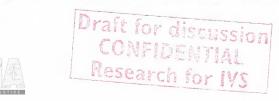
## DAM 10: HUMAN RISK ASSESSMENT + DAM WATER + SAMPLE NO. 9S | ORGANICS | PAR & VOCC | [ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

							RISK TO HUMA	N			
			RISK	OF DAM WATER			UTED DAM WATE	R IN RIVER		WATER FOR GRO	UNDWATER
ORGANIC	=	7 EPA RfD/				11 Conc. in			13 Conc. in	<sup>14</sup> PDI	
COMPOUNDS	ERFD/	EPA DWEL/	<sup>8</sup> Conc. in	9 POI Dam	10 Margin	River water	<sup>12</sup> PDI river	10 Margin	groundwater	groundwater	10 Margin
PAH <sup>s</sup> & VOC <sup>s</sup>	ADI / GV	RSA RID/	Dam water	water exposure	of Safety	(EEC)	water expesure	of Safety	(EEC)	exposure	of Safety
	mglagiday	WHO GV	ppm	mg/kg/day	%	ppli	mg/kg/day	8/0	ppb	mg/kg/day	%
Naphthalene	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Acenaphthylene	0.00002	WHO GV	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.9
Acenaphthene	0.06	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Dibenzofuran	0.004	EPA RfD	0.000	0.00	0.00	0.00		0.00	0.00	0.00	0.0
Fluorene	0.04	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Phenanthrene	0.0002	WHO GV	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Anthracene	0.3	EPA RfD	0.000	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.0
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	9.00	0.00	0.00	0.00	0.00	0.00	0.0
Fluoranthene	0.04	EPA RfD	0.000	0.00	0.90	0.00	0.00	0,00	0.00	0.00	0.0
Pyrene	0.03	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Benzo(a)anthracene	0.00002	WHD GV	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Chrysene	0.00002	WHO GV	0.000	0.00	0.00	0.00		0.00	0.00	0.00	0.0
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.0
Benzo[b]&[k]fluoranthene	0.00002	WHD GV	0.000	0.00	0.00	0.00	0.00	3,00	0.00	0.00	0.0
Benzo(a)pyrene	0.0002	WHO GV	0.000	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.0
Indeno[1,2,3·cd]pyrene	0.00002	WHO GV	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Benzo(g,h,i)perylene	0.0002	WHO GV	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	HISK / ACC	EFTABLE BISK	TH: HUMAN	Dam water			River water	A 14,15		Groundwater	AR





# DAM 10: HUMAN RISK ASSESSMENT \* DAM WATER \* SAMPLE NO. 9D [ORGANICS - PAN\* & VOC\*] [ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 90											
							RISK TO HUM <i>I</i>	١N			
			RISI	OF DAM WATER	AS IS	RISK OF DI	LUTED DAM WATE	R IN RIVER	RISK DF DAN	N WATER FOR GR	OUNDWATER
ORGANIC		7 EPA RID/				11 Conc. in			13 Conc. in	14 PD!	
COMPOUNDS	<sup>6</sup> RfD/	EPA DWEL	<sup>8</sup> Conc. in	<sup>9</sup> PDI Dam	10 Margin	River water	12 PDI river	10 Margin	groundwater	groundwater	10 Margin
PAH <sup>s</sup> & VOC <sup>s</sup>	ADI/GV	ASA RFD/	Dam water	water expesure	of Safety	(EEC)	water exposure	of Safety	(EEC)	exposure	of Safety
	mg/kg/day	WHO GV	ppm	mg/kg/day	%	ppb	mg/kg/day	8/8	ppb	mg/kg/day	9/6
Naphthalene	0.02	EPA RfD	0.000	0.00	9.00	0.00	0.00	0.00	0.00	0.00	9.98
Acenaphthylene	0.00002	WHO GV	0,000	0.00	9.99	0.00	0.00	0.00	0.00	0.00	9.90
Acenaphthene	0.06	EPA RfD	0.000	0.00		0.00	0.00	0.00	0.00	0.00	0.90
Dibenzofuran	0.004	EPA RfD	0.000	0.00		0.00		0.00	0.00	0.00	9.00
Fluorene	0.04	EPA RfD	0.000	0.00		0.00		0.00	0.00	0.00	0.00
Phenanthrene	0.0002	WHO GV	0.000	0.00		0.00		0.08	0.00	0.00	0.80
Anthracene	0.3	EPA RfD	0.000	0.00		0.00	0.00	0.00	0.00	0.00	0.90
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00		0.00		0,00	0.00	0.00	0.60
Fluoranthene	0.04	EPA RfD	0.000	0.00		0.00		0.00	0.00	0.00	0.00
Pyrene	0.03	EPA RfD	0.000	0.00		0.00	0.00	9.00	0.00	0.00	0.00
Benzo(a)anthracene	0.00002	WHO GV	0.000	0.00		0.00	0.00	0.08	0.00	0.00	0.00
Chrysene	0.00002	WHO GV	0.000	0.00		0.00	0.00	0.09	0.00	0.00	0.00
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.000	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]&[k]fluoranthene	0.00002	WHO GV	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Ü.Ņ.
Benzo(a)pyrene	0.0002	WHO GV	0.000	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00
Indeno[1,2,3-cd]pyrene	0.00002	WHO GV	0.000	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Benzo[g,h,i]perylene	0.0002	WHO GV	0.000	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00
	RISKIADO	EPTABLE RISK	TO: HUMAN	Dam water	AR		River water	AR		Croundwater	A.h

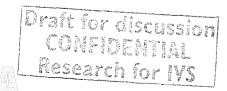


Draft for discussion CONFIDENTIAL Research for IVS



## **TABLES 67 - 69**

# DAM 10: SEDIMENTS INORGANIC ENVIRONMENTAL RISK QUANTIFICATION



# <u>DAM 10</u>: ENVIRONMENTAL RISK QUANTIFICATION • SEDIMENTS • SAMPLE NO's 2, 3 & 4 [INORGANIC · MICRO'S & MACRO'S] [ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NO's: 2, 3								RISK TO	ENVIRO	NMENT						
	cc.						RISK O	F SEDIMEN	TS FOR	GROUNDWA	TER					
INORGANIC	lisk		SAN	/IPLE NO	. 2			SAN	IPLE NO	). 3			SAN	IPLE NO.	4	
COMPOUNDS	Value	TOT	AL ANALYSIS		4 PROBIT M	ODEL	TOT	AL ANALYSIS		<sup>4</sup> PROBIT M	ODEL	ТОТ	AL ANALYSIS		<sup>4</sup> PROBIT M	ODEL
Micro's and Macro's	(VR&SA)	<sup>1</sup> Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	<sup>1</sup> Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	1 Lab Conc.	<sup>2</sup> EEC	3 Hisk	Risk Quan-	3 Risk
	100	ppm	ppb	R/AE	tification %	R/AB	ppm	ppb	RIAR	tification %	R / AR	ppm	ppb	B/AR	tification %	R / %8
Aluminium as Al	10000	1500	1237500	R	1.00E + 02	R	1600	1320000	R	1.00E+02	R	2600	2145000	R	1.00E + 02	R
Arsenic as As	430	< 50	0.00	FA	0.00E + 00	AR	< 50	0.00	AR	0.00E+00		< 50	0.00	AR	0.00E + 00	hü
Barium as Ba	7600	4.0	3300	- RA	4.29E-08	All -	22	18150	R	2.19E-01	R	24	19800	2 g	3.69E-01	R
Cadmium as Cd	31	< 10	0.00	AR	0.00E+00	- a k I	< 10	0.00	AB	0.00E+00	3418	< 16	0.00	AR	0.00E + 00	22.12
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	4700	400	330000	13	1.00E+02	R	200	165000	S S	9.93E+01	R	160	132000	R	9.78E + 01	R
Cobalt as Co	6900	< 10	0.00	AN	0.00E+00	AB	< 10	0.00	AR	0.00E+00	- 51	< 10	0.00	JAG .	0.00E + 00	11.5
Copper as Cu	100	< 10	0.00	AR	0.00E+00	AR	< 10	0.00	3151	0.00E+00	AR	< 10	0.00	124	0.00E + 00	4 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Iron as Fe	9000	29000	23925000	R	1.00E+02	R	12000	9900000	R	1.00E+02	R	17000	14025000	R	1.00E + 02	R
Lead as Pb	100	< 100	0.00	n.,	0.00E+00	MI	< 100	0.00	25	0.00E+00	mN	< 100	0.00	AR	0.00E + 00	2.6
Manganese as Mn	300	210	173250	A	1.00E+02	R	180	148500	B	1.00E+02	R	330	272250	H	1.00E + 02	R
Mercury as Hg	22	0.00	0.00	AB	0.00E+00	1 s t + 1 s k 4	0.00	0.00	111	0.00E + 00	3.1A 9.480	0.00	0.00	AR	0.00E + 00	N.
Nickel as Ni	1140	< 10	0.00	AR	0.00E+00	AR	12	9900	R	3.91E+01	R	< 18	0.00	AR	0.00E + 00	9.5
Selenium as Se	260	0.00	0.00	AN	0.00E+00	AH	0.00	0.00	283	0.00E+00	AR	0.00	0.00	AB	0.00E + 00	100
Titanium as Ti	731	78	64350	R	1.00E+02	ä	57	47025	R	1.00E+02	R	110	90750	R	1.00E+02	R
Vanadium as V	1300	< 10	0.00	1887	0.00E+00	1,000	< 10	0.00	An	0.00E + 00	1455	< 10	0.00	AN	0.00E + 00	101
Zinc as Zn	700	850	701250	R	1.00E + 02	R	1600	1320000	E	1.00E+02	R	3300	2722500	R	1.00E + 02	R
Calcium as Ca	150000	4500	3712500	R	9.62E+01	R	140	115500	AR	2.84E-05	AR	280	231000	R	1.28E-02	R
Chloride as Cl	250000	400	330000	R	3.80E-03	R	400	330000	B	3.80E-03	R	400	330000	R	3.80E-03	R
Fluoride as F	1500	1.6	1320	A.26	1.05E-04	All	1.3	1073	MA	1.35E-05	A 2 2	1.4	1155	141	2.84E-05	2.000
Magnesium as Mg	70000	310	255750	R	2.46E+00	R	310	255750	R	2.46E+00	R	500	412500	R	1.51E+01	R
Potassium as K	200000	190	156750	AR	3.39E-05	. 15 1	250	206250	R	4.56E-04	R	350	288750	R	7.78E-03	R
Sodium as Na	100000	330	272250	R	5.50E-01	R	300	247500	R	3.18E-01	R	330	272250	R	5.50E-01	R
Sulphate as SO <sub>4</sub>	200000	900	742500	R	2.64E+00	R	550	453750	R	1.87E-01	R	650	536250	R	5.05E- <b>0</b> 1	R
RI\$() 4	STAG	JUSTA TUE EN	VING NIMEN F	R		R		1	R		R			R		R



