

TABLE 153 - 159

EVAPORATION DAM 4: WATERS ORGANIC
ENVIRONMENTAL RISK QUANTIFICATION

Draft for discussion
CONFIDENTIAL
Research for IVS

Table 153

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 1S & 1D (ORGANICS - PAH's & VOC's)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 1S																		
ORGANIC COMPOUNDS PAH's & VOC's	Acc. Risk Value (ppb)	RISK TO ENVIRONMENT																
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER					RISK OF DAM WATER FOR GROUNDWATER						
		TOTAL ANALYSIS			PROBIT MODEL		DILUTED WATER		PROBIT MODEL		CURRENT VOLUME		PROBIT MODEL		TOTAL VOLUME		PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quantification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quantification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quantification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quantification %	³ Risk R / AR
Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR
SAMPLE NUMBER: 1D																		
Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.004	4.0	AR	0.0E+00	AR	0.13	AR	0.0E+00	AR	2.09	AR	0.0E+00	AR	5.12	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

Table 154

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 2S & 2D (ORGANICS - PAH^a & VOC^a)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 2S

ORGANIC COMPOUNDS PAH ^a & VOC ^a	Acc. Risk Value (MR) ppb	RISK TO ENVIRONMENT																	
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER					RISK OF DAM WATER FOR GROUNDWATER							
		TOTAL ANALYSIS			⁴ PROBIT MODEL		DILUTED WATER		⁴ PROBIT MODEL			CURRENT VOLUME		⁴ PROBIT MODEL		TOTAL VOLUME		⁴ PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	
Butylbenzylphthalate	530	0.007	7.00	AR	0.0E+00	AR	0.23	AR	0.0E+00	AR	3.66	AR	0.0E+00	AR	8.96	AR	0.0E+00	AR	
bis(2-ethylhexyl)phthalate	14400	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR	

SAMPLE NUMBER: 2D

Butylbenzylphthalate	530	0.006	6.0	AR	0.0E+00	AR		0.20	AR	0.0E+00	AR	3.14	AR	0.0E+00	AR	7.68	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.002	2.0	AR	0.0E+00	AR		0.067	AR	0.0E+00	AR	1.05	AR	0.0E+00	AR	2.56	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR		0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR		0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR		0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR		0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR		0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR	

Table 155

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 3S & 3D [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 3S

ORGANIC COMPOUNDS PAH ^s & VOC ^s	Add. Risk Value (MN)	RISK TO ENVIRONMENT																
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER				RISK OF DAM WATER FOR GROUNDWATER							
		TOTAL ANALYSIS			⁴ PROBIT MODEL		DILUTED WATER		⁴ PROBIT MODEL		CURRENT VOLUME		⁴ PROBIT MODEL		TOTAL VOLUME		⁴ PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR
Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.004	4.0	AR	0.0E+00	AR	0.133	AR	0.0E+00	AR	2.09	AR	0.0E+00	AR	5.12	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

SAMPLE NUMBER: 3D

Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.003	3.0	AR	0.0E+00	AR	0.10	AR	0.0E+00	AR	1.57	AR	0.0E+00	AR	3.84	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

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EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 4S & 4D [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 4S

ORGANIC COMPOUNDS PAH ^s & VOC ^s	Acc. Risk Value (MR) ppb	RISK TO ENVIRONMENT																
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER					RISK OF DAM WATER FOR GROUNDWATER						
		TOTAL ANALYSIS			⁴ PROBIT MODEL		DILUTED WATER		⁴ PROBIT MODEL		CURRENT VOLUME		⁴ PROBIT MODEL		TOTAL VOLUME		⁴ PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR
Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.003	3.00	AR	0.0E+00	AR	0.10	AR	0.0E+00	AR	1.57	AR	0.0E+00	AR	3.84	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

SAMPLE NUMBER: 4D

Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

Table 157

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 5S & 5D (ORGANICS - PAH^s & VOC^s)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 5S

ORGANIC COMPOUNDS PAH ^s & VOC ^s	Acc. Risk Value (MR) ppb	RISK TO ENVIRONMENT																
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER				RISK OF DAM WATER FOR GROUNDWATER							
		TOTAL ANALYSIS			⁴ PROBIT MODEL		DILUTED WATER		⁴ PROBIT MODEL		CURRENT VOLUME		⁴ PROBIT MODEL		TOTAL VOLUME		⁴ PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR
Butylbenzylphthalate	530	0.006	6.0	AR	0.0E+00	AR	0.20	AR	0.0E+00	AR	3.14	AR	0.0E+00	AR	7.68	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.006	6.0	AR	0.0E+00	AR	0.20	AR	0.0E+00	AR	3.14	AR	0.0E+00	AR	7.68	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

SAMPLE NUMBER: 5D

Butylbenzylphthalate	530	0.007	7.0	AR	0.0E+00	AR	0.233	AR	0.0E+00	AR	3.66	AR	0.0E+00	AR	8.96	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.006	6.0	AR	0.0E+00	AR	0.200	AR	0.0E+00	AR	3.14	AR	0.0E+00	AR	7.68	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Risk / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

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Table 158

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 6S & 6D (ORGANICS - PAH & VOC)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 6S

ORGANIC COMPOUNDS PAH ⁵ & VOC ⁵	Acc. Risk Value (MR) ppb	RISK TO ENVIRONMENT																
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER				RISK OF DAM WATER FOR GROUNDWATER							
		TOTAL ANALYSIS			⁴ PROBIT MODEL		DILUTED WATER		⁴ PROBIT MODEL		CURRENT VOLUME		⁴ PROBIT MODEL		TOTAL VOLUME		⁴ PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quan- tification%	³ Risk R / AR
Butylbenzylphthalate	530	0.008	8.0	AR	0.0E+00	AR	0.267	AR	0.0E+00	AR	4.18	AR	0.0E+00	AR	10.2	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.008	8.0	AR	0.0E+00	AR	0.267	AR	0.0E+00	AR	4.18	AR	0.0E+00	AR	10.2	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

SAMPLE NUMBER: 6D

Butylbenzylphthalate	530	0.000	0.0	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.003	3.0	AR	0.0E+00	AR	0.10	AR	0.0E+00	AR	1.57	AR	0.0E+00	AR	3.84	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

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Table 159

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO's 7S & 7D [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 7S																		
ORGANIC COMPOUNDS PAH ^s & VOC ^s	Acc. Risk Value (MR) ppb	RISK TO ENVIRONMENT																
		RISK OF DAM WATER AS IS					RISK OF DILUTED DAM WATER IN RIVER					RISK OF DAM WATER FOR GROUNDWATER						
		TOTAL ANALYSIS			PROBIT MODEL		DILUTED WATER		PROBIT MODEL		CURRENT VOLUME		PROBIT MODEL		TOTAL VOLUME		PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quantification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quantification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quantification%	³ Risk R / AR	² EEC ppb	³ Risk R / AR	Risk Quantification%	³ Risk R / AR
Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.005	5.0	AR	0.0E+00	AR	0.167	AR	0.0E+00	AR	2.61	AR	0.0E+00	AR	6.40	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR
SAMPLE NUMBER: 7D																		
Butylbenzylphthalate	530	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
bis(2-ethylhexyl)phthalate	14400	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Di-n-butylphthalate	200	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
Phenol	2690	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2-Methylphenol	1460	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
4-Methylphenol	1470	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
2,4-Dimethylphenol	1270	0.000	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR	0.00	AR	0.0E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				AR		AR		AR		AR		AR		AR		AR		AR

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TABLE 160 - 166

EVAPORATION DAM 4: WATERS ORGANIC
HUMAN RISK ASSESSMENT

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Table 160

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 1S & 1D - (ORGANICS - PAH's & VOC's)
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 1S											
ORGANIC COMPOUNDS PAH ^s & VOC ^s	6 RfD/ ADI/GV mg/kg/day	7 EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			8 Conc. in Dam water ppm	9 PDI Dam water exposure mg/kg/day	10 Margin of Safety %	11 Conc. in River water (EEC) ppb	12 PDI river water exposure mg/kg/day	10 Margin of Safety %	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	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	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR
SAMPLE NUMBER: 1D											
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.004	0.00013	0.667	0.133	0.000004	0.02	2.09	0.00007	0.35
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR

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Table 161

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 2S & 2D ♦ [ORGANICS ♦ PAH^a & VOC^a]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 2S											
ORGANIC COMPOUNDS PAH ^a & VOC ^a	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			⁸ Conc. in Dam water ppm	⁹ PDI Dam water exposure mg/kg/day	¹⁰ Margin of Safety %	¹¹ Conc. in River water (EEC) ppb	¹² PDI river water exposure mg/kg/day	¹⁰ Margin of Safety %	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.007	0.0002	0.117	0.233	0.00001	0.064	3.66	0.00012	0.051
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR
SAMPLE NUMBER: 2D											
Butylbenzylphthalate	0.2	EPA RfD	0.006	0.0002	0.1	0.2	0.000007	0.002	3.14	0.00010	0.052
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.002	0.0001	0.003	0.067	0.000002	0.011	1.05	0.000035	0.175
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR

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Table 162

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 3S & 3D - [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 3S											
ORGANIC CDMPDUNDS PAH ^s & VDC ^s	⁶ RID/ AD/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHD GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			⁸ Conc. in Dam water ppm	⁹ PDI Dam water exposure mg/kg/day	¹⁰ Margin of Safety %	¹¹ Conc. in River water (EEC) ppb	¹² PDI river water exposure mg/kg/day	¹⁰ Margin of Safety %	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.004	0.00013	0.667	0.133	0.000004	0.02	2.09	0.00007	0.345
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.06	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	AR		River water	AR		Groundwater	AR	
SAMPLE NUMBER: 3D											
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.003	0.0001	0.5	0.1	0.000003	0.017	1.57	0.00005	0.262
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	AR		River water	AR		Groundwater	AR	

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Table 163

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 4S & 4D - [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 4S											
ORGANIC COMPOUNDS PAH ^s & VOC ^s	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			⁸ Conc. in Dam water ppm	⁹ PDI Dam water exposure mg/kg/day	¹⁰ Margin of Safety %	¹¹ Conc. in River water (EEC) ppb	¹² PDI river water exposure mg/kg/day	¹⁰ Margin of Safety %	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.003	0.0001	0.5	0.1	0.000003	0.017	1.57	0.00005	0.262
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR
SAMPLE NUMBER: 4D											
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	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	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR

