

HUMAN HEALTH Risk Assessment																									
Comparison of determinand concentrations in stockpile material with human health Generic or Site Specific Assessment Criteria																									
	Stockpile		1			2				3			4				6		7A		7B				
	Sample Identity		SP1A	SP1B	SP1C	SP2A	SP2B	SP2C	SP2D	SP2E	SP3A	SP3B	SP3C	SP4A	SP4B	SP4C	SP4D	SP6A	SP6B	SP7A	SP7B	SP7C	SP7D		
	Sample Type		SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
	Sample Date		17/03/2008	17/03/2008	18/03/2008	19/03/2008	19/03/2008	19/03/2008	19/03/2008	20/03/2008	18/03/2008	18/03/2008	19/03/2008	18/03/2008	18/03/2008	18/03/2008	18/03/2008	17/03/2008	17/03/2008	17/03/2008	17/03/2008	17/03/2008	17/03/2008		
	Units	MDL	See Note 2																					Human Health GAC/SSAC	Source
Total Sulphate	mg/kg	<100	36,000	36,000	18,000	78,000	140,000	150,000	130,000	64,000	94,000	79,000	47,000	12,000	11,000	17,000	24,000	23,000	51,000	34,000	22,000	8,400	15,000	nv	nv
Boron Water Soluble	mg/kg	<3.5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	8	4	4	4	4	7560	GAC
Arsenic	mg/kg	<3.0	6	7	9	10	8	12	8	10	7	7	7	7	16	7	10	14	12	9	8	9	11	104	SSAC
Barium	mg/kg	<6.0	280	290	370	190	68	84	82	120	150	150	210	420	360	660	310	290	210	220	260	390	540	1850	SSAC
Beryllium	mg/kg	<0.4	1	1	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	139	GAC
Cadmium	mg/kg	<0.3	22	19	6	3	3	3	3	1	2	2	1	1	2	2	2	1	2	3	2	0	1	30.0	SGV
Chromium	mg/kg	<4.5	190	160	100	56	43	43	34	35	32	38	30	29	36	34	37	26	31	38	36	20	25	200	SGV
Copper	mg/kg	<6	38	30	24	42	32	39	32	85	23	31	21	16	21	18	22	31	37	23	21	20	25	32,000	GAC
Lead	mg/kg	<2	25	19	19	530	46	44	27	43	24	20	20	14	69	23	25	21	27	27	20	27	34	450	SGV
Mercury	mg/kg	<0.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	15.0	SGV
Nickel	mg/kg	<0.9	50	43	46	24	21	19	19	21	23	28	22	21	24	21	22	18	21	30	24	18	24	75.0	SGV
Selenium	mg/kg	<3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	260	SGV
Vanadium	mg/kg	<1.5	140	130	58	55	46	37	34	35	35	42	33	31	37	35	40	32	35	38	36	29	32	570	GAC
Zinc	mg/kg	<2.5	730	530	250	150	280	140	93	78	110	100	81	84	110	110	97	88	98	130	110	63	100	14,600	GAC
Phosphate (Ortho as PO4)	mg/kg	<1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	nv	nv
Hexavalent Chromium	mg/kg	<0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.3	0.3	0.3	0.3	0.5	0.3	0.3	0.5	3.0	0.3	0.3	0.5	3.0	0.4	200.0	SGV
Total Organic Carbon	%	<0.2	1	1	1	-	3	-	-	-	-	4	-	1	2	-	3	2	3	1	1	2	4	nv	nv
pH Value	pH Units	<1.00	9	9	9	8	9	9	9	9	8	8	8	9	9	8	10	8	8	8	8	8	8	nv	nv
GRO (C4-C12)	ug/kg	<10	73	10	10	10	10	10	10	10	10	10	10	10	23	26	58	10	12	10	10	10	10	nv	nv
MTBE	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	38,300	GAC
Benzene	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	12,900	SSAC
Toluene	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	19	10	10	10	10	10	10	2,880,000	SSAC
Ethyl benzene	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	16,000	SGV
m & p Xylene	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	see note 1	see note 1
o Xylene	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	see note 1	see note 1
total xylene	ug/kg	<20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	3,140,000	SSAC
Aliphatics C5-C6	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	23	26	23	10	12	10	10	10	10	8,100	GAC
Aliphatics >C6-C8	ug/kg	<10	73	10	10	10	10	10	10	10	10	10	10	10	10	10	16	10	10	10	10	10	10	15,900	GAC
Aliphatics >C8-C10	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	3,200	GAC
Aliphatics >C10-C12	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	16,100	GAC
Aliphatics >C12-C16	ug/kg	<100	34,000	39,000	16,000	9,800	18,000	3,500	5,400	9,200	3,000	3,800	4,500	100	6,400	11,000	10,000	5,600	6,200	1,500	4,400	8,200	6,100	600,000	GAC
Aliphatics >C16-C21	ug/kg	<100	140,000	150,000	80,000	14,000	36,000	14,000	16,000	24,000	12,000	12,000	15,000	20,000	23,000	35,000	42,000	20,000	30,000	13,000	17,000	42,000	30,000	110,000,000	GAC