CONFIDENTIAL Research for IVS

# <u>DAM 10</u>: ENVIRONMENTAL RISK QUANTIFICATION • SEDIMENTS • SAMPLE NO's 5, 6 & 7 [INORGANIC · MICRO'S & MACRO'S] [ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NO's: 5, 6	, & 7							RISK TO	ENVIRO	NMENT						
	Acc;						RISK O	F SEDIMEN	TS FOR	GROUNDWA	TER					
INORGANIC	Risk		SAN	IPLE NO	. 5			SAN	/PLE NO	. 6			SAN	IPLE NO	. 7	
COMPOUNDS	Value	ТОТ	AL ANALYSIS		4 PROBIT MO	DDEL	TOT	AL ANALYSIS		<sup>4</sup> PROBIT M	DDEL	ТОТ	AL ANALYSIS		<sup>4</sup> PROBIT MC	ODEL
Micro's and Macro's	(MR&SA)	1 Lab Conc.	<sup>2</sup> EEC	<sup>3</sup> Risk	Risk Quan-	3 Risk	<sup>1</sup> Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	1 Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk
	<b>de</b> g	ppm	ppb	R / AB	tification %	RIAR	ppm	ppb	R/AH	tification %	R / 48	ppm	ppb	RIAN	tification %	R/88
Aluminium as Al	1000	2400	198000 <b>0</b>	R	1.00E + 02	R	1400	1155000	R	1.00E+02	R	440	363000	R	9.94E+01	R
Arsenic as As	4/3(0)	< 50	0.00	3848	0.00E + 00	AS	< 50	0.00	. 588	0.00E+00	10 mg	< 50	0.00	stil	0.00E + 00	1017
Barium as Ba	7800	< 2.0	0.00	2 - 1 4	0.00E+00	91 T	2.3	1898	// L2	5.12E-11	11 m d 21 m k k	4.2	3465	11 77 E 11 14 E	7.55E-08	48
Cadmium as Cd	31	< 10	0.00	2.1 T 2 2.3 X ¥	0.00E+00	20 € 3 • 18 €	< 10	0.00	Mr.	0.00E + 00	2411	< 10	0.00	Mil	0.00E+00	1.18
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	1.4700	160	132000	R	9.78E+01	R	170	140250	C	9.84E+01	8	240	198000	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9.98E+01	ñ
Cobalt as Co	A de la	< 10	0.00	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.00E+00	F1 - 7 - 1	< 10	0.00	2157	0.00E+00	75 T 5	< 10	0.00	1000	0.00E+00	25
Copper as Cu		< 10	0.00	2017	0.00E+00	* 5 ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ±	< 10	0.00	7 ( A P	0.00E+00	17.11	< 10	0.00	51 × 1 × × 1	0.00E ÷ 00	11/2
Iron as Fe	10.00	12000	9900000	R	1.00E + 02	10 m	12000	9900000	R	1.00E+02	R	42000	34650000	R	1.00E+02	20
Lead as Pb	370,0	< 100	0.00	3685	0.00E+00	1671	< 100	0.00	्रवाच्या १ वर्ष	0.00E+00	ATI	< 100	0.00	N.X.	0.00E + 00	Ali
Manganese as Mn	300	190	156750	R	1.00E+02	# 79 9 0	190	156750	R	1.00E+02	R	400	330000	R	1.00E+02	R
Mercury as Hg	3.3	0.00	0.00	200	0.00E+00	1 x 2 x	0.00	0.00	40	0.00E + 00	24 E3	0.00	0.00	95 X 1	0.00E+00	أعرا
Nickel as Ni	1142	< 10	0.00	2 × 5 × 2	0.00E+00	AR	< 10	0.00	1.18	0.00E + 00	3000 2008	< 10	0.00	1282	0.00E+00	3 400
Selenium as Se	280	0.00	0.00	78 6 5 7 6 6	0.00E+00	23 (1.3) 2 (2.6) 4	0.00	0.00	がも一ト に分別が	0.00E+00	7621	9.00	0.00	Ala T	0.00E+00	1148
Titanium as Ti	731	85	70125	R	1. <b>0</b> 0E + 02	R	49	40425	R	1.00E+02	R	41	33825	R	9.99E+01	T.
Vanadium as V	30,300	< 10	0.00	10 K 1	0.00E + 00	1.54	< 10	0.00	2238	0.00E+00	2017	< 10	0.00	M01	0.00E + 00	(1)
Zinc as Zn	T. Web	120	99000	R	1.00E+02	R	1200	990000	R	1.00E+02	B	930	767250	R	1.00E+02	R
Calcium as Ca	i Magan	3700	3052500	R	9.18E+01	R	4500	3712500	R	9.62E+01	R	7100	5857500	R	9.96E+ <b>0</b> 1	
Chloride as Cl	2. <b>annie)</b> (10.00	200	165000	35 E 4 6 - 6 3	5.88E-06	AR	500	412500	R	2.15E-02	R	450	371250	R	9.69E-03	_
Fluoride as F	1.5(0)0	1.4	1155	2 1 4 4 2 4 5 4	2.84E-05	AR	1.2	990	AN	5.88E-06	2514	1.4	1155	7127	2.84E-05	
Magnesium as Mg	8)110287	280	231000	R	1.51E+00	R	280	231000	R	1.51E+00	R	380	313500	R	5.82E+00	
Potassium as K	altround)	200	165000	1447	5.61E-05	4 8 4 2 4 4 4	220	181500	AN	1.40E-04	****	130	107250		6.31E-07	
Sodium as Na	100000	250	206250	R	1.02E-01	R	350	288750	R	7.60E-01	R	320	264000	ii.	4.62E-01	
Sulphate as SO <sub>4</sub>	2/000000	400	330000	R	2.15E-02	R	800	660000	R	1.51E+00	R	350	288750	R	7.78E-03	_
SISKIA	CEPTABLE	EISK TO: EN	VIRONMENT	R		R			A.		R			R		



Draft for discussion CONFIDENTIAL Research for IVS

# DAM 10: ENVIRONMENTAL RISK QUANTIFICATION + SEDIMENTS + SAMPLE NO'S 8 & 9 [INORGANIC - MICRO'S & MACRO'S] [ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

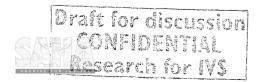
AMPLE NO's: 8, 8					RISK	TO EN	VIRONMEN'	T				
	5 Acc				RISK OF SEDII	WENTS	FOR GROU					
INORGANIC	Risk		SAN	IPLE NO				SAN	IPLE NO			
COMPOUNDS	Value	тот	AL ANALYSIS		4 PROBIT MO	DDEL	TOT	AL ANALYSIS		<sup>4</sup> PROBIT M	DDEL	
Micro's and Macro's	(MB&SA)	1 Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	<sup>1</sup> Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	
	ppb	ppm	ppb	R/AR	tification %	RIAS	ppm	ppb	R/AN	tification %	RIAN	NOTES
Aluminium as Al	10000	1800	1485000	R	1.00E+02	R	2500	2062500	R	1.00E+02	R	
Arsenic as As	430	< 50	0.00	AR	0.00E+00		< 50	0.00	400	0.00E +00	200	4.05
Barium as Ba	7800	8.9	7343	AR	1.98E-04	AR	12	9900	R	2.75E-03	R	VOLUME: 1.25 x 10 <sup>6</sup> = 1,250,000 kg/ha/n
Cadmium as Cd	31	< 10	0.00	AR	0.00E + 00	All	< 10	0.00	1741	0.00E + 00		
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	4700	270	222750	R	9.99E+01	R	200	165000	R	9.93E+01	R	
Cobalt as Co	6900	< 10	0.00	AR	0.00E+00	All	< 10	0.00	AR	0.00E+00	28.57	
Copper as Cu	100	< 10	0.00	AB	0.00E+00	AR	< 10	0.00	AR	0.00E + 00	30 Z	
Iron as Fe	9000	20000	16500000	R	1.00E+02	B	21000	17325000	R	1.00E + 02	R	
Lead as Pb	100	< 100	0.00	1.12	0.00E+00	VA 5 1 L 4 2 3	< 100	0.00	15 1	0.00E+00		
Manganese as Mn	300 -	340	280 <b>500</b>	R	1.00E+02	R	280	231000	R	1.00E+02	R	
Mercury as Hg	22	0.00	0.00	AR	0.00E + 00	Aii	0.00	0.00	An	0.00E+00		
Nickel as Ni	1140	< 18	0.00	Att	0.00E+00	AR	< 10	0.00	AR	0.00E+00		
Selenium as Se	260	0.00	0.00	AH	0.00E + 00	AR	0.00	0.00	AV	0.00E+00		
Titanium as Ti	731	65	53625	R	1.00E+02	F	140	115500	R	1.00E +02		
Vanadium as V	1300	< 10	0.00	111	0.00E+00	AR	< 10	0.00	3048	0.00E+00		
Zinc as Zn	700	3200	2640000	R	1.00E+02	R	2700	2227500	R	1.00E+02		
Calcium as Ca	150000	280	231000	R	1.28E-02	R	520	429000	R	7.22E-01	R	
Chloride as Cl	250000	300	247500	AR	3.15E-04		600	495000	R	7. <b>7</b> 5E-02	R	
Fluoride as F	1500	1.3	1073	AN.	1.35E-05	AR	1.1	908	P.B	2.36E-06		
Magnesium as Mg	70000	330	272250	R	3.25E +00	R	470	387750	R	1.24E+01	R	
Potassium as K	200000	260	214500	R	6.48E-04	R	280	231000	R	1.24E-03		
Sodium as Na	100000	280	231000	R	2.09E-01	R	300	247500	R	3.18E-01	R	
Sulphate as SO <sub>4</sub>	200000	950	783750	R	3.36E+00	R	500	412500	R	1.02E-01	R	
RISK J A	CCEPTABLE	MSK TO: EN	VIRONMENT	R		R			R	1	R	



Draft for discussion CONFIDENTIAL Research for IVS

## **TABLES 70 - 73**

# DAM 10: SEDIMENTS INORGANIC HUMAN RISK ASSESSMENT



## DAM 10: HUMAN RISK ASSESSMENT \* SEDIMENTS \* SAMPLE NO'S 2 & 3 [INORGANIC · MICRO'S & MACRO'S] [ISCOR VANOERBIJLPARK STEEL · MASTER PLAN]

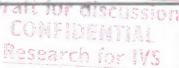
						RISK TO	HUMAN			
				SAMPL	E NO. 2				LE NO. 3	
INORGANIC		7 EPA RfD/		13 Conc. in	<sup>14</sup> PDI			<sup>13</sup> Conc. in	<sup>14</sup> PDI	
COMPOUNDS	6 RfDI	EPA DWEL/		groundwater	groundwater	10 Margin		groundwater	groundwater	10 <sub>Margin</sub>
Micro's and Macro's	ADI/GV	RSA RfD/	8 Lab conc.	(EEC)	өхроѕиге	of Safety	8 Lah conc.	(EEC)	ехроѕиге	of Safety
more cana madre c	emg/kg/day	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	%
Aluminium as Al	0.805	RSA RfD	1500	1237500	41.3	825000	1600	1320000	44.0	8800
Arsenic as As	0.0200	EPA RfD	< 50	0.00	0.00	0.00	< 50	0.00	0.00	Ü.
Barium as Ba	0.07	EPA RfD	4.0	3300	0.110	157	22	18150	0.605	8
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	Ü.
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	1.50	EPA RfD	400	330000	11.0	733	200	165000	5.5	3
Cobalt as Co	0.00%	RSA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	Ĵ.
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	J.
Iron as Fe	0.003	RSA RfD	29000	23925000	798	26583333	12000	9900000	330	110000
Lead as Pb	9.0001	RSA RfD	< 100	0.00	0.00	0.00	< 100	0.00	0.00	0.
Manganese as Mn	0+0.49	EPA RfD	210	173250	5.78	12554	180	148500	5.0	107
Mercury as Hg	0.0003	EPA RfD	0.80	0.00	0.00	0.00	0.00	0.00	0.00	Ú.
Nickel as Ni	0.02	EPA RfD	< 10	0.00	0.00	0.00	12	9900	0.330	16
Selenium as Se	9.003	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.
Titanium as Ti	0.003	RSA RfD	78	64350	2.15	71500	57	47025	1.57	522
Vanadium as V	0.008	EPA RfD	< 10	0.00	0.00	0,00	< 10	0.00	0.00	0.
Zinc as Zn	0.3	EPA RfD	850	701250	23.4	7792	1600	132000 <b>0</b>	44.0	146
Calcium as Ca	5.0	RSA RfD	4500	3712500	123.8	2475	140	115500	3.85	
Chloride as Cl	3.3	RSA RfD	400	330000	11.0	132.5	400	330000	11.0	1
Fluoride as F	() (Fig)	EPA RfD	1.6	1320	0.044	73.3	1.3	1073	0.036	
Magnesium as Mg	2.3	RSA RfD	310	255750	8.53	371	310	255750	8.53	3
Potassium as K	6.7	RSA RfD	190	156750	5.23	78	250	206250	6.88	1
Sodium as Na	3.3	RSA RfD	330	272250	9.08	275	300	247500	8.25	2
Sulphate as SO <sub>4</sub>	6.7	RSA RfD	900	742500	24.75	369	550	453750	15.1	2
	RISK / ACC	EPTABLE RIS	( TO: HUMAN	Gr	oundwater (PDI)	R		Gi	eundwater (PDI)	R



## DAW 10: HUMAN RISK ASSESSMENT • SEDIMENTS • SAMPLE NO'S 4 & 5 [INORGANIC · MICRO'S & MACRO'S] [ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