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Table 164

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 5S & 5U - (ORGANICS - PAH^s & VOC^s)
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 5S											
ORGANIC COMPOUNDS PAH ^s & VOC ^s	6 RfD/ ADI/GV mg/kg/day	7 EPA RfD/ EPA DWEL/ RSA RfD/ WHD GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			8 Conc. in Dam water ppm	9 PDI Dam water exposure mg/kg/day	10 Margin of Safety %	11 Conc. in River water (EEC) ppb	12 PDI river water exposure mg/kg/day	10 Margin of Safety %	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.006	0.0002	0.1	0.2	0.00001	0.002	3.14	0.0001	0.062
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.005	0.0002	1.0	0.2	0.00001	0.033	3.14	0.0001	0.523
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR
SAMPLE NUMBER: 5U											
Butylbenzylphthalate	0.2	EPA RfD	0.007	0.0002	0.117	0.233	0.000008	0.0009	3.66	0.00012	0.081
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.005	0.00017	0.333	0.167	0.000006	0.028	3.14	0.00010	0.523
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water		AR	River water		AR	Groundwater		AR

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Table 165

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 6S & 6D - [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 6S											
ORGANIC COMPOUNDS PAH ^s & VOC ^s	⁶ RfD/ mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			⁸ Conc. in Dam water ppm	⁹ PDI Dam water exposure mg/kg/day	¹⁰ Margin of Safety %	¹¹ Conc. in River water (EEC) ppb	¹² PDI river water exposure mg/kg/day	¹⁰ Margin of Safety %	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.008	0.0003	0.133	0.267	0.000009	0.004	4.18	0.00014	0.07
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.008	0.0003	1.25	0.267	0.000009	0.04	4.18	0.00014	0.697
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	AR		River water	AR		Groundwater	AR	
SAMPLE NUMBER: 6D											
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-ethylhexyl)phthalate	0.02	EPA RfD	0.003	0.0001	0.5	0.1	0.000003	0.017	1.57	0.000052	0.262
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	AR		River water	AR		Groundwater	AR	

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Table 166

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ DAM WATER ♦ SAMPLE NO's 7S & 7D - [ORGANICS - PAH^s & VOC^s]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 7S											
ORGANIC COMPOUNDS PAH ^s & VOC ^s	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN								
			RISK OF DAM WATER AS IS			RISK OF DILUTED DAM WATER IN RIVER			RISK OF DAM WATER FOR GROUNDWATER		
			⁸ Conc. in Dam water ppm	⁹ PDI Dam water exposure mg/kg/day	¹⁰ Margin of Safety %	¹¹ Conc. in River water (EEC) ppb	¹² PDI river water exposure mg/kg/day	¹⁰ Margin of Safety %	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	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	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.005	0.00017	0.167	0.167	0.000006	0.006	2.61	0.00009	0.057
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	AR		River water	AR		Groundwater	AR	
SAMPLE NUMBER: 7D											
Butylbenzylphthalate	0.2	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	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	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	AR		River water	AR		Groundwater	AR	

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TABLES 167 - 169

EVAPORATION DAM 4: SEDIMENTS INORGANIC
ENVIRONMENTAL RISK QUANTIFICATION

Table 167

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ SEDIMENTS ♦ SAMPLE NO's: 1&2 (INORGANIC - MICRO'S & MACRO'S)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NO.: 1&2		RISK TO ENVIRONMENT																			
INORGANIC COMPOUNDS Micro's and Macro's	Acc. Risk Value (MR&SA) Prob	RISK OF SEDIMENTS FOR GROUNDWATER																			
		SAMPLE NO. 1 Volume = 1,250,000 kg/ha/m										SAMPLE NO. 2 Volume = 1,250,000 kg/ha/m									
		TOTAL ANALYSIS			PROBIT MODEL		TECP EXTRACTION			PROBIT MODEL		TOTAL ANALYSIS			PROBIT MODEL		TECP EXTRACTION			PROBIT MODEL	
		1 Lab Conc ppm	2 EEC ppb	3 Risk R / AA	Risk Quantification%	3 Risk R / AA	1 Lab Conc ppm	2 EEC ppb	3 Risk R / AA	Risk Quantification%	3 Risk R / AA	1 Lab Conc ppm	2 EEC ppb	3 Risk R / AA	Risk Quantification%	3 Risk R / AA	1 Lab Conc ppm	2 EEC ppb	3 Risk R / AA	Risk Quantification%	3 Risk R / AA
Aluminium as Al	10000	7500	6187500	R	1.00E+02	R	1.2	990	AA	0.00E+00	AA	9500	7837500	R	1.00E+02	R	0.35	784	AA	0.00E+00	AA
Arsenic as As	400	< 50	0.00	AA	0.00E+00	AA	< 0.34	0.00	AA	0.00E+00	AA	< 50	0.00	AA	0.00E+00	AA	< 0.34	0.00	AA	0.00E+00	AA
Barium as Ba	7800	5.3	4785	AA	2.72E-06	AA	0.17	140	AA	0.00E+00	AA	5.3	4785	AA	2.72E-06	AA	0.33	272	AA	0.00E+00	AA
Cadmium as Cd	31	< 10	0.00	AA	0.00E+00	AA	< 0.03	0.00	AA	0.00E+00	AA	< 10	0.00	AA	0.00E+00	AA	< 0.03	0.00	AA	0.00E+00	AA
Chromium ³⁺ as Cr ³⁺	4700	44	36300	R	3.07E+01	R	< 0.04	0.00	AA	0.00E+00	AA	44	36300	R	3.07E+01	R	< 0.04	0.00	AA	0.00E+00	AA
Cobalt as Co	3900	< 10	0.00	AA	0.00E+00	AA	< 0.12	0.00	AA	0.00E+00	AA	< 10	0.00	AA	0.00E+00	AA	< 0.12	0.00	AA	0.00E+00	AA
Copper as Cu	100	< 10	0.00	AA	0.00E+00	AA	< 0.02	0.00	AA	0.00E+00	AA	< 10	0.00	AA	0.00E+00	AA	< 0.02	0.00	AA	0.00E+00	AA
Iron as Fe	9000	12000	9900000	R	1.00E+02	R	54	44550	R	8.47E+00	R	17000	14025000	R	1.00E+02	R	190	156750	R	8.61E+01	R
Lead as Pb	100	< 100	0.00	AA	0.00E+00	AA	< 0.31	0.00	AA	0.00E+00	AA	< 100	0.00	AA	0.00E+00	AA	< 0.31	0.00	AA	0.00E+00	AA
Manganese as Mn	300	39	73425	R	1.00E+02	R	3.1	2558	R	3.78E+01	R	130	107250	R	1.00E+02	R	6.5	5363	R	8.72E+01	R
Mercury as Hg	20	NA	0.00	AA	0.00E+00	AA	< 0.01	0.0	AA	0.00E+00	AA	NA	0.0	AA	0.00E+00	AA	< 0.01	0.00	AA	0.00E+00	AA
Nickel as Ni	1140	< 10	0.00	AA	0.00E+00	AA	0.09	74.0	AA	0.00E+00	AA	12	9900	R	3.91E+01	R	0.07	57.8	AA	0.00E+00	AA
Selenium as Se	200	NA	0.00	AA	0.00E+00	AA	< 0.05	0.00	AA	0.00E+00	AA	NA	0.00	AA	0.00E+00	AA	< 0.05	0.00	AA	0.00E+00	AA
Titanium as Ti	711	160	132000	R	1.00E+02	R	< 0.02	0.00	AA	0.00E+00	AA	660	544500	R	1.00E+02	R	< 0.02	0.00	AA	0.00E+00	AA
Vanadium as V	1300	< 10	0.00	AA	0.00E+00	AA	< 0.07	0.00	AA	0.00E+00	AA	10	13200	R	5.12E+01	R	< 0.07	0.00	AA	0.00E+00	AA
Zinc as Zn	700	13	10725	R	7.98E+01	R	< 0.17	0.00	AA	0.00E+00	AA	31	25575	R	9.94E+01	R	0.25	206	AA	5.50E-10	AA
Calcium as Ca	150000	720	594000	R	3.51E+00	R	630	519750	R	1.92E+00	R	30000	24750000	R	1.00E+02	R	410	338250	R	1.80E-01	R
Chloride as Cl	250000	650	536250	R	1.31E-01	R	120	99000	AA	1.98E-08	AA	550	453750	R	4.27E-02	R	30	66000	AA	1.43E-10	AA
Fluoride as F	1500	5.3	4373	R	8.00E-01	R	1.0	825	AA	8.34E-07	AA	4.6	3795	R	3.62E-01	R	0.6	495	AA	2.23E-09	AA
Magnesium as Mg	70000	660	544500	R	3.12E+01	R	17	14025	AA	4.31E-12	AA	820	676500	R	4.73E+01	R	21	17325	AA	6.34E-11	AA
Potassium as K	200000	1300	1072500	R	1.12E+01	R	36	29700	AA	8.88E-14	AA	1500	1320000	R	2.08E+01	R	52	42900	AA	1.03E-11	AA
Sodium as Na	100000	1200	990000	R	4.92E+01	R	NA	0.00	AA	0.00E+00	AA	1300	1072500	R	5.54E+01	R	NA	0.00	AA	0.00E+00	AA
Sulphate as SO ₄	200000	1350	1113750	R	1.26E+01	R	2.0	1650	AA	0.00E+00	AA	1300	1072500	R	1.12E+01	R	1.5	1073	AA	0.00E+00	AA
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R			R		R			R		R			R		R