Aliphatics >C21-C35	ug/kg	<100	380,000	360,000	200,000	53,000	160,000	76,000	90,000	89,000	47,000	46,000	51,000	63,000	68,000	89,000	120,000	81,000	420,000	46,000	42,000	33,000	26,000	110,000,000	nv
Total Aliphatics C5-C35	ug/kg	<100	550,000	540,000	300,000	77,000	210,000	94,000	110,000	120,000	63,000	62,000	70,000	83,000	98,000	140,000	170,000	110,000	450,000	60,000	63,000	83,000	62,000	nv	nv
Aromatics C6-C7	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	14,300	GAC
Aromatics >C7-C8	ug/kg	<10	10	10	10	10	10	10	10	10	10	20	10	10	10	10	19	10	10	10	10	10	10	14,400	GAC
Aromatics >EC8-EC10	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5,100	GAC
Aromatics >EC10-EC12	ug/kg	<10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	27,000	GAC
Aromatics >EC12-EC16	ug/kg	<100	7,400	9,800	1,700	3,900	5,300	4,400	4,500	100	2,200	1,600	450	100	1,500	4,900	1,500	5,500	10,000	1,600	100	540	1,500	130,000	GAC
Aromatics >EC16-EC21	ug/kg	<100	31,000	35,000	5,600	6,800	11,000	9,200	7,600	100	5,200	1,700	650	100	8,800	8,800	9,500	32,000	16,000	2,500	100	1,400	5,200	1,600,000	GAC
Aromatics >EC21-EC35	ug/kg	<100	130,000	150,000	54,000	39,000	70,000	65,000	50,000	62,000	59,000	48,000	34,000	100	53,000	42,000	58,000	180,000	90,000	30,000	3,700	800	3,600	1,700,000	GAC
Total Aromatics C6-C35	ug/kg	<100	170,000	190,000	61,000	49,000	86,000	78,000	62,000	62,000	66,000	51,000	35,000	100	64,000	55,000	69,000	220,000	120,000	34,000	3,700	2,700	10,000	nv	nv
TPH (Aliphatics and Aromatics C5-C35)	ug/kg	<100	720,000	740,000	360,000	130,000	300,000	170,000	170,000	180,000	130,000	110,000	100,000	83,000	160,000	190,000	240,000	330,000	570,000	94,000	67,000	86,000	72,000	nv	nv
HAZARD INDEX			0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	1	SSAC
PAH by GCMS																									
Naphthalene	ug/kg	<10	240	190	87	190	280	260	210	340	260	220	320	120	200	210	180	330	480	79	110	160	300	1,130,0	

Stockpile Investigation													
Former Albright and Wilson Works													
CONTROLLED WATERS Risk Assessment													
Comparison of determinand concentrations in soil leachates with controlled waters Generic Assessment Criteria													
	Sample Identity		SP1A	SP2A	SP2C	SP3A	SP4B	SP4D	SP6B	SP7B	SP7D		
	Sample Type		SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
	Sample Date		17/03/2008	19/03/2008	19/03/2008	18/03/2008	18/03/2008	18/03/2008	17/03/2008	17/03/2008	17/03/2008		
	Units	MDL										Controlled Waters GAC	
												Source of GAC	
Arsenic Dissolved	ug/l	<1	<1	1.7	3.1	2.7	2.0	3.0	3.0	7.0	1	25	D
Barium Dissolved	ug/l	<1	32.0	34.0	160.0	38.0	55.0	38.0	45.0	11.0	32.0	700	C
Beryllium Dissolved	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	73	B
Boron Dissolved	ug/l	<20	30.0	52.0	780.0	<20	25.0	<20	120.0	<20	46.0	7000	E
Cadmium Dissolved	ug/l	<0.22/<0.5	<0.5	<0.22	<0.22	<0.22	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	E
Chromium Dissolved	ug/l	<1	28.0	5.0	2.0	2.0	24.0	8.0	3.0	7.0	4.0	15	E
Copper Dissolved	ug/l	<1.6	2.4	13.0	20.0	11.0	3.2	8.2	61.0	9.8	<1.6	5	E
Lead Dissolved	ug/l	<0.5	<0.5	1.0	2.0	0.8	<0.5	<0.5	<0.5	6.2	1.8	25	E
Nickel Dissolved	ug/l	<1.5	4.7	7.5	7.6	10.0	1.9	4.8	6.8	11.0	2.8	30	E
Phosphorus Dissolved	ug/l	<105	<105	<105	<105	110	<105	<105	<105	210	<105	2200	A
Selenium Dissolved	ug/l	<1	<1	2.0	2.0	<1	<1	<1	<1	<1	<1	10	A
Vanadium Dissolved	ug/l	<1	17.0	28.0	18.0	8.0	14.0	26.0	8.0	9.0	<1	100	J
Zinc Dissolved	ug/l	<5	6.0	<5	18.0	<5	<5	<5	<5	9.0	<5	40	E
Mercury Dissolved	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	0.14	0.3	E
Hexavalent Chromium	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	15	J
Sulphate	mg/l	<3	1,200	1,400	1,400	1,400	480	820	1,400	67	870	nv	A
pH	pH Units	<1.00	7	9	8	8	7	7	7	9	7	nv	nv
GRO (C4-C12)	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	nv	nv
MTBE	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	11	B
Benzene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	30	G