						RISK TO	NAMUH C			
	4	9		SAMPL	E NO. 4			SAMPI	LE NO. 5	
INORGANIC	RfDj	' EPA RfD/		13 Conc. in	<sup>14</sup> PDI	10 Margin		13 Conc. in	<sup>14</sup> PDI	10 Margin
COMPOUNDS	150	EPA DWEL/	8	groundwater	groundwater		8	groundwater	groundwater	
Micro's and Macro's	ADI   GV mg/kg/day	RSA RfD/	<sup>8</sup> Lab conc.	(EEC)	exposure	of Safety	8 Lab conc.	(EEC)	exposure	of Safety
41 11 41	The second second	WHO GV	ppm	ppb	mg/kg/day	1420000	ppm	ppb	mg/ltg/day	100000
Aluminium as Al	\$1,0(2)	RSA RfD	2600	2145000	71.5	1430000	2400	1980000	66.0	132000
Arsenic as As	b, tens	EPA RfD	< 50	0.00	0.00	0.00	< 50	0.00	0.00	U.D
Barium as Ba	0.07	EPA RfD	24.0	19800	0.660	943	< 2.0	0.00	0.00	0.0
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	7.58	EPA RfD	160	132000	4.4	293	160	132000	4.4	29
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	9.0
Copper as Cu	0.0%	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Iron as Fe	9.003	RSA RfD	17000	14025000	468	15583333	<b>12</b> 000	9900000	330	1100000
Lead as Pb	9,002	RSA RfD	< 100	0.00	0.00	0.00	< 100	0.00	0.00	0.0
Manganese as Mn	0.46	EPA RfD	330	272250	9.1	19728	1 <b>9</b> 0	156750	5.2	1135
Mercury as Hg	e 0:00%	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0,6
Nickel as Ni	0.02	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	U.I
Selenium as Se	0.006	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Titanium as Ti	0.003	RSA RfD	110	90750	3.0	100833	85	70125	2.3	7791
Vanadium as V	0.069	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Zinc as Zn	0, 3	EPA RfD	3300	2722500	90.8	30250	120	99000	3.3	110
Calcium as Ca	5.0	RSA RfD	280	231000	7.7	154	3700	3052500	101.8	203
Chloride as Cl	8.3	RSA RfD	400	330000	11.0	133	200	165000	5.5	5
Fluoride as F	0 16	EPA RfD	1.4	1155	0.039	54	1.4	1155	0.04	6
Magnesium as Mg	2.3	RSA RfD	<b>5</b> 00	412500	13.8	598	280	231000	7.7	33
Potassium as K	6.7	RSA RfD	350	288750	9.6	144	200	165000	5.5	
Sodium as Na	3.3	RSA RfD	330	272250	9.1	275	250	206250	6.9	20
Sulphate as SO <sub>4</sub>	6,7	RSA RfD	650	536250	17.9	267	400	330000	11.0	16
	BISK Laga	EPTABLE RIS	CTO: HUMAN		Groundwater	R			Groundwater	R

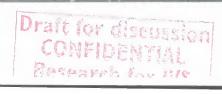




# DAM 10: HUMAN RISK ASSESSMENT \* SEDIMENTS \* SAMPLE NO'S 6 & 7 [INORGANIC - MICRO'S & MACRO'S] [ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

						RISK TO	NAMUH (			
				SAMPLI	E NO. 6			SAMPL		
INORGANIC COMPOUNDS	80	7 EPA RfD/		13 Conc. in groundwater	<sup>14</sup> PDI groundwater	10 Margin		13 Conc. in groundwater	14 PDI	10 Wargin
Micro's and Macro's	Aut/GV	RSA RfD/	8 Lab conc.	(EEC)	exposure	of Safety	8 Lab conc.	(EEC)	exposure	of Safety
William Control of Con	mg legitay	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	0/e
Aluminium as Al	0.005	RSA RfD	1400	1155000	38.5	7700 <b>00</b>	440	363000	12.1	24200
Arsenic as As	0.0003	EPA RfD	< 50	0.80	0.00	0.00	< 50	0.00	0.00	0.0
Barium as Ba	0.07	EPA RfD	2.3	1898	0.063	90	4	3465	0.116	16
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	· < 10	0.00	0.00	0.0
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	1.50	EPA RfD	170	140250	4.68	312	240	198000	6.60	44
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Iron as Fe	0.003	RSA RfD	12000	9900000	330	11000000	42000	34650000	1155	3850000
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 100	0.00	0.00	0.0
Manganese as Mn	0.046	EPA RfD	190	156750	5.23	11359	400	330000	11.0	2391
Mercury as Hg	0.0003	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Nickel as Ni	0.02	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Selenium as Se	0.005	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.0
Titanium as Ti	0.003	RSA RfD	49	40425	1.35	44917	41	33825	1.13	3758
Vanadium as V	0.009	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.0
Zinc as Zn	0.3	EPA RfD	1200	990000	33	11000	930	767250	25.6	852
Calcium as Ca	5.0	RSA RfD	4500	3712500	123.8	2475	7100	5857500	195.3	390
Chloride as Cl	8.3	RSA RfD	500	412500	13.8	166	450	371250	12.4	14
Fluoride as F	0.06	EPA RfD	1.2	990	0.03	- 55	1.4	1155	0.04	6
Magnesium as Mg	2.3	RSA RfD	280	231000	7.7	335	380	313500	10.5	45
Potassium as K	6.7	RSA RfD	220	181500	6.1	90	130	107250	3.58	5
Sodium as Na	3.3	RSA RfD	350	288750	9.6	292	320	264000	8.8	26
Sulphate as SO <sub>4</sub>	6.7	RSA RfD	800	660000	22	328	350	288750	9.63	14
	MISK   AC	CEPTABLE PAS	CTO: HUMAN		Groundwater	R			Groundwater	R

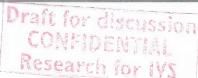




## <u>DAM 10</u>: HUMAN RISK ASSESSMENT \* <u>SEDIMENTS</u> \* SAMPLE NO'S 8 & 9 [INORGANIC · MICRO'S & MACRO'S] [ISCOR VANDERBIJLPARK STEEL · MASTER PLAN]

						RISK TO	HUMAN			
				SAMPL				SAMPI	LE NO. 9	
INORGANIC		7 EPA RfD/		13 Conc. in	<sup>14</sup> PDI			13 Conc. in	<sup>14</sup> PDI	
COMPOUNDS	6 RfD	SPA DWEL		groundwater	groundwater	10 Margin		groundwater	groundwater	10 Margin
Micro's and Macro's	ADITEV	RSA RfD/	8 Lab conc.	(EEC)	exposure	of Safety	<sup>8</sup> Lab conc.	(EEC)	exposure	of Safety
interes o arra intastro o	mg/kg/day	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	%
Aluminium as Al	0.005	RSA RfD	1800	1485000	49.5	990000	2500	2062500	68.8	13750
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 50	0.00	0.00	0.
Barium as Ba	0.07	EPA RfD	8.9	7343	0.245	350	12	9900	0.330	4
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	6,
Chromium <sup>3+</sup> as Cr <sup>3+</sup>	1.50	EPA RfD	270	222750	7.43	495	200	165000	5.50	3
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0,
Iron as Fe	0.003	RSA RfD	20000	165 <b>00</b> 000	55 <b>0</b>	18333333	21000	17325000	578	192500
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 100	0.00	0.00	G.
Manganese as Mn	0.046	EPA RfD	340	2805 <b>0</b> 0	9.35	20326	280	231000	7.70	167
Mercury as Hg	0.0003	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Nickel as Ni	0.02	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.
Selenium as Se	0.005	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.
Titanium as Ti	0.003	RSA RfD	65	53625	1.79	59 <b>58</b> 3	140	115500	3.85	1283
Vanadium as V	0.009	EPA RfD	< 10	0.00	0.00	0.00	< 10	0.00	0.00	0.
Zinc as Zn	0.3	EPA RfD	3200	26400 <b>0</b> 0	88	29333	2700	2227500	74.3	247
Calcium as Ca	5.0	RSA RfD	280	231000	7.7	154	520	429000	14.3	2
Chloride as Cl	8.3	RSA RfD	300	247500	8.3	99	600	495000	16.5	1
Fluoride as F	0.06	EPA RfD	1.3	1073	0.036	60	1.1	908	0.030	[5]
Magnesium as Mg	2.3	RSA RfD	330	272250	9.1	395	470	387750	12.93	5
Potassium as K	6.7	RSA RfD	260	214500	7.2	107	280	231000	7.7	1
Sodium as Na	3.3	RSA RfD	280	231000	7.7	233	300	247500	8.25	2
Sulphate as SO <sub>4</sub>	6.7	RSA RfD	950	783750	26.1	390	500	412500	13.75	2
	RISK   ACI	CEPTABLE RIS	CTO: HUMAN		Groundwater	R			Groundwater	R





## **TABLES 74 - 76**

# DAM 10: SEDIMENTS ORGANIC ENVIRONMENTAL RISK QUANTIFICATION



# Draft for discussion CONFIDENTIAL

Table 74

Research foramine: - Environmental RISK QUANTIFICATION + SEDIMENTS + SAMPLE NO'S 2, 3 & 4 [ORGANICS - PAH'S & VOC'] [ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

	THE PERSON NAMED IN				616	17 19175 510	ULUM ONES OPE	are manager	or nee	INSPAULO CO	0.000	anima a a mem				
	Acc.				HIS	KIUE	VIRUNIVE				K GKU	UNDWATER		IIDIC 4		
ORGANIC	Risk			MPLE 2	1				MPLE 3					MPLE 4		
COMPOUNDS	, Value	TOTA	L ANALYSI		4 PROBIT I		-	AL ANALYSIS		4 PROBIT N			L ANALYSIS		4 PROBIT I	
Volatile & Semi-Volatile	(MR)	Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan- tification %	Risk	<sup>1</sup> Lab Conc. ppm	<sup>2</sup> EEC	3 Risk	Risk Quan- tification %	3 Risk R / AR	<sup>1</sup> Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan- tification %	<sup>3</sup> Risi
Benzene	3000	59	48675	R	8.28E+01	R	0.26	215	AH	0.00E+00	AR	8.0	6600	- N	1.54E-01	n
oluene	4500	230	189750	R	9.98E+01	R	0.29	239	- 5/1	0.00E+00	-un	0.68	561	141	1.11E-14	100
thylbenzene	3570	38	31350	R	4.00E+01	R	0.2	165	- 98	0.00E+00	6.6	0.58	479	. 12	2.22E-14	i sli
n,p·Xylene	970	270	222750	R	1.00E + 02	R	0.39	322	40	2.40E-09	. A . L.	1.4	1155	R	1.61E-03	R
-Xylene	1450	78	64350	R	9.98E+01	R	0.2	165	AVI	0.00E+00	88	1.0	825	1 2	1.21E-06	
Styrene	4360	130	107250	R	9.61E+01	R	0.14	116	An	0.00E+00	AR .	1.0	825	M	2.07E-12	E IA
sopropylbenzene	2640	< 5	0.00	120	0.00E+00	617	< 0.1	0.00	(0)	0.00E+00	All	< 0.1	0.00	0.81	0.00E÷00	/48
,3,5-Trimethylbenzene	1260	36	29700	R	9.53E+01	R	< 0.1	0.00	44	0.00E+00	AB	0.17	140	AR	0.00E+00	7.8
,2,4-Trimethylbenzene	770	74	61050	R	1.00E+02	R	0.31	256	90	2.45E-09	- AR	0.3	248	AR	1.66E-09	0.7
laphthalene	460	6800	5610000	R	1,00E+02	R	90	74250	- 3	1.00E ÷ 02	l r I u	16	13200	Ä	9.80E + 01	8
henol	2690	6.5	5363	R	8,12E-02	R	0.00	0.00	100 m	0.00E+00	1	0.00	0.00	All	0.00E+00	1
!-Methylphenol	1460	3.8	3135	R	1.32E-01	B	0.00	0.00	341	0.00E+00	1140	0.00	0.00	All	0.00E+00	, In
l-Methylphenol	1470	1.5	1238	7.8	6.86E-05	AB	0.00	0.00	AR	0.00E+00	121	0.00	0.00	Add	0.00E+00	M
2,4-Dimethylphenol	1270	3.8	3135	B	3.13E-01	1) 11	0.16	132	- 131	0.00£+00		0.2	165	1640	1.11E-14	
-Methylnapthalene	150	1400	1155000	R	1.00E+02	R	25	20625	Si.	1.00E + 02	R	8,0	8600	11	9.98E+01	R
Acenaphthylene	0.5	300	247500	R	1,00E+02	R	1.9	1568	R	1.00E+02	R	1.9	1568	R	1.00E + 02	R
\cenapthene	170	920	759000	R	1.00E + 02	R	28	23100	R	1.00E+02	R	13	10725	R	1.00E + 02	R
)ibenzofuran	190	910	750750	R	1.00E+02	R	29	23925	R	1.00E + 02	R	14	11550	a	1.00E + 02	R
luorene	160	790	651750	R	1.00E+02	R	28	23100	R	1.00E+02	R	16	13200	R	1.00E + 02	R
henanthrene	80	920	759000	R	1.00E+02	R	39	32175	R	1.00E+02	R	32	26400	R	1.00E + 02	R
Anthracene	0.5	280	231000	R	1.00E+02	R	11	9075	R	1,00E+02	R	9.4	7755	R	1.00E+02	R
Carbazole	130	560	462000	R	1.00E+02	8	15	12375	R	1.00E + 02	R	6,9	5693	R	9.98E ÷ 01	ß
luoranthene	14	480	396000	R	1.00E ÷ 02	R	33	27225	R	1.00E+02	B	36	29700	R	1.00E+02	1
Pyrene	200	280	231000	R	1.00E+02	R	21	17325	R	1.00E+02	H	22	18150	R	1.00E + 02	l B
Benzo[a]anthracene	1	120	99000	R	1.00E+02	15	9.2	7590	R	1.00E+02	Ti.	11	9075	R	1.00E+02	R
Chrysene	100	110	90750	R	1.00E+02	R	9.0	7425	R	1.00E + 02	R	11	9075	R	1.00E + 02	-
is(2-Ethylhexyl)phthalate	14400	0.00	0.00	part 1	0.00E+00	AB	0.00	0.00	241	0.00E+00	1128	0.38	314	1914	0.00E+00	-
Benzo(b)+(k)fluoranthene	0.5	140	115500	B	1.00E + 02	3 1	11	9075	R	1.00E + 02	R	14	11550	11	1.00E + 02	R
Benzo(a)pyrene	0.5	83	68475	B	1.00E+02	R	6.0	4950	R	1.00E + 02	R	7.6	6270	F	1.00E + 02	H
ndeno[1,2,3-cd]pyrene	0.5	52	42900	R	1.00E+02	R	3.3	2723	R	1.00E+02	R	5.3	4373	R	1.00E + 02	E
Dibenz[a,h]anthracene	100	11	9075	R	1.00E+02	R	8.3	6848	R	1.00E + 02	R	1.2	990	R	4.92E+01	B
lenzo[g,h,i]perylene	780	36	29700	R	9.96E+01	R	2.3	1898	R	2.87E-01	R	2.6	2145	R	5.82E-01	R