Table 168

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ SEDIMENTS ♦ SAMPLE NO's: 3&4 [INORGANIC · MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NO.: 3&4		RISK TO ENVIRONMENT																			
INORGANIC COMPOUNDS Micro's and Macro's	Acc. Risk Value (MR&SA) ppb	RISK OF SEDIMENTS FOR GROUNDWATER																			
		SAMPLE NO. 3 Volume = 1,250,000 kg/ha/m										SAMPLE NO. 4 Volume = 1,250,000 kg/ha/m									
		TOTAL ANALYSIS		PROBIT MODEL		TECP EXTRACTION		PROBIT MODEL		TOTAL ANALYSIS		PROBIT MODEL		TECP EXTRACTION		PROBIT MODEL		TOTAL ANALYSIS		PROBIT MODEL	
		1 Lab Conc ppm	2 EEC ppb	3 Risk R / AR	4 Risk Quan- tification %	3 Risk R / AR	1 Lab Conc ppm	2 EEC ppb	3 Risk R / AR	4 Risk Quan- tification %	3 Risk R / AR	1 Lab Conc ppm	2 EEC ppb	3 Risk R / AR	4 Risk Quan- tification %	3 Risk R / AR	1 Lab Conc ppm	2 EEC ppb	3 Risk R / AR	4 Risk Quan- tification %	3 Risk R / AR
Aluminium as Al	10000	4100	3382500	R	1.00E+02	R	0.96	792	AR	0.00E+00	AR	5300	4372500	R	1.00E+02	R	1.5	1238	AR	1.11E+14	AR
Arsenic as As	50	< 50	0.00	AR	0.00E+00	AR	< 0.34	0.00	AR	0.00E+00	AR	< 50	0.00	AR	0.00E+00	AR	< 0.34	0.00	AR	0.00E+00	AR
Barium as Ba	1000	0.0	4950	AR	3.90E+06	AR	0.10	83	AR	0.00E+00	AR	4.5	3713	AR	1.66E+07	AR	0.12	99	AR	0.00E+00	AR
Cadmium as Cd	10	< 10	0.00	AR	0.00E+00	AR	< 0.03	0.00	AR	0.00E+00	AR	< 10	0.00	AR	0.00E+00	AR	< 0.03	0.00	AR	0.00E+00	AR
Chromium ³⁺ as Cr ³⁺	4700	52	67650	R	7.62E+01	R	< 0.04	0.00	AR	0.00E+00	AR	54	44550	R	4.58E+01	R	< 0.04	0.00	AR	0.00E+00	AR
Cobalt as Co	5000	< 10	0.00	AR	0.00E+00	AR	< 0.12	0.00	AR	0.00E+00	AR	< 10	0.00	AR	0.00E+00	AR	< 0.12	0.00	AR	0.00E+00	AR
Copper as Cu	100	< 10	0.00	AR	0.00E+00	AR	< 0.02	0.00	AR	0.00E+00	AR	< 10	0.00	AR	0.00E+00	AR	< 0.02	0.00	AR	0.00E+00	AR
Iron as Fe	9000	12000	9900000	R	1.00E+02	R	2.5	2063	AR	2.40E+11	AR	9100	7507500	R	1.00E+02	R	23	18975	R	1.17E+01	R
Lead as Pb	100	< 100	0.00	AR	0.00E+00	AR	< 0.31	0.00	AR	0.00E+00	AR	< 100	0.00	AR	0.00E+00	AR	< 0.31	0.00	AR	0.00E+00	AR
Manganese as Mn	300	160	132000	R	1.00E+02	R	2.3	1898	R	1.86E+01	R	400	330000	R	1.00E+02	R	3.5	2888	R	4.70E+01	R
Mercury as Hg	20	NA	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	NA	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Nickel as Ni	1000	15	12375	R	5.64E+01	R	< 0.05	0.00	AR	0.00E+00	AR	< 10	0.00	AR	0.00E+00	AR	0.09	74.25	AR	0.00E+00	AR
Selenium as Se	200	NA	0.00	AR	0.00E+00	AR	< 0.05	0.00	AR	0.00E+00	AR	NA	0.00	AR	0.00E+00	AR	< 0.05	0.00	AR	0.00E+00	AR
Titanium as Ti	700	640	528000	R	1.00E+02	R	< 0.02	0.00	AR	0.00E+00	AR	160	132000	R	1.00E+02	R	< 0.02	0.00	AR	0.00E+00	AR
Vanadium as V	1300	25	20625	R	8.17E+01	R	< 0.07	0.00	AR	0.00E+00	AR	11	9075	R	2.41E+01	R	< 0.07	0.00	AR	0.00E+00	AR
Zinc as Zn	700	30	24750	R	9.93E+01	R	0.17	140	AR	4.22E+12	AR	170	140250	R	1.00E+02	R	0.19	157	AR	1.82E+11	AR
Calcium as Ca	150000	1100	907500	R	1.63E+01	R	850	701250	R	6.86E+00	R	630	561000	R	2.73E+00	R	870	717750	R	7.49E+00	R
Chloride as Cl	250000	550	453750	R	4.27E+02	R	70	57750	AR	2.65E+11	AR	400	330000	R	3.80E+03	R	50	41250	AR	3.55E+13	AR
Fluoride as F	1500	0.33	784	AR	4.75E+07	AR	0.4	330	AR	1.43E+11	AR	2.7	2228	R	9.71E+03	R	0.7	578	AR	1.43E+08	AR
Magnesium as Mg	70000	420	346500	R	8.47E+00	R	11	9075	AR	1.11E+14	AR	430	354750	R	9.20E+00	R	12	9900	AR	4.44E+14	AR
Potassium as K	100000	740	610500	R	1.02E+00	R	23	18975	AR	0.00E+00	AR	830	684750	R	1.81E+00	R	28	23100	AR	0.00E+00	AR
Sodium as Na	100000	1300	1072500	R	5.54E+01	R	NA	0.00	AR	0.00E+00	AR	2000	1650000	R	8.36E+01	R	NA	0.00	AR	0.00E+00	AR
Sulphate as SO ₄	200000	1150	948750	R	7.25E+00	R	2.2	1815	AR	0.00E+00	AR	1400	1155000	R	1.42E+01	R	2.5	2063	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT		R		R		R		R		R		R		R		R		R		R	

Table 169

EVAPORATION DAM 4: ENVIRONMENTAL RISK QUANTIFICATION ♦ SEDIMENTS ♦ SAMPLE NO's: 5&6 [INORGANIC · MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NO.: 5&6		RISK TO ENVIRONMENT																			
INORGANIC COMPOUNDS Micro's and Macro's	Acc. Risk Value (MR&SA) ppb	RISK OF SEDIMENTS FOR GROUNDWATER																			
		SAMPLE NO. 5										SAMPLE NO. 6									
		TOTAL ANALYSIS					PROBIT MODEL					TOTAL ANALYSIS					PROBIT MODEL				
		Lab Conc ppm	² EEC ppb	³ Risk R / AD	Risk Quan- tification %	³ Risk R / AD	Lab Conc ppm	² EEC ppb	³ Risk R / AD	Risk Quan- tification %	³ Risk R / AD	Lab Conc ppm	² EEC ppb	³ Risk R / AD	Risk Quan- tification %	³ Risk R / AD	Lab Conc ppm	² EEC ppb	³ Risk R / AD	Risk Quan- tification %	³ Risk R / AD
Aluminium as Al	1000	2800	2310000	R	1.00E+02	R	0.63	520	NA	0.00E+00	NA	8500	7012500	R	1.00E+02	R	1.2	990	NA	0.00E+00	NA
Arsenic as As	400	< 50	0.00	NA	0.00E+00	NA	< 0.34	0.00	NA	0.00E+00	NA	< 50	0.00	NA	0.00E+00	NA	< 0.34	0.00	NA	0.00E+00	NA
Barium as Ba	7000	73	60225	R	3.07E+01	R	0.12	99	NA	0.00E+00	NA	38	31350	R	3.74E+00	R	0.15	124	NA	0.00E+00	NA
Cadmium as Cd	50	< 10	0.00	NA	0.00E+00	NA	< 0.03	0.00	NA	0.00E+00	NA	< 10	0.00	NA	0.00E+00	NA	< 0.03	0.00	NA	0.00E+00	NA
Chromium ⁺ as Cr ⁺	4700	230	189750	R	9.97E+01	R	< 0.04	0.00	NA	0.00E+00	NA	99	81675	R	8.60E+01	R	< 0.04	0.00	NA	0.00E+00	NA
Cobalt as Co	1000	< 10	0.00	NA	0.00E+00	NA	< 0.12	0.00	NA	0.00E+00	NA	< 10	0.00	NA	0.00E+00	NA	< 0.12	0.00	NA	0.00E+00	NA
Copper as Cu	100	13	10725	R	1.00E+02	R	< 0.02	0.00	NA	0.00E+00	NA	< 10	0.00	NA	0.00E+00	NA	< 0.02	0.00	NA	0.00E+00	NA
Iron as Fe	5000	12000	9900000	R	1.00E+02	R	45	37125	R	4.18E+00	R	9500	7837500	R	1.00E+02	R	44	36300	R	3.80E+00	R
Lead as Pb	100	< 100	0.00	NA	0.00E+00	NA	< 0.31	0.00	NA	0.00E+00	NA	< 100	0.00	NA	0.00E+00	NA	< 0.31	0.00	NA	0.00E+00	NA
Manganese as Mn	300	240	198000	R	1.00E+02	R	2.9	2393	R	3.29E+01	R	710	585750	R	1.00E+02	R	3.1	2550	R	3.78E+01	R
Mercury as Hg	20	NA	0.00	NA	0.00E+00	NA	< 0.01	0.0	NA	0.00E+00	NA	NA	0.00	NA	0.00E+00	NA	< 0.01	0.00	NA	0.00E+00	NA
Nickel as Ni	1000	16	13200	R	6.13E+01	R	0.05	41.3	NA	0.00E+00	NA	10	8250	R	2.84E+01	R	0.05	49.5	NA	0.00E+00	NA
Selenium as Se	250	NA	0.00	NA	0.00E+00	NA	< 0.05	0.00	NA	0.00E+00	NA	NA	0.00	NA	0.00E+00	NA	< 0.05	0.00	NA	0.00E+00	NA
Titanium as Ti	700	560	482000	R	1.00E+02	R	< 0.02	0.00	NA	0.00E+00	NA	330	272250	R	1.00E+02	R	< 0.02	0.00	NA	0.00E+00	NA
Vanadium as V	1300	24	19800	R	7.95E+01	R	< 0.07	0.00	NA	0.00E+00	NA	21	17325	R	7.13E+01	R	< 0.07	0.00	NA	0.00E+00	NA
Zinc as Zn	700	310	255750	R	1.00E+02	R	< 0.17	0.00	NA	0.00E+00	NA	1300	1073	R	1.24E+02	R	< 0.17	0.00	NA	0.00E+00	NA
Calcium as Ca	150000	100	8250	NA	8.34E-07	NA	880	726000	R	7.81E+00	R	92	75900	NA	3.31E-07	NA	840	693000	R	6.56E+00	R
Chloride as Cl	250000	650	536250	R	1.31E-01	R	120	99000	NA	1.98E-08	NA	250	206250	NA	5.61E-05	NA	50	41250	NA	3.55E-13	NA
Fluoride as F	1000	5.3	4785	R	1.28E+00	R	0.3	248	NA	3.55E-13	NA	1.55	1287	NA	8.21E-05	NA	0.5	413	NA	2.41E-10	NA
Magnesium as Mg	70000	410	338250	R	7.76E+00	R	15	12375	NA	8.55E-13	NA	610	503250	R	2.60E+01	R	15	12375	NA	8.55E-13	NA
Potassium as K	200000	750	618750	R	1.09E+00	R	20	23925	NA	0.00E+00	NA	1300	1072500	R	1.12E+01	R	42	34650	NA	6.66E-13	NA
Sodium as Na	100000	750	618750	R	1.74E+01	R	NA	0.00	NA	0.00E+00	NA	1500	1237500	R	6.62E+01	R	NA	0.00	NA	0.00E+00	NA
Sulphate as SO ₄	250000	1450	1196250	R	1.58E+01	R	2.6	2145	NA	0.00E+00	NA	1400	1155000	R	1.42E+01	R	2.4	1980	NA	0.00E+00	NA
MIN / ACCEPTABLE RISK TO: ENVIRONMENT		R		R		R		R		R		R		R		R		R		R	