Toluene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	40	G
Ethyl benzene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	300	C
m & p Xylene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	See Note 1	See Note 1
o Xylene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	See Note 1	See Note 1
total xylene	ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	30	J
Aliphatics C5-C6	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aliphatics >C6-C8	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aliphatics >C8-C10	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aliphatics >C10-C12	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aliphatics >C12-C16	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aliphatics >C16-C21	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aliphatics >C21-C35	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	nv	nv
Total Aliphatics C5-C35	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	nv	nv
Aromatics C6-C7	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aromatics >C7-C8	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aromatics >EC8-EC10	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aromatics >EC10-EC12	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aromatics >EC12-EC16	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aromatics >EC16-EC21	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Aromatics >EC21-EC35	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
Total Aromatics C6-C35	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	nv	nv
TPH (Aliphatics and Aromatics C5-C35)	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	A
PAH by GCMS													
Naphthalene	ng/l	<100	<100	<100	110	<100	<100	<100	<100	<100	<100	5,000	E
Acenaphthylene	ng/l	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	10,000	A
Acenaphthene	ng/l	<15	<15	<15	50	21	<15	<15	<15	<15	<15	365,000	B
Fluorene	ng/l	<14	<14	<14	23	<14	<14	<14	<14	<14	<14	243,333	B
Phenanthrene	ng/l	<22	46	24	69	27	<22	<22	<22	<22	<22	10,000	A
Anthracene	ng/l	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	1,825,000	B
Fluoranthene	ng/l	<17	89	18	21	<17	22	<17	<17	<17	<17	200	A
Pyrene	ng/l	<15	74	<15	<15	<15	21	<15	<15	<15	<15	182,500	B
Benz(a)anthracene	ng/l	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	92	B
Chrysene	ng/l	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	9,210	B
Benzo(b)fluoranthene	ng/l	<23	<23	<23	<23	<23	<23	<23	<23	<23	<23	nv	A
Benzo(k)fluoranthene	ng/l	<27	<27	<27	<27	<27	<27	<27	<27	<27	<27	nv	A
Benzo(a)pyrene	ng/l	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	10	A
Indeno(123cd)pyrene	ng/l	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	nv	A
Dibenzo(ah)anthracene	ng/l	<16	<16	<16	<16	<16	<16	<16	<16	<16	<16	9	B
Benzo(ghi)perylene	ng/l	<16	<16	<16	<16	<16	<16	<16	<16	<16	<16	nv	A
PAH (sum of 4)	ng/l	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	100	A
PAH 16 Total (see Note 2)	ng/l	<100	210	<100	270	<100	<100	<100	<100	<100	<100	nv	nv
note 1 = xylenes assessed as sum of m,p-xylene and o-xylene													
note 2 = PAH (sum of 4) sum of benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene													
calculated value													
Concentration exceeds CW GAC													
nv = no value													
A = UK Drinking Water Stanards (DWS) 2000													
B = USEPA Region 9 (pathway specific)													
C = World Health Organisation Drinking Water Guidelines (WHO DWG)													
D = UK Marine / Estuarine EQS Surface Waters (Dangerous Substances)(Classification) Regulations 1997													
E = UK Marine / Estuarine EQS Surface Waters (Dangerous Substances)(Classification) Regulations 1989													
G = UK Marine / Estuarine EQS Surface Waters (Dangerous Substances)(Classification) Regulations 1998													
J = UK Marine / Estuarine Environmental Quality Standards (EQS) UK EQS													