# Draft for discussion CONFIDENTIAL

Table 75

Research 100AM 18: ENVIRONMENTAL RISK QUANTIFICATION + SEDIMENTS + SAMPLE NO'S 5, 6 & 7 [ORGANICS - PAH' & VOC']
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

AMPLE NUMBERS:	0,07			1.0			LPANK 311									
-	A00				RIS	K TO E	VVIRONMER	VT - RISK	OF SED	IMENTS FO	R GRO	UNDWATER				
ORGANIC	Risk		SA	MPLE 5					MPLE 6					MPLE 7		
COMPOUNDS	Value	TOTA	L ANALYSIS	3	4 PROBIT	MODEL	TOTA	L ANALYSIS	S	4 PROBIT I	MODEL	TOTA	AL ANALYSIS	3	4 PROBIT	MODEL
Volatile & Semi-Volatile	(1)(1)	1 Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Risk	<sup>1</sup> Lab Conc.	<sup>2</sup> EEC	3 Risk	Risk Quan-	3 Ris
	ppb	ppm	ppb	R/AS	tification%	RIAR	ppm	ppb	RIAR	tification%	R/an	ppm	apb	R/An	tification%	R/A
Benzene	3000	350	288750	B	1.00E+02	R	0.25	206	ĘĬ,	0.00E+00	9,83	23	18975	R	1.85E+01	R
Toluene	4500	660	544500	R	1.00E+02	R	0.27	223	AR	0.00E+00	NA.	33	27225	R	1.63E+01	R
Ethylbenzene	3570	87	71775	R	9.14E+01	R	0.22	182	0.25	0.00E+00	AF	39	32175	R	4.20E+01	R
m,p-Xylene	970	560	462000	R	1.00E+02	R	0.41	338	(8.14)	4.31E-09	B.B	89	73425	R	1.00E+02	R
o-Xylene	1450	160	132000	R	1.00E+02	R	0.22	182	0.85	1.11E-14	N.B.	25	20625	R	7.55E+01	В
Styrene	4360	270	222750	B	9.99E+01	R	0.17	140	AB	0.00E+00	0.00	= 1.0	0.00		0.00E+00	- Ali
Isopropylbenzene	2640	< 5	0.00	Mi.	0.00E+00	100	< 1.0	0.00	AB	0.00E+00	0,51	4.0	3300	R	2.42E-03	17
1,3,5-Trimethylbenzene	1260	56	46200	R	9.94E+01	R	0.16	132	AR	0.00E+00	A.F.	14	11550	1.5	4.33E+01	R
1,2,4-Trimethylbenzene	770-	120	99000	R	1.00E+02	R	0.43	357	AB	1.23E-07	A.S	26	21450	R	9.77E+01	П
Naphthalene	460	3200	2640000	R	1.00E+02	R	420	3481500	R	1.00E+02	R	> 2800	2310000	R	1.00E+02	B
Phenol	2690	75	61875	R	9.48E+01	R	0.00	0.00	Alli	0.00E+00	Mil	1.0	817	All	8.11E-10	DAF!
2-Methylphenol	1460	57	47025	R	9.89E+01	R	0.00	0.00	All	0.00E+00	42	0.76	627		5.11E-08	- 46
4-Methylphenol	1470	110	90750	R	1.00E+02	R	0.00	0.00	AR:	0.00E+00	0.63	1.9	1568	R	6.17E-04	B
2,4-Dimethylphenol	1270	67	55275	R	9.98E+01	R	0.41	338		1.58E-10	7.5	7.9	6518	R	9.62E+00	R
2-Methylnapthalene	15()	> 1642	1354650	R	1.00E+02	R	12	9900	R	1.00E+02	R	> 2800	2310000	R	1.00E + 02	R
Acenaphthylene	0.5	400	330000	R	1.00E+02	B	2.9	2393	R	1.00E+02	A	1600	1320000	R	1.00E+02	R
Acenapthene	170	1400	1155000	В	1.00E+02	R	120	99000	R	1.00E+02	R	> 2800	2310000	R	1.00E + 02	B
Dibenzofuran	190	1400	1155000	B	1. <b>00</b> E+02	R	120	99000	R	1.00E+02	R	> 2800	2310000	R	1.00E+02	R
Fluorene	160	1200	990000	n	1.00E+02	R	120	99000	R	1.00E+02	R	> 2800	2310000	R	1.00E+02	R
Phenanthrene	80	1400	1155000	B	1.00E+02	R	170	140250	R	1.00E+02	R	> 2800	2310000	R	1.00E+02	R
Anthracene	0.5	430	354750	R	1.00E+02	R	13	10725	R	1.00E+02	R	1300	1072500	R	1.00E+02	N
Carbazole	130	510	420750	8	1.00E+02	R	14	11550	R	1.00E+02	R	910	750750	R	1.00E + 02	15
Fluoranthene	14	780	643500	R	1.00E + 02	R	33	27225	R	1.00E+02	R	2400	1980000	R	1.00E+02	R
Pyrene	200	470	387750	B	1.00E+02	R	22	18150	R	1.00E+02	R	1500	1237500	B	1.00E+02	B
Benzo[a]anthracene	1	200	165000	R	1.00E+02	R	11.0	9075	R	1.00E+02	R	670	552750	R	1.00E+02	R
Chrysene	100	180	148500	R	1.00E + 02	R	10.0	8250	R	1.00E+02	R	600	495000	R	1.00E+02	R
bis(2-Ethylhexyl)phthalate	14400	0.48	396	All	0.00E+00	- Mal	0.00	0.00	117	0.00E+00	-31	0.00	0.00	Ma.	0.00E+00	A. 13
Benzo(b)+[k]fluoranthene	0.5	230	189750	22	1.00E+02	17	15	12375	R	1.00E + 02	R	790	651750	B	1.00E+02	R
Benzo[a]pyrene	0,5	140	115500	R	1.00E+02	R	8.1	6683	R	1.00E+02	R	470	387750	R	1.00E+02	R
Indeno[1,2,3-cd]pyrene	0.5	77	63525	R	1.00E+02	R	4.1	3383	R	1.00E + 02	R	300	247500	R	1.00E+02	R
Dibenz[a,h]anthracene	100	24	19800	R	1.00E+02	R	1.0	825	R	3.54E+01	R	85	70125	R	1.00E+02	R
Benzo[g,h,i]perylene	780	53	43725	R	1.00E+02	B	2.9	2393	R	1.05E + 00	R	200	165000	R	1.00E+02	R
BISKING	TOTARITI	MBK TO: ENVI		R		R		1	R		B			R		R

Draft for discussion COMFIDENTIAL Research for Mana

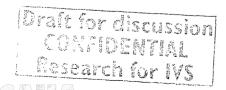
Table 76

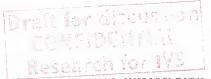
Research for the Environmental Risk Quantification • SEDIMENTS • SAMPLE NO'S 8 & 9 [ORGANICS - PAH'S & VOC']
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

	5	Ĭ T	RISH TO	ENIVIDO	MIRAFRIT E	SICK OF	SEDIMENT	S FOR CO	עמשונום	VATER		
ORGANIC	Acc. Bisk			AMPLE 8	AIRINIE IN L. F	non or	OLDHWLLIN		AMPLE 9	val Lii	_	
		mom.			4	I RAMEI	Town 1			4 0000171	LANDEL	
COMPOUNDS	Value		L ANALYSI	_	<sup>4</sup> PROBIT		-	L ANALYSI		4 PROBIT I		
Volatile & Semi-Volatile	(MR) ppb	1 Lab Conc.	<sup>2</sup> EEC ppb	<sup>3</sup> Risk R / AR	Risk Quan- tification%	Risk R/AR	1 Lab Conc.	<sup>2</sup> EEC ppb	3 Risk R / All	Risk Quan- tification%	3 Risk R / AR	NOTES
Benzene	3000	<b>ppm</b> 2.7	2228	_	1.98E-05	_	<b>ppm</b> 3.7	3053	R	4.05E-04	3	
Toluene	4500	1.9	1568	AH	4.31E-09		3.2	2640	AB	1.68E-06		
Ethylbenzene	3570	1.3	1073		7.13E·10		1.8	1485		3.52E-08		
m,p-Xylene	970	4.7	3878	ß	3.66E + 00	R	2.0	1650		2.68E-02	B	
o-Xylene	1450	2.9	2393	R	2.15E-02	() ()	1.0	825		1.21E-06		
Styrene	4360	2.3	1898		5.97E-08	AR	1.0	825		2.07E-12		
Isopropylbenzene	2640	1.1	908		3.69E-09	AR	< 1.0	0.00		0.00E+00		
1,3,5-Trimethylbenzene	1260	7.6	6270	R	8.63E+00		1.9	1568	R	2.34E-03	B	
1,2,4-Trimethylbenzene	770	1.7	1403	R	4.38E-02	R	2.8	2310	R	9,31E-01	R	
Naphthalene	460	40	33000	R	1.00E+02	R	11	9075	0	9.08E+01	R	
Phenol	2690	0.00	0.00		0.00E+00	Ale	0.00	0.00		0.00E+00		
2-Methylphenol	1460	0.00	0.00		0.00E+00		0.09	0.00		0.00E+00		
4-Methylphenol	1470	0.00	0.00	AB	0.00E+00	AR	0.00	0.00		0.00E+00		
2,4-Dimethylphenol	1270	0.00	0.00	_	0.00E+00	AR	0.00	0.00		0.00E+00		
2-Methylnapthalene	150	1.9	1568	R	5.35E+01	R	10	8250	R	1.00E+02	23 (1	
Acenaphthylene	0.5	2.6	2145	R	1.00E+02	n	13	10725	R	1.00E+02	B	
Acenapthene	170	13	10725	R	1.00E + 02	77	29	23925	R	1.00E+02	R	
Dibenzofuran	190	16	13200	В	1.00E+02	ñ	38	31350	R	1.00E+02	R	
Fluorene	160	18	14850	R	1.00E + 02	R	52	4290 <b>0</b>	R	1.00E+02	R	
Phenanthrene	80	33	27225	B	1.00E+02	R	140	115500	R	1.00E+02	R	
Anthracene	0.5	8.2	6765	R	1.00E+02	R	42	34650	R	1.00E+02	Я	
Carbazole	130	9.5	7838	R	1.00E + 02	В	11	9075	R	1.00E+02	R	
Fluoranthene	14	24	19800	B	1.00E+02	R	150	1237 <b>50</b>	R	1.00E+02	R	
Pyrene	200	8.7	7178	R	9.94E+01	R	95	78375	R	1.00E+02	Ĥ	
Benzo(a)anthracene	1	6.7	5528	R	1.00E+02	R	47	38775	R	1.00E+02	R	
Chrysene	100	6.0	4950	R	9.99E+01	R	47	38775	R	1.00E+02	R	
bis(2-Ethylhexyl)phthalate	14400	0.00	0.00	AR	0.00E+00	Al.	0.00	0.00	358 F	0.00E+00		
Benzo[b]+[k]fluoranthene	0.5	5.4	4455	R	1.00E+02	R	51	50325	R	1.00E+02	a	
Benzo[a]pyrene	0.5	3.3	2723	R	1.0 <b>0</b> E+02	R	34	28050	R	1.00E+02	8	
Indeno[1,2,3-cd]pyrene	0.5	3.0	2475	R	1.00E+02	R	19	15675	R	1.00E+02	R	
Dibenz(a,h)anthracene	100	9.2	7590	R	1.00E + 02	R	1.6	1320	R	7. <b>0</b> 6E + 01	R	
Benzo(g,h,i)perylene	780	2.0	1650	R	1.20E-01	R	14	11550	R	7.79E+01	R	
RISK I ACE	EPTABLE	RISK TO: ERVI	RONMENT					1	R		R	