TABLES 170 –175

EVAPORATION DAM 4: SEDIMENTS INORGANIC
HUMAN RISK ASSESSMENT

Draft for discussion
CONFIDENTIAL
Research for IVS

SAFRA
ARCHIVE FOR JUSTICE

Table 170

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO. 1 [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 1										
INORGANIC COMPOUNDS Micro's and Macro's	RfD/ ADI/GV mg/kg/day	EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN							
			TOTAL ANALYSIS				TCLP EXTRACTION			
			Lab conc. ppm	Conc. in groundwater (EEC) ppb	PDI groundwater exposure mg/kg/day	Margin of Safety %	Lab conc. ppm	Conc. in groundwater (EEC) ppb	PDI groundwater exposure mg/kg/day	Margin of Safety %
Aluminium as Al	0.005	RSA RfD	7500	6187500	206	4125000	1.2	990	0.033	660
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 0.34	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	5.8	4785	0.160	228	0.17	140	0.005	8.57
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 0.03	0.00	0.00	0.00
Chromium ⁺⁺ as Cr ⁺⁺	1.5	EPA RfD	44	36300	1.21	80.7	< 0.04	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 0.12	0.00	0.00	0.00
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 0.02	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	12000	9900000	330	11000000	54	44550	1.49	40500
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 0.31	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	89	73425	2.45	5321	3.1	2558	0.085	108
Mercury as Hg	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	< 10	0.00	0.00	0.00	0.1	74.0	0.0025	12.32
Selenium as Se	0.005	EPA RfD	NA	0.00	0.00	0.00	< 0.05	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	160	132000	4.40	146667	< 0.02	0.00	0.00	0.00
Vanadium as V	0.009	EPA RfD	< 10	0.00	0.00	0.00	< 0.07	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	13	10725	0.358	119	< 0.17	0.00	0.00	0.00
Calcium as Ca	5.0	RSA RfD	720	594000	19.80	396	630	519750	17.33	347
Chloride as Cl	8.3	RSA RfD	650	536250	17.88	215	120	99000	3.30	39.78
Fluoride as F	0.06	EPA RfD	5.3	4373	0.146	243	1.0	825	0.028	45.83
Magnesium as Mg	2.3	RSA RfD	660	544500	18.15	789	17	14025	0.468	20.33
Potassium as K	6.7	RSA RfD	1300	1072500	35.8	534	36	29700	0.990	14.78
Sodium as Na	3.3	RSA RfD	1200	990000	33.0	1000	NA	0.00	0.00	0.00
Sulphate as SO ₄	6.7	RSA RfD	1350	1113750	37.13	554	2.0	1650	0.055	0.821
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				Groundwater			
			R				R			

Table 171

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO. 2 (INORGANIC · MICRO'S & MACRO'S)
[ISCOR VANDERBIJLPARK STEEL · MASTER PLAN]

SAMPLE NUMBER: 2										
INORGANIC COMPOUNDS Micro's and Macro's	6 RfD/ AQI/GV mg/kg/day	7 EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN							
			TOTAL ANALYSIS				ICLP EXTRACTION			
			8 Lab conc. ppm	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %	8 Lab conc. ppm	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %
Aluminium as Al	0.005	RSA RfD	9500	7837500	261	5225000	0.95	784	0.026	523
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 0.34	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	5.8	4785	0.160	228	0.33	272	0.009	13.3
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 0.03	0.00	0.00	0.00
Chromium ³⁺ as Cr ³⁺	1.5	EPA RfD	44	36300	1.21	96.7	< 0.04	0.00	0.00	0.00
Cobalt as Co	0.004	RSA RfD	< 10	0.00	0.00	0.00	< 0.12	0.00	0.00	0.00
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 0.02	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	17000	14025000	468	15583333	190	156750	5.23	174167
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 0.31	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	130	107250	3.58	7772	6.5	5363	0.179	389
Mercury as Hg	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	12	9900	0.330	1650	0.07	57.8	0.0019	0.63
Selenium as Se	0.005	EPA RfD	NA	0.00	0.00	0.00	< 0.05	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	660	544500	18.15	605000	< 0.02	0.00	0.00	0.00
Vanadium as V	0.009	EPA RfD	16	13200	0.440	4889	< 0.07	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	31	25575	0.853	284	0.25	206	0.007	2.25
Calcium as Ca	3.0	RSA RfD	30000	24750000	825	16500	410	338250	11.28	226
Chloride as Cl	0.3	RSA RfD	550	453750	15.13	182	80	66000	2.20	26.61
Fluoride as F	0.06	EPA RfD	4.6	3795	0.127	211	0.5	495	0.017	27.50
Magnesium as Mg	2.3	RSA RfD	820	676500	22.55	980	21	17325	0.578	25.11
Potassium as K	6.7	RSA RfD	1600	1320000	44.0	657	52	42900	1.43	21.34
Sodium as Na	3.3	RSA RfD	1300	1072500	35.75	1083	NA	0.00	0.00	0.00
Sulphate as SD ₄	0.7	RSA RfD	1300	1072500	35.75	534	1.3	1073	0.04	0.534
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				R	Groundwater		

Table 172

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO. 3 [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 3										
INORGANIC COMPOUNDS Micro's and Macro's	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN							
			TOTAL ANALYSIS				TCLP EXTRACTION			
			⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %	⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Aluminium as Al	0.005	RSA RfD	4100	3382500	113	2255000	0.96	792	0.026	528
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 0.34	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	6.0	4950	0.165	236	0.10	83.0	0.003	4.0
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 0.03	0.00	0.00	0.00
Chromium ³⁺ as Cr ³⁺	1.50	EPA RfD	82	67650	2.26	150	< 0.04	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 0.12	0.00	0.00	0.00
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 0.02	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	12000	9900000	330	11000000	2.5	2063	0.069	2292
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 0.31	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	160	132000	4.40	9565	2.3	1898	0.063	138
Mercury as Hg	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	15	12375	0.413	2063	< 0.05	0.00	0.00	0.00
Selenium as Se	0.005	EPA RfD	NA	0.00	0.00	0.00	< 0.05	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	640	528000	17.60	586667	< 0.02	0.00	0.00	0.00
Vanadium as V	0.009	EPA RfD	25	20625	0.688	7639	< 0.07	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	30	24750	0.825	275	0.17	140	0.005	1.58
Calcium as Ca	5.0	RSA RfD	1100	907500	30.25	605	850	701250	23.38	468
Chloride as Cl	8.3	RSA RfD	550	453750	15.13	182	70	57750	1.93	23.19
Fluoride as F	0.06	EPA RfD	0.95	784	0.026	43.6	0.4	330	0.011	10.39
Magnesium as Mg	2.3	RSA RfD	420	346500	11.55	502	11	9075	0.303	13.19
Potassium as K	6.7	RSA RfD	740	610500	20.35	304	23	18975	0.633	9.44
Sodium as Na	3.3	RSA RfD	1300	1072500	35.75	1083	NA	0.00	0.00	0.00
Sulphate as SO ₄	6.7	RSA RfD	1150	948750	31.63	472	2.2	1815	0.061	0.908
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				Groundwater			
			R				R			

