206	153.43	11.5	115	101
MKS12	397006	7706932	6.7	64.9	7.8	10224	170.40	6.8	68	59
MKS13	394195	7703990	0.6	58	5.1	8520	142.00	10.5	105	92
MKS14	394668	7707288	0.4	46.2	6.2	6956	115.93	11.7	117	103
MKS15	395351	7709169	0.7	51.4	9.5	8323	138.72	X	X	X
MKS16	396957	7705304	0.5	59.7	5.4	9157	152.62	12.5	125	109
MKPW1	397273	7705284	X	X	X	X		6.6	66	58
MKPW2	397189	7705234	X	X	X	X		34	340	300
MKPW3	397096	7705269	X	X	X	X		22.6	226	198
MKPW4	397205	7705363	X	X	X	X		580	5800	X
MKPW5	397282	7705318	X	X	X	X		15.6	156	137
MKPW6	396997	7705374	X	X	X	X		44	440	380
MKPW7	397105	7705527	X	X	X	X		46	460	400
MKWD1	396579	7705566	X	X	X	X		48	480	420
MKWD2	396435	7705514	X	X	X	X		26	260	229
MKWD3	396506	7705662	X	X	X	X		35	350	310
MKWD4	396833	7706669	X	X	X	X		48	480	420
MKWD5	397006	7706932	X	X	X	X		36	360	310

Radiometric readings taken with a Scintrex BGS-1SL
total count model scintillometer
Traverses 1-9 surveyed by Dr P Ashley and Dr B Lottermoser.

South Tip

Traverse 1
Starting Point 396816E 7704832N (bearing 85 degrees)

Distance (m)	TC (cps)	Comment
0-50	500	initially high
50-100	800	mid high
100-150	300	steady/tree
150-200	350	sready/grass
200-250	500	below bench
250-300	450	mid high/bench
300-350	500	dogleg

West Tip

Traverse 2
Starting Point 396585E 7705514N (bearing 250 degrees)

Distance (m)	TC (cps)	Comment
0-50	2000	partly covered
50-100	2000	
100-150	800	flat covered
150-200	2500	uncovered / dogleg
200-250	750	covered
250-300	700	
300-350	800	wall high

West Tip

Traverse 3
Starting Point 396420E 7705386N (bearing 350 degrees)

Distance (m)	TC (cps)	comment
0-50	400	covered
wall	3550	bench wall
wall-50	650	covered
50-100	1500	ripped
100-150	2500	ripped
150-200	1000	bench/ripped
200-250	3550	ore
250-edge	600	covered
edge-edge	3000	ore

Crusher Pile

Traverse 4
Starting Point 397045E 7705936N (bearing 0 degrees)

Distance (m)	TC (cps)	comment
0-50	350	concrete foundations
50-100	350	
100-150	300	
150-200	350	
bench wall	2000	
200-250	400	
250-300	400	
300-350	400	
350-400	450	

Base to top Crusher Pile

Traverse 5
Starting Point 396636E 7706868N (bearing 180 degrees)

Distance (m)	TC (cps)	comment
0-50	350	MKS9 at 0m
50-100	400	
100-150	1000	
150-200	700	
200-250	600	road/S dump
250-300	400	
300-350	400	S dump
350-400	400	crusher
400-450	500	past crusher
450-500	1000	up waste dump
500-550	400	top waste dump
550-600	400	
600-650	400	
650-700	300	
700-750	300	

Base to top Crusher Tip

Traverse 6
Starting Point 396384E 7706640N (bearing 80 degrees)

Distance (m)	TC (cps)	comment
0-50	1000	red soil
50-100	1000	red soil
100-150	1000	red soil
150-200	500	brown trees
200-250	400	
250-300	500	
300-350	700	
350-400	4000	at waste toe

D-stockpile

Traverse 7
Starting Point 397078E 7706880N (bearing 10 degrees)

Distance (m)	TC (cps)	comment
0-50	400	covered
50-100	400	covered past Mn
100-150	800	poorly covered
150-200	1500	heaps next to road
200-250	500	ripped
250-300	700	ripped
300-350	600	ripped
350-400	600	ripped

D-stockpile

Traverse 8
Starting Point 397078E 7706880N (bearing 100 degrees)

Distance (m)	TC (cps)	comment
0-50	700	grassy covered
50-100	3800	block uncovered
100-150	1200	grassy covered
150-200	800	grassy covered

Tailings dam traverse

Traverse 9
Starting Point 395946 7708167 (bearing 230 degrees)

Distance (m)	TC (cps)	comment
0-100	300	Vegetated
100-230	300	Pz C13 Pz C14
230-240	2000	Drum 16 (MKT1)
240-250	300	Vegetated