## **TABLES 77 – 80**

## DAM 10: SEDIMENTS ORGANIC HUMAN RISK ASSESSMENT





ARCHIVE FOR JUSTICE

Table 77

DAM 10: HUMAN RISK ASSESSMENT + SEDIMENTS + SAMPLE NO'S 2 & 3 (ORGANIC - PANS & VGCs) - ISCOR VANDERBIJLPARK STEEL - MP

AMPLE NUMBERS: 2 & 3	3					RISK TO	NAMUHC			
				SAMPL	E NO. 2			SAMPI	E NO. 3	
ORGANIC		7 EPA RfD/		13 Conc. in	<sup>14</sup> PDI			<sup>13</sup> Conc. in	<sup>14</sup> PDI	
COMPOUNDS	RfD/	EPA DWEL/		groundwator	groundwater	10 Margin		groundwater	groundwater	10 <sub>Margin</sub>
PAHS & VOCS	ANIT CV	RSA RfD/	<sup>8</sup> Lab conc.	(EEC)	exposure	of Safety	<sup>8</sup> Lab conc.	(EEC)	exposure	of Safety
17.11 0. 100	mg/kg/day	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	0/6
Toluene	0.2	EPA RfD	230	189750	6.33	3163	0.29	239	0.008	4
Ethylbenzene	0.1	EPA RfD	38	31350	1.05	1045	0.2	165	0.006	Ž.
m,p-Xylene	0.17	WHO GV	270	222750	7.43	4368	0.39	322	0.011	9
o-Xylene	0.17	WHO GV	78	64350	2.1	1262	0.2	165	0.01	3.
Styrene	0.2	EPA RfD	130	107250	3.58	1788	0.14	116	0.004	1.
Isopropylbenzene	0.1	EPA RfD	< 5	0.00	0.00	0.00	< 0.1	0.00	0.00	0.
1,3,5-Trimethylbenzene	0.05	EPA RfD	36	29700	1.0	1980	< 0.1	0.00	0.00	â.
1,2,4-Trimethylbenzene	0.05	EPA RfD	74	61050	2.04	4070	0.31	256		¥ ??.
Naphthalene	0.02	EPA RfD	6800	5610000	187	935000	90	74250	2.48	1237
Phenol	0.6	EPA RfD	6.50	5363	0.179	29.8	0.00	0.00	0.00	3.0
2-Methylphenol	0.05	EPA RfD	3.8	3135	0.10	209	0.00	0.00	0.00	0.0
4-Methylphenol	0.005	EPA RfD	1.50	1238	0.041	825	0.80	0.00	0.00	0.0
2,4-Dimethylphenol	0.02	EPA RfD	3.8	3135	0.10	523	0.16	132	0.004	22
2-Methylnaphthalene	0.02	EPA RfD	1400	1155000	38.5	192500	25	20625	0.688	343
Acenaphthylene	0.00002	WHD GV	300	247500	8.3	41250000	1.9	1568	0.052	26133
Acenaphthene	0.1	EPA RfD	920	759000	25.3	42167	28	23100	0.77	128
Dibenzofuran	0.004	EPA RfD	910	750750	25.0	625625	20	23925	0.80	1993
Fluorene	0.04	EPA RfD	790	651750	21.7	54313	28	23100	0.77	192
Phenanthrene	0.0002	WHO GV	920	759000	25.3	12650000	39	32175	1.07	53625
Anthracene	0.3	EPA RfD	280	231000	7.7	2567	11	9075	0.303	10
Carbazole	0.006	EPA RfD	560	462000	15.4	256667	15	12375	0.413	687
Fluoranthene	0.04	EPA RfD	480	396000	13.2	33000	33	27225		226
Pyrene	0.03	EPA RfD	280	231000	7.7	25667	21	17325	0.578	192
Benzo[a]anthracene	0.00002	WHO GV	120	99000	3.3	16500000	9.2	7590	0.253	126500
Chrysene	0.00002	WHO GV	110	90750	3.0	15125000	9.0	7425	0.248	123750
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	J. Ü
Benzo[b]+[k]fluoranthene	0.00002	WHO GV	140	115500	3.9	19250000	11	9075	0.303	151250
Benzo[a]pyrene	0.0002	WHO GV	83	68475	2.3	1141250	6.0	4950	0.165	8250
Indeno[1,2,3·cd]pyrene	0.00002	WHO GV	52	42900	1.43		3.3	2723		45383
Dibenz(a,h)anthracene	0.0002	WHO GV	11	9075	0.303	151250	8.3	6848		11413
Benzo[4,h,i]perylene	0.0002	WHO GV	36	29700	0.990	495000	2.3	1898		3163
2204	DICHILL		R TO: HUMAN			R				R

Draft for discussion CONFIDENTIAL

Table 78

Resegrance Human Risk Assessment + Sediments + SAMPLE NO'S 4 & 5 | ORGANIC - PARS & VOCS | - ISCOR VANDERBIJLPARK STEEL - MP

<b>AMPLE NUMBERS: 4 &amp;!</b>	5		RISK TO HUMAN								
	disk Your				E NO. 4			SAMP	LE NO. 5		
ORGANIC		7 EPA RfD/		13 Conc. in	<sup>14</sup> PDI			13 Conc. in	<sup>14</sup> PDI		
CDMPOUNDS	RID	EPA DWEL/		groundwater	groundwater	10 Margin		groundwater	groundwater	10 <sub>Margin</sub>	
PAH' & VOC'	antev	RSA RfD/	8 Lab conc.	(EEC)	exposure	of Safety	<sup>8</sup> Lab conc.	(EEC)	вхроѕиго	of Safety	
11111 00 100	ichell ulus p	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	8%	
Benzene	0.002	EPA RfD	8.0	6600		11000	350	288750	9.6	4812	
Toluene	0.2	EPA RfD	0.68	561	0.019	9.35	660	544500	18.2	90	
Ethylbenzene	0.1	EPA RfD	0.58	479	0.016	16.0	87	71775	2.39	23	
m,p-Xylene	0.17	WHO GV	1.4	1155	0.04	22.0	560	462000	15.4	90	
o-Xylene	0.17	WHO GV	1.0	825	0.03	16.2	160	132000	4.4	25	
Styrene	0.32	EPA RfD	1.0	825	0.03	13.8	270	222750	7.43	37	
Isopropylbenzene	0.1	EPA RfD	< 0.1	0.00	0.00	0.00	< 5	0.00	0.00	0.	
1,3,5-Trimethylbenzene	0.03	EPA RfD	0.17	140	0.005	9.3	56	46200	1.54	30	
1,2,4-Trimethylbenzene	0.05	EPA RfD	0.3	248	0.01	17	120	99000	3.3	66	
Naphthalene	0.02	EPA RfD	16	13200	0.44	2200	3200	2640000	88	4400	
Phenol	0.1	EPA RfD	0.00	0.00	0.00	0.00	75	61875	2.1	4	
2-Methylphenol	12 (874)	EPA RfD	0.00	0.00	0.00	0.00	57	47025	1.57	3	
4-Methylphenol	6.005	EPA RfD	0.00	0.00	0.00	0.00	110	90750	3.03	608	
2,4-Dimethylphenol	0.02	EPA RfD	0.2	165	0.006	27.5	67	55275	1.8	92	
2-Methylnaphthalene	0.02	EPA RfD	8.0	6600	0.22	1100	> 1642	1354650	45.2	225	
Acenaphthylene	0.00002	WHO GV	1.9	1568	0.052	261333	400	330000	11.0	550000	
Acenaphthene	3,1	EPA RfD	13	10725	0.358	596	1400	1155000	38.5	64	
Dibenzofuran	0.004	EPA RfD	14	11550		9625	1400	1155000	38.5	962	
Fluorene	0.04	EPA RfD	16	13200	0.44	1100	1200	990000		82	
Phenanthrene	0.0002	WHO GV	32				1400	1155000	38.5	192500	
Anthracene	Jul 0.3	EPA RfD	9.4	7755			430	354750		3:	
Carbazole	0.000	EPA RfD	6.9	5693	0.19		510	420750	14.0	233	
Fluoranthene	0.04	EPA RfD	36	29700	1.0	2475	780	643500	21.5	531	
Pyrene	0.03	EPA RfD	22	18150	0.605	2017	470	387750	12.9	431	
Benzo[a]anthracene	2.00002	WHD GV	and the second	9075			200	165000	5.50	275000	
Chrysene	(Tittelianes)	WHO GV	1 1	9075			180	148500	4.95	24750	
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	0.38	314		52.3	0.480	396.00		f	
Benzo[b]+[k]fluoranthene	0.00002	WHO GV	14	11550	0.385		230	189750		31625	
Benzo(a)pyrene	0.0002	WHO GV	7.6	6270	0.209	104500	140	115500	3.85	1925	
Indeno[1,2,3-cd]pyrene	0.00002	WHO GV	5.3	4373	0.146		77	63525		10587	
Dibenz(a,h)anthracene	0.0002	WHO GV	1.2	990	0.033	16500	24	19800	0.660	330	
Benzo[u,h,i]perylene	0.0002	WHO GV	2.6	2145	0.072	35750	53	43725	1.46	7287	
2017	MSKIACE	ETTABLE RIS	K TO: HUMAN			R				R	

Table 79

Research: Human Risk assessment • Sediments • Sample No's 6 & 7 [ONDARIG | Paris & vocs] - ISCOR VANDERBIJLPARK STEEL - MP