Table 173

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO. 4 [INORGANIC · MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 4										
INORGANIC COMPOUNDS Micro's and Macro's	6 RfD/ ADI/GV mg/kg/day	7 EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN							
			TOTAL ANALYSIS				TELP EXTRACTION			
			8 Lab conc. ppm	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %	8 Lab conc. ppm	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %
Aluminium as Al	0.005	RSA RfD	5300	4372500	146	2915000	1.50	1238	0.041	825
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 0.34	0.00	0.00	0.00
Barium as Ba	0.007	EPA RfD	4.5	3713	0.124	177	0.12	99	0.003	4.71
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 0.03	0.00	0.00	0.00
Chromium ³⁺ as Cr ³⁺	0.003	EPA RfD	54	44550	1.49	99	< 0.04	0.00	0.00	0.00
Cobalt as Co	0.001	RSA RfD	< 10	0.00	0.00	0.00	< 0.12	0.00	0.00	0.00
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 0.02	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	9100	7507500	250	8341667	23	18975	0.633	21083
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 0.31	0.00	0.00	0.00
Manganese as Mn	0.045	EPA RfD	400	330000	11.0	23913	3.5	2888	0.096	209
Mercury as Hg	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	< 10	0.00	0.00	0.00	0.09	74.25	0.0025	12.38
Selenium as Se	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.05	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	160	132000	4.4	146667	< 0.02	0.00	0.00	0.00
Vanadium as V	0.009	EPA RfD	11	9075	0.303	3361	< 0.07	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	170	140250	4.68	1558	0.19	157	0.0052	1.74
Calcium as Ca	5.0	RSA RfD	680	561000	18.7	374	870	717750	23.93	479
Chloride as Cl	0.3	RSA RfD	400	330000	11.0	133	50	41250	1.38	16.57
Fluoride as F	0.06	EPA RfD	2.7	2228	0.074	124	0.7	578	0.019	32.11
Magnesium as Mg	2.3	RSA RfD	430	354750	11.83	514	12	9900	0.330	14.35
Potassium as K	6.0	RSA RfD	830	684750	22.83	341	28	23100	0.770	11.49
Sodium as Na	3.3	RSA RfD	2000	1650000	55.00	1667	NA	0.00	0.00	0.00
Sulphate as SO ₄	6.7	RSA RfD	1400	1155000	38.50	575	2.5	2063	0.069	1.03
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater		R	Groundwater		R		

Table 174

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO. 5 [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 5										
INORGANIC COMPOUNDS Micro's and Macro's	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN							
			TOTAL ANALYSIS				TCLP EXTRACTION			
			⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %	⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Aluminium as Al	0.009	RSA RfD	2800	2310000	77.0	1540000	0.63	520	0.017	347
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 0.34	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	73.0	60225	2.01	2868	0.12	99	0.003	4.71
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 0.03	0.00	0.00	0.00
Chromium ³⁺ as Cr ³⁺	1.50	EPA RfD	230	189750	6.33	422	< 0.04	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 0.12	0.00	0.00	0.00
Copper as Cu	0.04	EPA RfD	13.0	10725	0.358	894	< 0.02	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	12000	9900000	330	11000000	45	37125	1.24	41250
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 0.31	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	240	198000	6.60	14348	2.9	2393	0.080	170
Mercury as Hg	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	16	13200	0.440	2200	0.1	41.30	0.0014	8.88
Selenium as Se	0.005	EPA RfD	NA	0.00	0.00	0.00	< 0.05	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	560	462000	15.4	513333	< 0.02	0.00	0.00	0.00
Vanadium as V	0.009	EPA RfD	24	19800	0.660	7333	< 0.07	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	310	255750	8.53	2842	< 0.17	0.00	0.00	0.00
Calcium as Ca	5.0	RSA RfD	100	82500	2.75	55	880	726000	24.20	484
Chloride as Cl	8.3	RSA RfD	650	536250	17.88	215	120	99000	3.30	59.70
Fluoride as F	0.06	EPA RfD	5.8	4785	0.160	266	0.3	248	0.008	13.70
Magnesium as Mg	2.3	RSA RfD	410	338250	11.28	490	15	12375	0.413	17.33
Potassium as K	6.7	RSA RfD	750	618750	20.63	308	20	23925	0.798	11.90
Sodium as Na	3.3	RSA RfD	750	618750	20.63	625	NA	0.00	0.00	0.00
Sulphate as SO ₄	6.7	RSA RfD	1450	1196250	39.88	595	2.6	2145	0.072	1.07
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				Groundwater			
			R				R			

Table 175

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO. 6 [INORGANIC · MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 6										
INORGANIC COMPOUNDS Micro's and Macro's	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	RISK TO HUMAN							
			TOTAL ANALYSIS				TCLP EXTRACTION			
			⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %	⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Aluminium as Al	0.005	RSA RfD	8500	7012500	234	4675000	1.20	990	0.033	660
Arsenic as As	0.0003	EPA RfD	< 50	0.00	0.00	0.00	< 0.34	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	38.0	31350	1.05	1493	0.15	124	0.004	5.00
Cadmium as Cd	0.0005	EPA RfD	< 10	0.00	0.00	0.00	< 0.03	0.00	0.00	0.00
Chromium ⁺⁺ as Cr ⁺⁺	1.5	EPA RfD	99	81675	2.72	182	< 0.04	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	< 10	0.00	0.00	0.00	< 0.12	0.00	0.00	0.00
Copper as Cu	0.04	EPA RfD	< 10	0.00	0.00	0.00	< 0.02	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	9500	7837500	261	8708333	44	36300	1.21	40333
Lead as Pb	0.002	RSA RfD	< 100	0.00	0.00	0.00	< 0.31	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	710	585750	19.53	42446	3.1	2558	0.085	185
Mercury as Hg	0.0003	EPA RfD	NA	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	10	8250	0.275	1375	0.1	49.50	0.0017	0.25
Selenium as Se	0.005	EPA RfD	NA	0.00	0.00	0.00	< 0.05	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	330	272250	9.08	302500	< 0.02	0.00	0.00	0.00
Vanadium as V	0.009	EPA RfD	21	17325	0.578	6417	< 0.07	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	1300	1073	0.036	11.5	< 0.17	0.00	0.00	0.00
Calcium as Ca	5.0	RSA RfD	92	75900	2.53	50.5	840	693000	23.1	462
Chloride as Cl	8.3	RSA RfD	250	206250	6.88	82.3	50	41250	1.38	16.57
Fluoride as F	0.06	EPA RfD	1.56	1287	0.043	71.5	0.5	413	0.014	22.94
Magnesium as Mg	2.3	RSA RfD	610	503250	16.78	729	15	12375	0.413	17.93
Potassium as K	6.7	RSA RfD	1300	1072500	35.75	534	42	34650	1.16	17.24
Sodium as Na	3.3	RSA RfD	1500	1237500	41.25	1250	NA	0.00	0.00	0.00
Sulphate as SO ₄	6.7	RSA RfD	1400	1155000	38.50	575	2.4	1980	0.066	0.985
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater		R	Groundwater		R		

TABLES 176 - 177

EVAPORATION DAM 4: SEDIMENTS ORGANIC
ENVIRONMENTAL RISK ASSESSMENT

Draft for discussion
CONFIDENTIAL
Research for IVS

Table 176

EVAPORATION DAM 4: - ENVIRONMENTAL RISK QUANTIFICATION ♦ SEDIMENTS ♦ SAMPLE NO's 1, 2 & 3 (ORGANICS PART 3 V001)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBERS: 1, 2 & 3

ORGANIC COMPOUNDS Volatile & Semi-Volatile	Lab Conc. ppm	RISK TO ENVIRONMENT - RISK OF SEDIMENTS FOR GROUNDWATER														
		SAMPLE NO. 1 (Volume = 1,250,000 kg/ha/m)					SAMPLE NO. 2 (Volume = 1,250,000 kg/ha/m)					SAMPLE NO. 3 (Volume = 1,250,000 kg/ha/m)				
		TOTAL ANALYSIS			PROBIT MODEL		TOTAL ANALYSIS			PROBIT MODEL		TOTAL ANALYSIS			PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR
Benzene	300	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Toluene	300	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Ethylbenzene	3570	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
m,p-Xylene	970	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
o-Xylene	1480	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Styrene	4360	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Isopropylbenzene	2640	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
1,3,5-Trimethylbenzene	1200	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
1,2,4-Trimethylbenzene	770	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Naphthalene	300	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR	< 0.01	0.00	AR	0.00E+00	AR
Phenol	2650	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
2-Methylphenol	1400	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
4-Methylphenol	1470	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.29	239	AR	3.00E-13	AR
2,4-Dimethylphenol	1470	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
2-Methylnaphthalene	150	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.03	0.00	AR	0.00E+00	AR
Acenaphthylene	0.5	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Acenaphthene	170	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Dibenzofuran	180	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Fluorene	180	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Phenanthrene	30	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Anthracene	0.5	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Carbazole	130	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Di-n-butylphthalate	200	0.19	157	AR	3.44E-05	AR	0.22	182.00	AR	1.44E-04	AR	0.12	99	AR	2.59E-07	AR
Fluoranthene	14	0.12	99	R	2.49E+01	R	0.15	124	R	4.06E+01	R	0.00	0.00	AR	0.00E+00	AR
Pyrene	200	0.00	0.00	AR	0.00E+00	AR	0.11	91	AR	9.94E-08	AR	0.00	0.00	AR	0.00E+00	AR
Butylbenzylphthalate	530	0.00	0.00	AR	0.00E+00	AR	0.13	124	AR	3.12E-11	AR	0.00	0.00	AR	0.00E+00	AR
Benzo[a]anthracene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Chrysene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
bis(2-Ethylhexyl)phthalate	14000	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Benzo[b]+[k]fluoranthene	0.5	0.00	0.00	AR	0.00E+00	AR	0.13	107	R	1.00E+02	R	0.00	0.00	AR	0.00E+00	AR
Benzo[a]pyrene	0.5	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Indeno[1,2,3-cd]pyrene	0.5	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Dibenz[a,h]anthracene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Benzo[g,h,i]perylene	740	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO ENVIRONMENT		R				R	R				R	AR				AR

Table 177

DAM 4: - ENVIRONMENTAL RISK QUANTIFICATION ♦ SEDIMENTS ♦ SAMPLE NO's 4, 5 & 6 (ORGANICS - PAH's & VOC's)
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBERS: 4, 5 & 6