AMPLE NUMBERS:6 &						KISK II	O HUMAN			
				SAMPL	E NO. 6			SAMP	LE NO. 7	
ORGANIC		7 EPA RfD/		<sup>13</sup> Conc. in	<sup>14</sup> PDI			13 Conc. in	<sup>14</sup> PDI	
COMPOUNDS	<sup>©</sup> RfD/	EPA DWEL/		groundwater	groundwater	10 Margin		groundwater	groundwater	10 Wargin
PAH <sup>s</sup> & VOC <sup>s</sup>	ADI / GV	RSA RfD/	8 Lab conc.	(EEC)	exposure	of Safety	8 Lab conc.	(EEC)	ехроѕиге	of Safety
	mg/kg/day	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	0/0
Benzene	0.002	EPA RfD	0.25	206	0.007	343	23	18975	0.633	310
Toluene	0.2	EPA RfD	0.27	223	0.007	3.72	33	27225	0.908	4
Ethylbenzene	0.1	EPA RfD	0.22	182	0.006	6.07	39	32175	1.07	1
m,p-Xylene	0.17	WHO GV	0.41	338	0.011	3.63	89	73425	2.45	1
o-Xylene	0.17	WHO GV	0.22	182	0.006	3.57	25	20625	0.688	
Styrene	0.2	EPA RfD	0.17	140	0.005	11.33	< 1.0	0.00	0.00	Ç
Isopropylbenzene	0.1	EPA RfD	< 1.0	0.00	0.00	0.43	4.0	3300	0.11	
1,3,5-Trimethylbenzene	0.05	EPA RfD	0.16	132	0.004	8.8	14	11550	0.385	
1,2,4-Trimethylbenzene	0.05	EPA RfD	0.43	357	0.012	24	26	21450	0.715	1
Naphthalene	0.02	EPA RfD	420	3481500	116	580250	> 2800	2310000	77.0	385
Phenol	0.6	EPA RfD	0.00	0.00	0.00	0.00	0.99	817	0.03	
2-Methylphenol	0.05	EPA RfD	0.00	0.00	0.00	9.00	0.76	627	0.02	į,
4-Methylphenol	0.005	EPA RfD	0.00	0.00	0.00	0.00	1.9	1568	0.05	1
2,4-Dimethylphenol	0.02	EPA RfD	0.41	338	0.011	58	7.9	6518	0.217	V-mare
2-Methylnaphthalene	0.02	EPA RfD	12	9900	0.33	1650	> 2800	2310000	77	385
Acenaphthylene	0.000032	WHO GV	2.9	2393	0.08	398833	1600	1320000	44	220000
Acenaphthene	0.1	EPA RfD	120	99000	3.3	5500	> 2800	2310000	77	128
Dibenzofuran	0.004	EPA RfD	120	99000	3.3	82500	> 2800	2310000	77	1925
Fluorene	0.94	EPA RfD	120	99000	3.3	8250	> 2800	2310000	77	192
Phenanthrene	0.0002	WHO GV	170	140250	4.7	2337500	> 2800	2310000	77	38500
Anthracene	0.3	EPA RfD	13	10725	0.358	119	1300	1072500	35.8	11
Carbazole	0.040	EPA RfD	14	11550	0.385	6417	910	750750	25.0	417
Fluoranthene	0.04	EPA RfD	33	27225	0.91	2269	2400	1980000	66.0	165
Pyrene	0.03	EPA RfD	22	18150		2017	1500	1237500	41.3	137
Benzo[a]anthracene	0.00002	WHO GV	100	9075	0.30	1512500	670	552750	18.4	92125
Chrysene	0.00002	WHO GV	10	8250	0.28	1375000	600	495000	16.5	82500
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	9.00	0.00	0.00	0.00	0.00	0.00	0.00	ĺ
Benzo[b]+[k]fluoranthene	0.00402	WHD GV	15	12375	0.413	2062500	790	651750	21.7	108625
Benzo(a)pyrene	0.0002	WHO GV	3.1	6683	0.223	111383	470	387750	12.9	6462
Indeno[1,2,3-cd]pyrene	0.00002	WHO GV	4.1	3383	0.113	563833	300	247500	8.25	41250
Dibenz[a,h]anthracene	0.0002	WHD GV	1.0	825	0.028	13750	85	70125	2.34	1168
Benzo[],h,i], erylene	0.0002	WHO GV	2.9	2393	0.080	39883	200	165000	5.5	2750
	20021-03	ENTAGLE SIS	Cata: HHM AN			R				R

Draft for discussion

Table 80

Research 10: HUMAN RISK ASSESSMENT + SEMMEANS + SAMPLE NO'S 8 & 9 [ORGANIC - PAHS & VOCS] - ISCOR VANDERBIJLPARK STEEL - MP

AMPLE NUMBERS: 8 &	9					RISK T	NAMUH C			
					E NO. 8				LE NO. 9	
ORGANIC		' EPA RfD/		Conc. in	14 PDI			Conc. in	14 PDI	
COMPOUNDS	6 0/8/	EPA DWEL/		groundwater	groundwater	10 Margin		groundwater	groundwater	TU <sub>Margin</sub>
PAH <sup>s</sup> & VOC <sup>s</sup>	ADIT GV	RSA RfD/	8 Lab conc.	(EEC)	exposure	of Safety	Lab conc.	(EEC)	exposure	of Safety
	asimum tang	WHO GV	ppm	ppb	mg/kg/day	%	ppm	ppb	mg/kg/day	0/0
Benzene	0.032	EPA RfD	2.7	2228		3713	3.7	3053		50
Toluene	7.2	EPA RfD	1.9	1568	0.05	26.1	3.2	2640		· /)
Ethylbenzene	777 014	EPA RfD	1.3	1073	0.04	35.8	1.8	1485		OŞ
m,p-Xylene	1.17	WHO GV	4.7	3878		76.0	2.0	1650		j j
o-Xylene	0.17	WHO GV	2.9	2393	0.08	46.3	1.0	825		
Styrene	0.2	EPA RfD	2.3	1898	0.063	31.0	1.00	825	0.028	
Isopropylbenzene	0.1	EPA RfD	1.1	908		30.27	< 1.0	0.00	0.00	Ü
1,3,5-Trimethylbenzene	0 (752.22)	EPA RfD	7.6	6270	0.209	418	1.9	1568	0.05	
1,2,4-Trimethylbenzene	0.05	EPA RfD	1.7	1403	0.05	3G.8	2.80	2310		
Naphthalene	0.02	EPA RfD	40	33000		5500	11	9075		1
Phenol	0.6.	EPA RfD	0.00	0.00		0.00	0.00	0.00		
2-Methylphenol	0.03	EPA RfD	0.00	0.00		9.00	0.00	0.00		į
4-Methylphenol	4.005	EPA RfD	0.00	0.00		0.00	0.00	0.00		Verse
2,4-Dimethylphenol	8.02	EPA RfD	9.00	0.00		8.88	0.00	0.00		-
2-Methylnaphthalene	0.02	EPA RfD	1.9	1568		261	10	8250		1
Acenaphthylene	0.00002	WHO GV	2.6	2145		357500	13.0	10725		1787
Acenaphthene	0.1	EPA RfD	13	10725		596	29	23925		1
Dibenzofuran	0.004	EPA RfD	16	13200		11 <b>00</b> 0	38	31350		26
Fluorene	0.04	EPA RfD	18	14850	0.495	1238	52	42900	1.43	3
Phonanthrene	0.0002	WHO GV	33	27225	0.908	453 <b>750</b>	140	115500	3.85	192 <b>5</b>
Anthracene	0,3	EPA RfD	8.2	6765		75	42	34650		
Carbazole	0.01016	EPA RfD	9.5	7838		4354	11	9075		5
Fluoranthene	0.04	EPA RfD	24	19800		1650	150	123750		10
Pyrene	0.04	EPA RfD	8.7	7178		798	95	78375		8
Benzo[a]anthracene	0.00002	WHO GV	6.7	5528	0.184	921333	47	38775		6462
Chrysene	0.00002	WHO GV	6.0	4950	0.17	825000	47	38775		6462
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	0.00	0.00		0.00	9.90	0.00		
Benzo(b)+[k]fluoranthene	0.00003	WHO GV	5.4	4455		742 <b>500</b>	61	50325		8387
Benzo[a]pyrene	0.00084	WHO GV	3.3	2723		45383	34	28050		467
Indeno[1,2,3-cd]pyrene	0.000003	WHO GV	3.0	2475		4125 <b>0</b> 0	19	15675		2612
Dibenz[a,h]anthracene	0.0002	WHO GV	9,2	7590	0.253	126 <b>50</b> 0	1.6	1320	0.044	22
Benzo[ j.h,i]perylene	0.0002	WHO GV	2.0	1650	0.055	275 <b>0</b> 0	14	11550	0.385	192
244	RIGHTARY	EPTABLE AIS	O TO HUMAN			R				R



## **DAM 10: LABORATORY ANALYSIS**

WATERS

Draft for discussion CONFIDENTIAL Research for iVS



## LAKEFIELD RESEARCH AFRICA (Pty) LIMITED

Reg. No.1948/28709/07

Directors: South Africa - Heinrich Williams Canada - Larry E. Seely, Christopher A. Fleming, Robin K. MacLean

58 Melvill Street, Booysens, Johannesburg 2091

P.O. Box 82582 Southdale 2135

Phone: +27 (0) 11 680 3466 Fax: +27 (0) 11 433 3654

Ockie Fourie Toxicologists (Pty) Ltd

P.O. Box 73179

Lynnwood Ridge, 0040 - RSA

Attn : Dr H.O. Fourie Fax : (012) 348 7436 Johannesburg, December 12, 2001

Date Rec.: November 5, 2001
LR. Ref.: NOV1001.R01
Reference: LAB/39/2001
Project: Total Analysis

## **CERTIFICATE OF ANALYSIS**

No.	Sample	ID	Al g/t	As g/t	Cr g/t	cd g/t	Ba g/t	Pb g/t	Co g/t	Cu g/t
1	Sample	2	1500	< 50	400	< 10	4.0	< 100	< 10	< 10
2	Sample	3	1600	< 50	200	< 10	22	< 100	< 10	< 10
3	Sample	4	2600	< 50	210	< 10	24	< 100	< 10	17
4	Sample	5	2400	< 50	160	< 10	< 2.0	< 100	< 10	< 10
5	Sample	6	1400	< 50	170	< 10	2.3	< 100	< 10	< 10
6	Sample	7	440	< 50	240	< 10	4.2	< 100	< 10	< 10
7	Sample	8	1800	< 50	270	< 10	8.9	< 100	< 10	10
8	Sample	9	2500	< 50	200	< 10	12	< 100	< 10	10
C	Check									
9	Sample	2	1300	< 50	410	< 10	7.6	< 100	< 10	10

No.	Sample	ID	Fe g/t	V g/t	Mn g/t	Ni g/t	Ti g/t	Zn g/t	* F* mg/L	NH3-N mg/L	* pH *	Cond mS/m
1	Sample	2	29000	< 10	210	< 10	78	850	1.6	0.54	7.9	98.9
2	Sample	3	12000	< 10	180	12	57	1600	1.3	2.0	8.5	65.3
3	Sample	4	17000	< 10	330	< 10	110	3300	1.4	1.7	8.7	74.4
4	Sample	5	12000	< 10	190	< 10	85	120	1.4	0.40	8.1	57.0
5	Sample	6	12000	< 10	190	< 10	49	1200	1.2	3.2	8.4	75.2
6	Sample	7	42000	< 10	400	< 10	41	930	1.4	2.9	7.5	86.0
7	Sample	8	20000	< 10	340	< 10	65	3200	1.3	2.9	8.6	68.0
8	Sample	9	21000	< 10	280	< 10	140	2700	1.1	1.7	8.2	68.5
C	heck											
9	Sample	2	28000	< 10	230	< 10	82	870				

No.	Sample	ID	* TDS mg/L	* Alk	Ca g/t	Mg g/t	Na g/t	K g/t	Si %	* C1 mg/L	* SO4	* NO3 mg/L
1	Sample	2	650	125	4500	310	330	190 <	0.20	400	900	10
2	Sample	3	450	40	140	310	300	250 <	0.20	400	550	42
3	Sample	4	400	60	280	500	330	350 <	0.20	400	650	22
4	Sample	5	750	90	3700	210	250	200 <	0.20	200	400	0.90
5	Sample	6	900	65	4500	280	350	220 <	0.20	500	800	< 0.50
6	Sample	7	700	190	7100	380	320	130 <	0.20	450	350	< 0.50
7	Sample	8	400	75	280	330	280	260 <	0.20	300	950	< 0.50
8	Sample	9	450	55	520	470	300	280 <	0.20	600	500	13
C	heck											
9	Sample	2	White Military	Professors	730	330	290	180 <	0.20	est tes		000



Draft for discussion CONFIDENTIAL Research for IVS

## Corporate Affairs proposed restructuring man power impact

## CSR, COMMUNICATIONS, RECEPTION & GOVT RELATIONS

Grading	Before	Proposed	Difference	Percentage Changed	
С	1	1	0	0%	
D	2	1	-1	-50%	
E	4	3	-1	-25%	E
F	2	2	0	0%	t
Н	2	1	-1	-50%	1
J	2	1	-1	-50%	
Total	13	9	-4	-31%	

E role downgraded to F role

## REPROGRAPHICS & RECORDS

Grading	Before	Proposed	Difference	Percentage Changed
F	1	0	-1	-100%
Н	3	0	-3	-100%
I	3	0	-3	-100%
J	3	0	-3	-100%
К	6	1	-5	-83%
Total	16	1	-15	-94%