ORGANIC COMPOUNDS Volatile & Semi-Volatile		RISK TO ENVIRONMENT - RISK OF SEDIMENTS FOR GROUNDWATER														
		SAMPLE NO. 4 (Volume = 1,250,000 kg/ha/m)					SAMPLE NO. 5 (Volume = 1,250,000 kg/ha/m)					SAMPLE NO. 6 (Volume = 1,250,000 kg/ha/m)				
		TOTAL ANALYSIS			PROBIT MODEL		TOTAL ANALYSIS			PROBIT MODEL		TOTAL ANALYSIS			PROBIT MODEL	
		¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR	¹ Lab Conc. ppm	² EEC ppb	³ Risk R / AR	Risk Quan- tification %	³ Risk R / AR
Benzene	1000	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
Toluene	4000	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
Ethylbenzene	3000	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
m,p-Xylene	2700	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
o-Xylene	1400	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
Styrene	1300	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
Isopropylbenzene	4000	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
1,3,5-Trimethylbenzene	1200	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
1,2,4-Trimethylbenzene	700	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
Naphthalene	300	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR	<0.01	0.00	AR	0.00E+00	AR
Phenol	2000	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
2-Methylphenol	1000	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
4-Methylphenol	1300	0.00	0.00	AR	0.00E+00	AR	0.42	347	AR	3.49E-11	AR	0.00	0.00	AR	0.00E+00	AR
2,4-Dimethylphenol	1000	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
2-Methylnaphthalene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Acenaphthylene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Acenaphthene	1700	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Dibenzofuran	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Fluorene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Phenanthrene	30	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Anthracene	0.5	0.00	0.00	AR	0.00E+00	AR	0.13	107	AR	1.00E+02	AR	0.00	0.00	AR	0.00E+00	AR
Carbazole	1300	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Di-n-butylphthalate	200	0.12	99	AR	2.59E-07	AR	0.00	0.00	AR	0.00E+00	AR	0.14	116	AR	1.49E-06	AR
Fluoranthene	10	0.14	116	R	3.57E+01	R	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Pyrene	200	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Butylbenzylphthalate	300	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.93	809	R	1.19E-02	R
Benzo[a]anthracene	0.1	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Chrysene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
bis(2-Ethylhexyl)phthalate	1400	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Benzo[b]+[k]fluoranthene	0.3	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Benzo[a]pyrene	0.5	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Indeno[1,2,3-cd]pyrene	0.5	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Dibenz[a,h]anthracene	100	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
Benzo[g,h,i]perylene	700	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR	0.00	0.00	AR	0.00E+00	AR
RISK / RISK TO: ENVIRONMENT		R			R		AR			AR		R			R	

TABLES 178 - 180

EVAPORATION DAM 4: SEDIMENTS ORGANIC
HUMAN RISK ASSESSMENT

Draft for discussion
CONFIDENTIAL
Research for IVS

ARCHIVE FOR JUSTICE

Table 178

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO's 1 & 2 [ORGANIC · PAH^s & VOC^s] · IVS · MASTER PLAN

SAMPLE NUMBERS: 1 & 2			RISK TO HUMAN							
ORGANIC COMPOUNDS Volatile & Semi-Volatile	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	SAMPLE NO. 1				SAMPLE NO. 2			
			⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %	⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Benzene	0.002	EPA RfD	< 0.01	0.01	0.00	0.01	< 0.01	0.00	0.00	0.00
Toluene	0.2	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Ethylbenzene	0.1	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
m,p-Xylene	0.1	WHO GV	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
o-Xylene	0.1	WHO GV	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Styrene	0.2	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Isopropylbenzene	0.1	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
1,3,5-Trimethylbenzene	0.03	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.04	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Naphthalene	0.02	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.006	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylnaphthalene	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthylene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthene	0.1	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dibenzofuran	0.0002	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	0.04	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenanthrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	0.3	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carbazole	0.006	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.19	157	0.0002	5.23	0.22	182	0.006	0.07
Fluoranthene	0.04	EPA RfD	0.12	99	0.0033	8.29	0.15	124	0.004	0.00
Pyrene	0.03	EPA RfD	0.00	0.00	0.00	0.00	0.11	91	0.003	0.01
Butylbenzylphthalate	0.2	EPA RfD	0.00	0.00	0.00	0.00	0.15	124	0.004	0.01
Benzo[a]anthracene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]+[k]fluoranthene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.13	107	0.0036	17833
Benzo[a]pyrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indeno[1,2,3-cd]pyrene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dibenz[a,h]anthracene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a,h]perylene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				Groundwater			
			R				R			

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Table 179

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO's 3 & 4 [ORGANIC - PAH^s & VOC^s] - IVS - MASTER PLAN

SAMPLE NUMBERS: 3 & 4			RISK TO HUMAN							
ORGANIC COMPOUNDS Volatile & Semi-Volatile	⁶ RfD/ ADI/GV mg/kg/day	⁷ EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	SAMPLE NO. 3				SAMPLE NO. 4			
			⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %	⁸ Lab conc. ppm	¹³ Conc. in groundwater (EEC) ppb	¹⁴ PDI groundwater exposure mg/kg/day	¹⁰ Margin of Safety %
Benzene	0.002	EPA RfD	< 0.01	0.0	0.0	0.00	< 0.01	0.0	0.0	0.00
Toluene	0.2	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Ethylbenzene	0.1	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
m,p-Xylene	0.17	WHO GV	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
o-Xylene	0.17	WHO GV	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Styrene	0.2	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Isopropylbenzene	0.1	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
1,3,5-Trimethylbenzene	0.05	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.05	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Naphthalene	0.02	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.23	239	0.008	159	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylnaphthalene	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthylene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthene	0.1	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dibenzofuran	0.004	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	0.04	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenanthrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	0.3	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carbazole	0.006	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.12	99	0.003	3.30	0.12	99.0	0.0033	3.30
Fluoranthene	0.04	EPA RfD	0.00	0.00	0.00	0.00	0.14	116	0.0039	3.30
Pyrene	0.03	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Butylbenzylphthalate	0.2	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]anthracene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b]+[k]fluoranthene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indeno[1,2,3-cd]pyrene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dibenz[a,h]anthracene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[e,h,i]perylene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				Groundwater			
			R				R			

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Table 180

EVAPORATION DAM 4: HUMAN RISK ASSESSMENT ♦ SEDIMENTS ♦ SAMPLE NO's 5 & 6 (ORGANIC - PAH⁶ & VOC⁷) - IVS - MASTER PLAN

SAMPLE NUMBERS: 5 & 6			RISK TO HUMAN							
ORGANIC COMPOUNDS Volatile & Semi-Volatile	RfD/ ADI/GV mg/kg/day	7 EPA RfD/ EPA DWEL/ RSA RfD/ WHO GV	SAMPLE NO. 5				SAMPLE NO. 6			
			8 Lab conc. ppm	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %	8 Lab conc. ppm	13 Conc. in groundwater (EEC) ppb	14 PDI groundwater exposure mg/kg/day	10 Margin of Safety %
Benzene	0.002	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Toluene	0.2	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Ethylbenzene	0.1	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
m,p-Xylene	0.17	WHO GV	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
o-Xylene	0.17	WHO GV	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Styrene	0.2	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Isopropylbenzene	0.1	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
1,3,5-Trimethylbenzene	0.05	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.05	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Naphthalene	0.02	EPA RfD	< 0.01	0.00	0.00	0.00	< 0.01	0.00	0.00	0.00
Phenol	0.6	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylphenol	0.05	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-Methylphenol	0.005	EPA RfD	0.42	347	0.012	231	0.00	0.00	0.00	0.00
2,4-Dimethylphenol	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylnaphthalene	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthylene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthene	0.1	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dibenzofuran	0.004	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	0.04	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenanthrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anthracene	0.3	EPA RfD	0.13	107	0.0036	1.2	0.00	0.00	0.00	0.00
Carbazole	0.006	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Di-n-butylphthalate	0.1	EPA RfD	0.00	0.00	0.00	0.00	0.14	116	0.0039	0.00
Fluoranthene	0.04	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pyrene	0.03	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Butylbenzylphthalate	0.2	EPA RfD	0.00	0.00	0.00	0.00	0.90	809	0.027	0.00
Benzo[a]anthracene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bis(2-Ethylhexyl)phthalate	0.02	EPA RfD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[b] + [k]fluoranthene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]pyrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indeno[1,2,3-cd]pyrene	0.00002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dibenz[a,h]anthracene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[e]pyrene	0.0002	WHO GV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RISK / ACCEPTABLE RISK TO: HUMAN			Groundwater				Groundwater			
			R				R			

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EVAPORATION DAM 1 - 4: LABORATORY ANALYSIS

WATERS

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(Dam 1-4)

Dam water

WATERLAB**WATERLAB (Edms)Bpk/(Pty)Ltd**

[1983/009165/07]

Monitoring - en Laboratoriumdienste vir Water en Afvalwater
Omgewings Monitoring en Impak Evaluering
Monitoring and Laboratory Services for Water and Waste Water
Environmental Monitoring and Impact Assessment

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Hatfield 0028

FAKS BOODSKAP / FAX MESSAGE

DATUM / DATE : 2001 - 12 - 10

AAN / TO : OCKIE FOURIE TOKSIKOLOË

VIR AANDAG / FOR ATTENTION OF : DR H.O. FOURIE

FAKS NO / FAX NO : 348 - 7436

VAN / FROM : M.L. SIEBERT

AANTAL BLS / NUMBER OF : 5
[INSLUITENDE HIERDIE EEN / INCLUDING THIS ONE]

BOODSKAP / MESSAGE:

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WATERLAB (PTY) LTD
CERTIFICATE OF ANALYSES

(Water lab)
Dam 1-4
(Inorganics)
Dam water
(18 Samples)

DATE RECEIVED: 2001 - 11 - 23

DATE COMPLETED: 2001 - 12 - 07

PROJECT NUMBER: 1244

REPORT NUMBER: 7968

OCKIE FOURIE TOXICOLOGISTS [Dr H.O. Fourie]

ANALYSES in mg/l	Dam 4	Dam 4	SAMPLE NAME	Dam 4	Dam 4
	1	2	3	4	5
SAMPLE NUMBER	3737	3738	3739	3740	3741
pH	6,2	6,2	6,0	6,0	6,0
CONDUCTIVITY in mS/m at 25 °C	2170	2162	2173	2175	2171
TOTAL DISSOLVED SOLIDS at 180 °C	13610	13918	13610	13822	13674
AMMONIA as N	153	151	151	150	150
NITRATE as N	0,6	0,6	0,6	0,6	0,6
CHLORIDE as Cl	3499	3499	3499	3499	3499
SULPHATE as SO ₄	5389	5389	5500	5500	5556
SILICA as Si	1,5	1,5	1,7	1,6	1,5
FLUORIDE as F	14,2	13,5	13,4	13,3	13,3
SODIUM as Na	2460	2489	2503	2486	2464
POTASSIUM as K	522	529	515	518	511
CALCIUM as Ca	621	641	631	661	621
MAGNESIUM as Mg	383	371	371	365	389
ALUMINIUM as Al	< 0,100	< 0,100	< 0,100	< 0,100	< 0,100
BORON as B	1,9	1,5	1,6	1,4	1,9
CADMIUM as Cd	0,053	0,053	0,055	0,055	0,053
CHROOM as Cr	0,039	0,033	0,044	0,041	0,029
IRON as Fe	0,435	0,393	0,428	0,399	0,403
COPPER as Cu	0,037	0,036	0,034	0,033	0,037
MANGANESE as Mn	39	39	39	38	38
LEAD as Pb	0,313	0,320	0,311	0,313	0,302
MERCURY as Hg	< 0,002	< 0,002	< 0,002	< 0,002	< 0,002
NICKEL as Ni	0,157	0,157	0,162	0,162	0,159
SELENIUM as Se	0,014	0,013	0,015	0,020	0,016
ZINC as Zn	0,053	0,059	0,058	0,055	0,054
FREE CYANIDE as CN	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
ARSENIC as As	0,010	0,013	0,011	0,013	0,011
HEXAVALLENT CHROMIUM as Cr ⁶⁺	< 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	0,184	0,179	0,183	0,181	0,184
VANADIUM as V	< 0,03	< 0,03	< 0,03	< 0,03	< 0,03
TITANIUM as Ti	0,31	0,32	0,34	0,37	0,41
% BALANCING	95,9	96,3	95,7	95,7	95,2

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Dam 3

ANALYSES in mg/l	Dam 4	Dam 4	SAMPLE NAME	Dam 1	Dam 1
	6	7	8	9	10
SAMPLE NUMBER	3742	3743	3744	3745	3746
pH	6,1	6,0	6,1	11,0	9,6
CONDUCTIVITY in mS/m at 25 °C	2166	2176	1808	1079	973
TOTAL DISSOLVED SOLIDS at 180 °C	13686	13572	11562	6238	5652
AMMONIA as N	150	151	71	11	9,5
NITRATE as N	0,5	0,5	0,6	< 0,2	< 0,2
CHLORIDE as Cl	3474	3524	2680	1092	1092
SULPHATE as SO ₄	5556	5500	4778	2833	2722
SILICA as Si	1,8	1,8	0,6	16,6	13,9
FLUORIDE as F	13,2	13,2	10,4	6,8	5,5
SODIUM as Na	2484	2501	2087	1807	1574
POTASSIUM as K	508	502	367	266	237
CALCIUM as Ca	651	641	641	5	20
MAGNESIUM as Mg	359	365	304	2	10
ALUMINIUM as Al	< 0,100	< 0,100	< 0,100	0,129	0,119
BORON as B	1,9	1,8	1,3	2,0	1,5
CADMIUM as Cd	0,053	0,052	0,046	0,020	0,018
CHROMIUM as Cr	0,038	0,031	0,043	< 0,025	< 0,025
IRON as Fe	0,430	0,498	0,396	0,118	0,042
COPPER as Cu	0,036	0,036	0,033	< 0,025	< 0,025
MANGANESE as Mn	39	39	33	0,038	< 0,025
LEAD as Pb	0,312	0,298	0,245	0,083	0,070
MERCURY as Hg	< 0,002	< 0,002	< 0,002	< 0,002	< 0,002
NICKEL as Ni	0,164	0,161	0,138	0,066	0,059
SELENIUM as Se	0,019	0,025	0,015	0,005	< 0,005
ZINC as Zn	0,053	0,052	0,051	< 0,025	0,026
FREE CYANIDE as CN	< 0,05	< 0,05	0,19	0,22	0,06
ARSENIC as As	0,009	0,010	0,011	0,008	0,006
HEXAVALLENT CHROMIUM as Cr ⁶⁺	< 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	0,178	0,173	0,144	0,044	0,030
VANADIUM as V	< 0,03	< 0,03	< 0,03	0,11	0,09
TITANIUM as Ti	0,42	0,55	0,053	0,15	< 0,03
% BALANCING	95,3	95,2	96,4	97,3	96,2

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Dam 3

ANALYSES in mg/l	Dam 1	Dam 1	SAMPLE NAME	Dam 3	Dam 3
	11	12	13	14	15
SAMPLE NUMBER	3747	3748	3749	3750	3751
pH	8,4	7,8	8,4	8,4	8,5
CONDUCTIVITY in mS/m at 25 °C	997	1010	2194	2226	2236
TOTAL DISSOLVED SOLIDS at 180 °C	5772	5846	13898	13970	14382
AMMONIA as N	19	21	5,0	3,4	3,9
NITRATE as N	< 0,2	< 0,2	0,3	0,3	0,4
CHLORIDE as Cl	1141	1166	3027	3102	3102
SULPHATE as SO ₄	2722	2256	6000	6000	6111
SILICA as Si	12,6	11,9	6,8	6,3	6,1
FLUORIDE as F	6,0	6,4	15,1	16,1	16,6
SODIUM as Na	1534	1521	3163	3188	3197
POTASSIUM as K	225	222	648	665	634
CALCIUM as Ca	84	112	491	521	541
MAGNESIUM as Mg	21	26	207	219	231
ALUMINIUM as Al	0,110	0,101	< 0,100	< 0,100	< 0,100
BORON as B	1,7	1,6	2,1	2,3	1,8
CADMIUM as Cd	0,021	0,022	0,054	0,055	0,056
CHROMIUM as Cr	< 0,025	0,025	0,040	0,035	0,036
IRON as Fe	0,187	0,356	0,162	0,160	0,383
COPPER as Cu	< 0,025	< 0,025	0,042	0,042	0,042
MANGANESE as Mn	0,175	0,275	0,344	0,263	0,204
LEAD as Pb	0,078	0,083	0,311	0,320	0,324
MERCURY as Hg	< 0,002	< 0,002	< 0,002	< 0,002	< 0,002
NICKEL as Ni	0,059	0,062	0,162	0,162	0,161
SELENIUM as Se	< 0,005	< 0,005	0,013	0,011	0,017
ZINC as Zn	0,044	0,065	0,047	0,047	0,045
FREE CYANIDE as CN	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
ARSENIC as As	0,005	0,008	0,007	0,007	0,007
HEXAVALLENT CHROMIUM, as Cr ⁶⁺	< 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	0,035	0,036	0,125	0,126	0,129
VANADIUM as V	0,05	0,04	< 0,03	< 0,03	< 0,03
TITANIUM as Ti	0,10	0,16	0,24	0,26	0,29
% BALANCING	97,2	100,0	96,2	96,7	96,5

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ANALYSES in mg/l	SAMPLE NAME				
	16	17	18		
SAMPLE NUMBER	3752	3753	3754		
pH	8,9	8,9	8,1		
CONDUCTIVITY in mS/m at 25 °C	1627	1628	1142		
TOTAL DISSOLVED SOLIDS at 180 °C	9720	9782	6734		
AMMONIA as N	5,6	5,6	12,3		
NITRATE as N	< 0,2	< 0,2	< 0,2		
CHLORIDE as Cl	1687	1737	1266		
SULPHATE as SO ₄	4389	4333	2500		
SILICA as Si	11,9	12,3	13,2		
FLUORIDE as F	12,8	12,9	8,6		
SODIUM as Na	2810	2780	1767		
POTASSIUM as K	481	474	255		
CALCIUM as Ca	40	40	106		
MAGNESIUM as Mg	22	23	27		
ALUMINIUM as Al	0,184	0,221	0,239		
BORON as B	2,8	1,8	1,8		
CADMIUM as Cd	0,035	0,035	0,024		
CHROMIUM as Cr	< 0,025	< 0,025	< 0,025		
IRON as Fe	0,518	0,530	1,17		
COPPER as Cu	0,028	0,029	< 0,025		
MANGANESE as Mn	0,123	0,132	0,579		
LEAD as Pb	0,182	0,179	0,117		
MERCURY as Hg	< 0,002	< 0,002	< 0,002		
NICKEL as Ni	0,107	0,115	0,070		
SELENIUM as Se	< 0,005	< 0,005	0,008		
ZINC as Zn	0,050	0,048	0,061		
FREE CYANIDE as CN	< 0,05	< 0,05	< 0,05		
ARSENIC as As	0,013	0,014	0,007		
HEXAVALLENT CHROMIUM as Cr ⁶⁺	< 0,025	< 0,025	< 0,025		
BARIUM as Ba	< 0,10	< 0,10	< 0,10		
COBALT as Co	0,071	0,075	0,047		
VANADIUM as V	0,03	< 0,03	< 0,03		
TITANIUM as Ti	0,51	0,50	0,61		
% BALANCING	99,4	98,8	98,5		

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Page 1 of 1

8/02/2002

OFT

From: Bridgit Liebenberg <BLiebenberg@csir.co.za>
To: <OFT@global.co.za>
Sent: Friday, February 08, 2002 11:37 AM
Attach: VOC&SVOC REP 011553.doc
Subject: Report

Dam 1-4
(Water)

Dear Dr Fourie,

Please find attached our report for the VOC and SVOC analysis of 25 water and 16 sediment samples.

We trust the attached will meet with your approval. Please accept our apologies for the delay in these results and for any inconvenience this may have caused.

If you should have any further queries, please do not hesitate to contact me.

Regards,

Bridgit

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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.: 01-1553

Enquires: B G Cowan

Tel. #: 011-605 2452

Fax #: (011) 605-2537

Date: 08 February 2002

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 AQUEOUS AND SEDIMENT SAMPLES

1. INTRODUCTION

This report details the results for the analysis of aqueous and sediment samples received on 23 November 2001.

2. SAMPLE RECEIPT AND HANDLING

Twenty-five aqueous samples for volatile organic analysis (VOC) were received in duplicate in 40ml EPA vials. Twenty-five water samples for semi-volatile organic analysis (SVOC) were received in 1-litre Schott bottles. Sixteen sediment samples were received in glass jars for both volatile and semi-volatile organic analysis. The samples were immediately transferred to a refrigerator where they were kept until analysed.

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REFERENCE NO: 01-1553

3. ANALYTICAL METHODS

3.1 Volatile organics:

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

Volatile organics in the sediment samples* were determined using an in-house headspace GC-MS method (based on US EPA 5021 & 8260).