-125%

Total 29 **10 -19** -62.26%





## WATERLAB (PTY) LTD

#### CERTIFICATE OF ANALYSES

DATE RECEIVED: 2001 - 10 - 01

DATE COMPLETED: 2001 - 10 - 24

PROJECT NUMBER: 1244

REPORT NUMBER: 7606

### OCKIE FOURIE TOXICOLOGISTS [Dr H.O. Fourie]

ANALYSES In mg/l			SAMPLE NAME		
ANALISES III IIIg/I	15?	° 25	,2D	35 %	3D?
SAMPLE NUMBER	2056	2057	2058	2059	2060
pН	7,7	7,7	7,5	7,7	7,6
CONDUCTIVITY in mS/m at 25 °C	592	590	589	591	591
TOTAL DISSOLVED SOLIDS at 180 °C	4180	4218	4350	4252	4374
AMMONIA as N	101	98	101	98	99
NITRATE as N	1,2	1,2	1,1	1,1	1,2
CHLORIDE as CI	1235	1235	1211	1223	1235
SULPHATE as SO <sub>4</sub>	1019	1048	1039	1072	1048
SILICA as Si	8,3	8,0	8,0	8,0	7,8
FLUORIDE as F	8,4	7,7	7,5	7,4	7,5
SODIUM as Na	366	362	366	373	367
POTASSIUM as K	94	94	92	94	93
CALCIUM as Ca	581	579	581	583	583
MAGNESIUM as Mg	80	84	83	81	81
ALUMINIUM as Ai	< 0,100	< 0,100	< 0,100	< 0,100	< 0.100
BORON as B	0,95	0,72	0,46	0,58	0,71
CADMIUM as Cd	< 0.010	< 0,010	< 0,010	< 0,010	< 0,010
CHROOM as Cr	0.042	0,049	0,061	0,060	0,063
IRON as Fe	0,737	0,752	0,728	0,674	0,652
COPPER as Cu	< 0,025	< 0,025	< 0,025	< 0,025	< 0,025
MANGANESE as Mn	3,45	3,48	3,43	3.38	3,43
LEAD as Pb	< 0.050	< 0,050	< 0,050	< 0,050	< 0,050
MERCURY as Hg	< 0,002	< 0,002	< 0,002	< 0,002	< 0,002
NICKEL as Ni	0,049	0,046	0,046	0,043	0,041
SELENIUM as Se	< 0,005	< 0,005	< 0,005	< 0,005	< 0,005
ZINC as Zn	0.309	0,314	0,316	0,304	0.288
FREE CYANIDE as CN	< 0,05	< 0,05	< 0.05	< 0.05	< 0.05
ARSENIC as As	< 0,005	< 0,005	< 0,005	< 0,005	< 0.005
HEXAVALLENT CHROMIUM as Cr <sup>6+</sup>	< 0,025	< 0,025	< 0,025	< 0,025	< 0,025
BARIUM as Ba	< 0,10	< 0,10	< 0,10	< 0,10	< 0,10
COBALT as Co	0,052	0,051	0,045	0,046	0,046
VANADIUM as V	< 0.03	< 0,03	< 0,03	< 0,03	< 0,03
TITANIUM as TI	0,22	0,20	0,18	0,21	0.22
% BALANCING	96,5	97,1	96,1	96,9	96,9

The information contained in this report is relevant only to the sample/samples supplied to WATERLAB (Pty) Ltd. Any further use of the above information is not the responsibility or liability of WATERLAB (Pty). Ltd. Except for the full report, parts of this report may not be reproduced without written approval of WATERLAB (Pty) Ltd.

Page 1 of 4

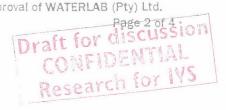


Draft for discussion CONFIDENTIAL Research for IVS

45141.7050			SAMPLE NAME		
ANALYSES in mg/l	£457	34D/	#5S 5	5D/	65 <sup>4</sup>
SAMPLE NUMBER	2061	2062	2063	2064	2065
рН	7,6	7,6	7,7	7,5	7,7
CONDUCTIVITY In mS/m at 25 °C	588	592	591	589	591
TOTAL DISSOLVED SOLIDS at 180 °C	4170	4232	4368	4384	4256
AMMONIA as N	98	1 101	98	115	101
NITRATE as N	1,1	1,1	1,2	0,9	1,1
CHLORIDE as CI	1223	1223	1223	1223	1235
SULPHATE as SO4	1058	1053	1048	1063	1087
SILICA as Si	7,8	7,0	7,8	7,2	7,8
FLUORIDE as F	7,5	7.1	7,6	7,8	7,1
SODIUM as Na	363	374	359	364	366
POTASSIUM as K	93	92	93	92	92
CALCIUM as Ca	581	583	581	585	585
MAGNESIUM as Mg	80	81	83	78	79
ALUMINIUM as Al	< 0,100	< 0,100	< 0.100	< 0,100	< 0,100
BORON as B	0.75	0,75	0,80	0,69	0,66
CADMIUM as Cd	< 0.010	< 0,010	< 0,010	< 0.010	< 0,010
CHROOM as Cr	0,065	0,068	0,038	0,046	0,058
IRON as Fe	0,664	0,671	0.920	0,679	0,713
COPPER as Cu	< 0,025	< 0,025	< 0,025	< 0,025	< 0,025
MANGANESE as Mn	3,44	3,45	3.22	3,16	3,34
LEAD as Pb	< 0,050	< 0,050	< 0,050	< 0,050	< 0,050
MERCURY as Hg	< 0.002	< 0.002	< 0.002	< 0,002	< 0,002
NICKEL as Ni	0,040	0,046	0,044	0,046	0,039
SELENIUM as Se	< 0,005	< 0,005	< 0,005	< 0,005	< 0,005
ZINC as Zn	0,297	0,290	0,341	0,286	0,270
FREE CYANIDE as CN	< 0,05	< 0,05	< 0,05	< 0.05	< 0,05
ARSENIC as As	< 0,005	< 0,005	< 0,005	< 0,005	< 0,005
HEXAVALLENT CHROMIUM as Cr <sup>S+</sup>	< 0.025	< 0,025	< 0,025	< 0,025	< 0,025
BARIUM as Ba	< 0,10	< 0.10	< 0,10	< 0,10	< 0.10
COBALT as Co	0,041	0,039	0,038	0,033	0,030
VANADIUM as V	< 0,03	< 0,03	< 0,03	< 0,03	< 0,03
TITANIUM as Ti	0,19	0,21	0,22	0,23	0,23
% BALANCING	97,2	96,3	96,9	96,2	97,6

The information contained in this report is relevant only to the sample/samples supplied to WATERLAB (Pty) Ltd. Any further use of the above information is not the responsibility or liability of WATERLAB (Pty). Ltd. Except for the full report, parts of this report may not be reproduced without written approval of WATERLAB (Pty) Ltd.





INITIAL COLUMN TO A COLUMN TO			SAMPLE NAME		
ANALYSES in mg/l	(6D)	(7S)	707	∮8S <b>*</b>	₹8D#
SAMPLE NUMBER	2066	2067	2068	2069	2070
рН	7,6	7,7	7,6	7,7	7,6
CONDUCTIVITY in mS/m at 25 °C	590	590	590	590	592
TOTAL DISSOLVED SOLIDS at 180 °C	4342	4120	4346	4324	4246
AMMONIA as N	98	. 100	104	117	98
NITRATE as N	1,6	4,4	3,9	3,8	0,9
CHLORIDE as Cl	1235	1211	1223	1223	1223
SULPHATE as SO <sub>4</sub>	1063	1039	1058	1092	1043
SILICA as Si	7,8	7,8	8,5	7,8	6.8
FLUORIDE as F	7,8	7,4	7,8	7,6	7,6
SODIUM as Na	370	369	390	389	357
POTASSIUM as K	92	91	91	92	93
CALCIUM as Ca	581	581	581	585	583
MAGNESIUM as Mg	83	81	83	78	80
ALUMINIUM as Al	< 0,100	< 0,100	< 0,100	< 0,100	0,594
BORON as B	0,67	0.71	0,38	0,73	0,79
CADMIUM as Cd	< 0.010	< 0,010	< 0,010	< 0,010	< 0,010
CHROOM as Cr	0,084	0,053	0,832	0,055	1,96
IRON as Fe	2,01	0,734	34	0,660	57
COPPER as Cu	< 0,025	< 0,025	< 0,025	< 0,025	0,046
MANGANESE as Mn	3,26	3,36	4,35	3,35	4,87
LEAD as Pb	< 0,050	< 0,050	< 0,050	< 0.050	1,01
MERCURY as Hg	< 0,002	< 0.002	< 0.002	< 0.002	< 0,002
NICKEL as NI	0,038	0,038	0,085	0,048	0,091
SELENIUM as Se	< 0,005	< 0.005	0,006	< 0,005	< 0,005
ZINC as Zn	0,411	0,280	3,08	0,289	18
FREE CYANIDE as CN	< 0,05	< 0,05	< 0,05	< 0,05	< 0.05
ARSENIC as As	< 0,005	< 0,005	< 0,005	< 0.005	< 0,005
HEXAVALLENT CHROMIUM as Cr <sup>6+</sup>	< 0,025	< 0,025	< 0,025	< 0.025	< 0,025
BARIUM as Ba	< 0,10	< 0,10	< 0,10	< 0,10	< 0,10
COBALT as Co	0,028	0,026	0,054	0,041	0.056
VANADIUM as V	< 0.03	< 0,03	< 0,03	< 0,03	< 0,03
TITANIUM as Ti	0,27	0,23	0,39	0,23	1,7
% BALANCING	97,1	96,4	94,9	95,9	94,8

The information contained in this report is relevant only to the sample/samples supplied to WATERLAB (Pty) Ltd. Any further use of the above information is not the responsibility or liability of WATERLAB (Pty). Ltd. Except for the full report, parts of this report may not be reproduced without written approval of WATERLAB (Pty) Ltd.



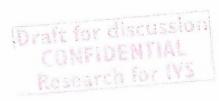


REPORT NUMBER: 7606

ANALYSES In add	SAMPLE NAME				
ANALYSES in mg/l	395 ♦	√9D‡			
SAMPLE NUMBER	2071	2072			
pН	7,6	7,7			
CONDUCTIVITY in mS/m at 25 °C	592	592			
TOTAL DISSOLVED SOLIDS at 180 °C	4300	4328			
AMMONIA as N	101	106			
NITRATE as N	1,2	1,3			
CHLORIDE as CI	1235	1211			
SULPHATE as SO4	1159	1058			
SILICA as Si	7,7	7,8			
FLUORIDE as F	7,3	7,1			
SODIUM as Na	364	358			
POTASSIUM as K	93	91			
CALCIUM as Ca	585	581			
MAGNESIUM as Mg	80	83			
ALUMINIUM as AI	< 0,100	< 0,100			
BORON as B	0,81	0,73			
CADMIUM as Cd	< 0.010	< 0.010			
CHROOM as Cr	0,072	0,072			
IRON as Fe	0,580	0,732			
COPPER as Cu	< 0,025	< 0,025			
MANGANESE as Mn	3.37	3,43			
LEAD as Pb	< 0,050	< 0,050			
MERCURY as Hg	< 0.002	< 0,002			
NICKEL as Ni	0,045	0,043			
SELENIUM as Se	0,007	< 0.005			
ZINC as Zn	0,257	0.307			
FREE CYANIDE as CN	< 0,05	0,05			
ARSENIC as As	< 0,005	< 0,005			
HEXAVALLENT CHROMIUM as Cr <sup>6+</sup>	< 0.025	< 0,025			
BARIUM as Ba	< 0,10	< 0,10			
COBALT as Co	0,028	0,033			
VANADIUM as V	< 0,03	< 0,03			
TITANIUM as Ti	0,21	0,23			
% BALANCING	98,9	96,4			

The information contained in this report is relevant only to the sample/samples supplied to WATERLAB (Pty) Ltd. Any further use of the above information is not the responsibility or liability of WATERLAB (Pty). Ltd. Except for the full report, parts of this report may not be reproduced without written approval of WATERLAB (Pty) Ltd.

Page 4 of 4





Page 1 of 1

Ontung: 2/11/2001

OFT

Bridgit Liebenberg <br/> <br/> bliebenberg@csir.co.za>

From: To:

<OFT@global.co.za>

Sent: Attach:

Friday, November 02, 2001 8:53 AM RESULTS 011299compiled.doc

Subject:

Report VOCs and SVOCs

Water Organic

Dear Dr Fourie,

Please find attached our revised report for the determination of VOCs and SVOCs in water samples. As discussed, the non-target compound results as well as the results for the sediment of 6D have now been included in the report. The analysis for sample 3D was repeated, but remained unchanged.

I trust the attached will meet with your approval. If you should have any queries, please do not hesitate to contact me.