3.2 Semi-Volatile organics:

Semi-Volatile organics* in the soil and water samples were determined using an in-house GC-MS method based on US EPA 8270.

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.

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

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Volatile

Appendix I

Volatile Organics by Purge and Trap GC-MS

÷ 1000

Dam 4

Dam 4

Dam 4

Dam 4

		Date Analysed		14/12/01	15/12/01	15/12/01	15/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.	MDL	1S	1D	2S	2D
Peak	CAS No.:	Units	µg/litre	µg/litre	µg/litre	µg/litre	µg/litre
1	75-71-8	Dichlorodifluoromethane	0.4	-	-	-	-
2	75-01-4	Vinyl Chloride	0.2	-	-	-	-
3	74-83-9	Bromomethane	0.3	-	-	-	-
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	<4
7	156-60-5	trans-1,2-Dichloroethene	0.3	-	-	-	-
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	-	-	-	-
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	<1	<1	<1	<1
23	79-00-5	1,1,2-Trichloroethane	0.3	-	-	-	-
24	142-28-9	1,3-Dichloropropane	0.2	-	-	-	-
25	127-18-4	Tetrachloroethene	0.2	-	-	-	-
26	124-48-1	Dibromochloromethane	0.3	-	-	-	-
27	106-93-4	1,2-Dibromoethane	0.2	-	-	-	-
28	108-90-7	Chlorobenzene	0.3	-	-	-	-
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-	-	-	-

“ - ” = < Method detection limit (MDL)

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Appendix I
Volatile Organics
by
Purge and Trap GC-MS

Peak	CAS No.:			Dem 4	Dem 4	Dem 4	Dem 4
		Date Analysed		14/12/01	15/12/01	15/12/01	15/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.	MDL	1S	1D	2S	2D
		Units	µg/litre	µg/litre	µg/litre	µg/litre	µg/litre
30	100-41-4	Ethylbenzene	0.2	-	-	-	-
31	108-38-3 106-42-3	m,p-Xylene	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	-	-	-	-
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	-	-	-	-
41	108-67-8	1,3,5-Trimethylbenzene	0.1	-	-	-	-
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	-	-	-	-
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	<1	<1	<1
55	87-61-6	1,2,3-Trichlorobenzene	0.7	-	-	-	-

“—” = < Method detection limit (MDL)

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Appendix I

Volatile Organics by Purge and Trap GC-MS

Dem 4 Dem 4 Dem 4

		Date Analysed		15/12/01	15/12/01	15/12/01
		Ref no		01-1553	01-1553	01-1553
		Sample I.D.	MDL	3S	3D	4S
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	-	-	-
3	74-83-9	Bromomethane	0.3	-	-	-
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	-	-	-
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	-	-	-
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	<1	<1	<1
23	79-00-5	1,1,2-Trichloroethane	0.3	-	-	-
24	142-28-9	1,3-Dichloropropane	0.2	-	-	-
25	127-18-4	Tetrachloroethene	0.2	-	-	-
26	124-48-1	Dibromochloromethane	0.3	-	-	-
27	106-93-4	1,2-Dibromoethane	0.2	-	-	-
28	108-90-7	Chlorobenzene	0.3	-	-	-
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-	-	-

“ - “ = < Method detection limit (MDL)

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Volatile Organics by Purge and Trap GC-MS

		Date Analysed		15/12/01	15/12/01	15/12/01
		Ref no		01-1553	01-1553	01-1553
		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	108-38-3 106-42-3	m,p-Xylene	0.4	-	<2	-
32	95-47-6	o-Xylene	0.1	<1	<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	-	-	-
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	<1	<1	-
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	<1	<1	-
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	-	-	-
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	<1	<1
55	87-61-6	1,2,3-Trichlorobenzene	0.7	-	-	-

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Volatile Organics by Purge and Trap GC-MS

		Date Analysed		16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553
		Sample I.D.	MDL	4D	5S	5D
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	-	-	-
3	74-83-9	Bromomethane	0.3	-	-	-
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	-	-	-
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	-	-	-
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	<1	-	<1
23	79-00-5	1,1,2-Trichloroethane	0.3	-	-	-
24	142-28-9	1,3-Dichloropropane	0.2	-	-	-
25	127-18-4	Tetrachloroethene	0.2	-	-	-
26	124-48-1	Dibromochloromethane	0.3	-	-	-
27	106-93-4	1,2-Dibromoethane	0.2	-	-	-
28	108-90-7	Chlorobenzene	0.3	-	-	-
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-	-	-

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Appendix I
Volatile Organics
by
Purge and Trap GC-MS

		Date Analysed		16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553
		Sample I.D.	MDL	4D	5S	5D
Peak	CAS No.:	Units	µg/l	µg/litre	µg/litre	µg/litre
30	100-41-4	Ethylbenzene	0.2	-	-	-
31	108-38-3 106-42-3	m,p-Xylene	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	-	-	-
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	-	-	-
41	108-67-8	1,3,5-Trimethylbenzene	0.1	-	-	-
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	-	-	-
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	<1	<1
55	87-61-6	1,2,3-Trichlorobenzene	0.7	-	-	-

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Volatile Organics by Purge and Trap GC-MS

		Date Analysed		16/12/01	16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.	MDL	6S	6D	7S	7D
Peak	CAS No.:	Units	µg/l	µg/litre	µg/litre	µg/litre	µg/litre
1	75-71-8	Dichlorodifluoromethane	0.4	-	-	-	-
2	75-01-4	Vinyl Chloride	0.2	-	-	-	-
3	74-83-9	Bromomethane	0.3	-	-	-	-
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	<4
7	156-60-5	trans-1,2-Dichloroethene	0.3	-	-	-	-
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	-	-	-	-
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	<1	<1	<1	<1
23	79-00-5	1,1,2-Trichloroethane	0.3	-	-	-	-
24	142-28-9	1,3-Dichloropropane	0.2	-	-	-	-
25	127-18-4	Tetrachloroethene	0.2	-	-	-	-
26	124-48-1	Dibromochloromethane	0.3	-	-	-	-
27	106-93-4	1,2-Dibromoethane	0.2	-	-	-	-
28	108-90-7	Chlorobenzene	0.3	-	-	-	-
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-	-	-	-

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Appendix I

Volatile Organics by Purge and Trap GC-MS

Dam 4 *Dam 4* *Dam 4* *Dam*

Peak	CAS No.:	Date Analysed		16/12/01	16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.		6S	6D	7S	7D
		Units	MDL	µg/litre	µg/litre	µg/litre	µg/litre
30	100-41-4	Ethylbenzene	0.2	-	-	-	-
31	108-38-3 106-42-3	m,p-Xylene	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	-	-	-	-
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	-	-	-	-
41	108-67-8	1,3,5-Trimethylbenzene	0.1	-	-	-	-
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	-	-	-	-
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	<1	<1	<1
55	87-61-6	1,2,3-Trichlorobenzene	0.7	-	-	-	-

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Volatile Organics by Purge and Trap GC-MS

Peak	CAS No.:			Dam 3	Dam 1	Dam 1	Dam 1
		Date Analysed		16/12/01	16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.	MDL	8D	9D	10D	11D
		Units	µg/litre	µg/litre	µg/litre	µg/litre	µg/litre
1	75-71-8	Dichlorodifluoromethane	0.4	-	-	-	-
2	75-01-4	Vinyl Chloride	0.2	-	-	-	-
3	74-83-9	Bromomethane	0.3	-	-	-	-
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	<4
7	156-60-5	trans-1,2-Dichloroethene	0.3	-	-	-	-
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	-	-	-	-
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	<1	-	-	-
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	2	<1	<1	-
23	79-00-5	1,1,2-Trichloroethane	0.3	-	-	-	-
24	142-28-9	1,3-Dichloropropane	0.2	-	-	-	-
25	127-18-4	Tetrachloroethene	0.2	-	-	-	-
26	124-48-1	Dibromochloromethane	0.3	-	-	-	-
27	106-93-4	1,2-Dibromoethane	0.2	-	-	-	-
28	108-90-7	Chlorobenzene	0.3	-	-	-	-
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-	-	-	-

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Volatile Organics by Purge and Trap GC-MS

		Date Analysed		16/12/01	16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.	MDL	8D	9D	10D	11D
Peak	CAS No.:	Units	µg/litre	µg/litre	µg/litre	µg/litre	µg/litre
30	100-41-4	Ethylbenzene	0.2	<1	-	-	-
31	108-38-3 106-42-3	m,p-Xylene	0.4	<2	-	-	-
32	95-47-6	o-Xylene	0.1	<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	-	-	-	-
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	<1	-	-	-
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	<1	-	-	-
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	-	-	-	-
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	<1	<1	-
55	87-61-6	1,2,3-Trichlorobenzene	0.7	-	-	-	-

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Volatile Organics by Purge and Trap GC-MS

Dam1 Dam3 Dam3 Dam3

		Date Analysed		16/12/01	16/12/01	16/12/01	16/12/01
		Ref no		01-1553	01-1553	01-1553	01-1553
		Sample I.D.	MDL	12D	13D	14D	15D
Peak	CAS No.:	Units	µg/litre	µg/litre	µg/litre	µg/litre	µg/litre
1	75-71-8	Dichlorodifluoromethane	0.4	-	-	-	-
2	75-01-4	Vinyl Chloride	0.2	-	-	-	-
3	74-83-9	Bromomethane	0.3	-	-	-	-
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	<4
7	156-60-5	trans-1,2-Dichloroethene	0.3	-	-	-	-
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	-	-	-	-
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	-	-	-	-
23	79-00-5	1,1,2-Trichloroethane	0.3	-	-	-	-
24	142-28-9	1,3-Dichloropropane	0.2	-	-	-	-
25	127-18-4	Tetrachloroethene	0.2	-	-	-	-
26	124-48-1	Dibromochloromethane	0.3	-	-	-	-
27	106-93-4	1,2-Dibromoethane	0.2	-	-	-	-
28	108-90-7	Chlorobenzene	0.3	-	-	-	-
29	630-20-6	1,1,1,2-Tetrachloroethane	0.2	-	-	-	-

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