Regards,

Bridgit

Draft for discussion COMPIDENTIAL Research for IVS





Programme for Organic, Biochemical & Environmental Analysis Private Bag X2 P. O. Modderfontein 1645 Gauteng South Africa

Pinelands Road Pinelands Site Building T5 Modderfontein 1645 Gauteng South Africa Your Ref.:

**Our Ref.:** 01-1299

Enquires: B Cowan

Tel. #:

011-605 2452

Fax #:

(011) 605-2537

Date:

1 November 2001

#### **CERTIFICATE OF ANALYSIS**

Ockie Fourie Toxicologists Po Box 73179 Lynnwood Ridge 0040

ATTENTION: Dr O Fourie

Dear Dr Fourie,

SUBJECT: DETERMINATION OF VOLATILE ORGANIC COMPOUNDS AND SEMI-VOLATILE ORGANIC COMPOUNDS IN WATER SAMPLES

#### 1. INTRODUCTION

This report details the results for the analysis of water samples received on 01 October 2001.

#### 2. SAMPLE RECEIPT AND HANDLING

Seventeen water samples for Volatile Organic analysis (VOC) were received in duplicate in 40ml EPA vials. Seventeen water samples for Semi-Volatile Organic analysis (SVOC) were received in 1-litre Schott bottles. The samples were immediately transferred to a refrigerator where they were kept until analysed.

This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)

\* Not SANAS Accredited

Page 1 of 1

REFERENCE NO: 01-1299



#### 3. ANALYTICAL METHODS

#### 3.1 Volatile organics:

Volatile organics were determined by purge and trap GC-MS using method GC.050 (based on US EPA 8260).

### 3.2 Semi-Volatile organics:

Semi-Volatile organics\* were determined using an in-house GC-MS method based on US EPA 8270.

Sample 6D was filtered and the residue collected. The residue was analysed using an in-house GC-MS method based on US EPA 8270.

Non-target compounds were also identified and quantified semi-quantitatively against the closest internal standard.

#### 4. RESULTS

## 4.1 Volatile Organics:

The volatile organic results are given in Appendix 1. This is a target compound analysis. A list of the target compounds, together with the method detection limits is given with the results.

#### 4.2 Semi-Volatile Organics:

The semi-volatile organic results are given in Appendix 2. This is a target compound analysis. A list of the target compounds, together with the method detection limits is given with the results.

The result for the analysis of the residue of sample 6D is given in Appendix 3.

The identities and results for the non-target compounds are given in Appendix 4. The non-target compounds with MS spectral matches greater than 80% are reported. Theses results should be confirmed using reference materials of the compounds identified. Please note these are semi-quantitative results.

This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)

COMPRODUCTION INS



We trust these results will meet with your approval. Please let us know if you require any further information.

Yours faithfully,

B G Cowan Project Manager PROBE, Bio/Chemtek CSIR



This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)

Not SANAS Accredited

ve for justileage 3 of 3

REFERENCE NO: 01-1299



## Appendix 1

## Volatile Organics by Purge and Trap GC-MS

		Date Analysed		12/10/01	12/10/01	12/10/01
		Ref no		01-1299	01-1299	01-1299
		Sample I.D.	MDL	1S	2S	2D
Peak	CAS No.:	Units	μg/litre	μg/litre	μg/litre	μg/litre
1	75-71-8	Dichlorodifluoromethane	0.4		-	
2	75-01-4	Vinyl Chloride	0.2	100	tue .	-
3	74-83-9	Bromomethane	0.3		***	-
4	75-69-4	Trichlorofluoromethane	0.2	Mar.	MB.	-
5	75-35-4	1,1-Dichloroethene	0.3	100	-	-
6	75-09-2	Dichloromethane	0.1	<4	<4	<4
7	156-60-5	trans-1,2-Dichloroethene	0.3	~	200	-
8	75-34-3	1,1-Dichloroethane	0.3	140	h-	-
9	156-59-2	cis-1,2-Dichloroethene	0.1	No.	No.	-
10	594-20-7	2,2-Dichloropropane	0.2		No.	-
11	74-97-5	Bromochloromethane	0.2	No.	No.	-
12	67-66-3	Chloroform	0.3	-	-	_
13	71-55-6	1,1,1-Trichloroethane	0.2		~	
14	563-58-6	1,1-Dichloropropene	0.3	-		
15	56-23-5	Carbon Tetrachloride	0.3	-	MA.	-
16	107-06-2	1,2-Dichloroethane	0.2		-	-
17	71-43-2	Benzene	0.2	-	-	**
18	79-01-6	Trichloroethene	0.2	No.		-
19	78-87-5	1,2-Dichloropropane	0.2			-
20	74-95-3	Dibromomethane	0.1	tas	-	-
21	75-27-4	Bromodichloromethane	0.2	Page 1	NAME .	-
22	108-88-3	Toluene	0.2	-	***	-
23	79-00-5	1,1,2-Trichloroethane	0.3	-	M4	-
24	142-28-9	1,3-Dichloropropane	0.2	**	140-	4+
25	127-18-4	Tetrachloroethene	0.2	_	_	NA.
26	124-48-1	Dibromochloromethane	0.3	No.	hug.	na-
27	106-93-4	1,2-Dibromoethane	0.2	me .	-	-
28	108-90-7	Chlorobenzene	0.3		-	~
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2		āre	

"\_" = < Method detection limit (MDL)

This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)







## Appendix 1

## Volatile Organics by Purge and Trap GC-MS

		Date Analysed		12/10/01	12/10/01	12/10/01
		Ref no		01-1299	01-1299	01-1299
		Sample I.D.	MDL	1S	2S	2D
Peak	CAS No.:	Units	μg/litre	μg/litre	μg/litre	μg/litre
30	100-41-4	Ethylbenzene	0.2		-	-
31	108-38-3	m,p-Xylene				
	106-42-3		0.4	-	-	
32	95-47-6	o-Xylene	0.1			-
33	100-42-5	Styrene	0.1	•	-	_
34	75-25-2	Bromoform	0.4	**	-	
35	98-82-8	Isopropylbenzene	0.2	-	••	-
36	79-34-5	1,1,2,2-Tetrachloroethane	0.4			Mar.
37	96-18-4	1,2,3-Trichloropropane	0.4	•		-
38	108-86-1	Bromobenzene	0.2	+	-	•••
39	103-65-1	n-Propylbenzene	0.2	-	•	-
40	95-49-8	2-Chlorotoluene	0.1	-	••	<del>-</del>
41	108-67-8	1,3,5-Trimethylbenzene	0.1	<1	3	-
42	106-43-4	4-Chlorotoluene	0.2	-	-	-
43	98-06-6	tert-Butylbenzene	0.3	-		•••
44	95-63-6	1,2,4-Trimethylbenzene	0.2	-	-	
45	135-98-8	sec-Butylbenzene	0.3		-	-
46	99-87-6	4-Isopropyltoluene	0.2	-	-	-
47	541-73-1	1,3-Dichlorobenzene	0.4	_	-	-
48	106-46-7	1,4-Dichlorobenzene	0.3	-	-	•
49	104-51-8	n-Butylbenzene	0.5	-	**	**
50	95-50-1	1,2-Dichlorobenzene	0.2	-	44	-
51	96-12-8	1,2-Dibromo-3-				
		chloropropane	0.2	-	-	-
52	120-82-1	1,2,4-Trichlorobenzene	0.4			-
53	87-68-3	Hexachlorobutadiene	0.7		-	
54	91-20-3	Naphthalene	0.5	<1	•	-
55	87-61-6	1,2,3-Trichlorobenzene	0.7	-	-	

<sup>&</sup>quot;\_" = < Method detection limit (MDL)

This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)

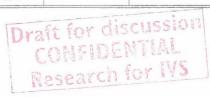


## Appendix 1

## Volatile Organics by Purge and Trap GC-MS

		Date Analysed		12/10/01	12/10/01	12/10/01
		Ref no		01-1299	01-1299	01-1299
		Sample I.D.	MDL	3S	3D	48
Peak	CAS No.:	Units	μg/litre	μg/litre	μg/litre	μg/litre
1	75-71-8	Dichlorodifluoromethane	0.4	***	_	-
2	75-01-4	Vinyl Chloride	0.2	504	**	
3	74-83-9	Bromomethane	0.3	maj.	-	
4	75-69-4	Trichlorofluoromethane	0.2	_		-
5	75-35-4	1,1-Dichloroethene	0.3	-	-	
6	75-09-2	Dichloromethane	0.1	<4	<4	<4
7	156-60-5	trans-1,2-Dichloroethene	0.3	njan.	-	**
8	75-34-3	1,1-Dichloroethane	0.3	-		
9	156-59-2	cis-1,2-Dichloroethene	0.1	-	***	-
10	594-20-7	2,2-Dichloropropane	0.2		***	
11	74-97-5	Bromochloromethane	0.2	400	H	_
12	67-66-3	Chloroform	0.3			**
13	71-55-6	1,1,1-Trichloroethane	0.2		-	_
14	563-58-6	1,1-Dichloropropene	0.3		-	-
15	56-23-5	Carbon Tetrachloride	0.3	-	-	-
16	107-06-2	1,2-Dichloroethane	0.2	-		-
17	71-43-2	Benzene	0.2	-	-	-
18	79-01-6	Trichloroethene	0.2	**		
19	78-87-5	1,2-Dichloropropane	0.2	-		-
20	74-95-3	Dibromomethane	0.1	-	-	-
21	75-27-4	Bromodichloromethane	0.2		-	
22	108-88-3	Toluene	0.2	~	**	46-
23	79-00-5	1,1,2-Trichloroethane	0.3		-	_
24	142-28-9	1,3-Dichloropropane	0.2		699	194
25	127-18-4	Tetrachloroethene	0.2	-	_	-
26	124-48-1	Dibromochloromethane	0.3	***	- Maria	-
27	106-93-4	1,2-Dibromoethane	0.2	Asse	~	tion .
28	108-90-7	Chlorobenzene	0.3		-	
2.9	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-		

"-" = < Method detection limit (MDL)



This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)

Not SANAS Accredited

CHIVE FOR JUSTIC Page 6 of 6

REFERENCE NO: 01-1299

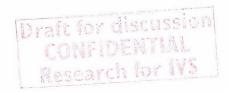


## Appendix I

## Volatile Organics by Purge and Trap GC-MS

	****	Date Analysed		12/10/01	12/10/01	12/10/01
		Ref no		01-1299	01-1299	01-1299
		Sample I.D.	MDL	3S	3D	4S
Peak	CAS No.:	Units	μg/litre	μg/litre	μg/litre	μg/litre
30	100-41-4	Ethylbenzene	0.2		-	
31	108-38-3	m,p-Xylene				
	106-42-3		0.4	ma.	_	
32	95-47-6	o-Xylene	0.1	-	-	
33	100-42-5	Styrene	0.1	-	-	
34	75-25-2	Bromoform	0.4	-	-	
35	98-82-8	Isopropylbenzene	0.2		-	-
36	79-34-5	1,1,2,2-Tetrachloroethane	0.4	-	-	-
37	96-18-4	1,2,3-Trichloropropane	0.4	-	-	-
38	108-86-1	Bromobenzene	0.2	N/A	-	_
39	103-65-1	n-Propylbenzene	0.2	-	-	-
40	95-49-8	2-Chlorotoluene	0.1	***		
41	108-67-8	1,3,5-Trimethylbenzene	0.1	44		-
42	106-43-4	4-Chlorotoluene	0.2	and .	-	-
43	98-06-6	tert-Butylbenzene	0.3	-		-
44	95-63-6	1,2,4-Trimethylbenzene	0.2	-	-	
45	135-98-8	sec-Butylbenzene	0.3		-	-
46	99-87-6	4-Isopropyltoluene	0.2		-	-
47	541-73-1	1,3-Dichlorobenzene	0.4		-	-
48	106-46-7	1,4-Dichlorobenzene	0.3	-		-
49	104-51-8	n-Butylbenzene	0.5	-	-	to V
50	95-50-1	1,2-Dichlorobenzene	0.2	sub		_
51	96-12-8	1,2-Dibromo-3-				
		chloropropane	0.2	400		100
52	120-82-1	1,2,4-Trichlorobenzene	0.4	and a	800	
53	87-68-3	Hexachlorobutadiene	0.7	-	_	nos .
54	91-20-3	Naphthalene	0.5	04	~	-
55	87-61-6	1,2,3-Trichlorobenzene	0.7	saler	_	

"\_" = < Method detection limit (MDL)



This report relates only to samples tested and to conditions, which prevailed when, samples were received. The certificate may not be reproduced, except in full, without the written approval of the Program Manager (PROBE)

Not SANAS Accredited