ISCOR VANDERBIJLPARK STEEL

ENVIRONMENTAL MASTER PLAN

SPECIALIST REPORT

IDENTIFICATION OF SECONDARY SOURCES OF POLLUTION ENVIRONMENTAL AND HUMAN RISK ASSESSMENT

Volume 2

Dam 10

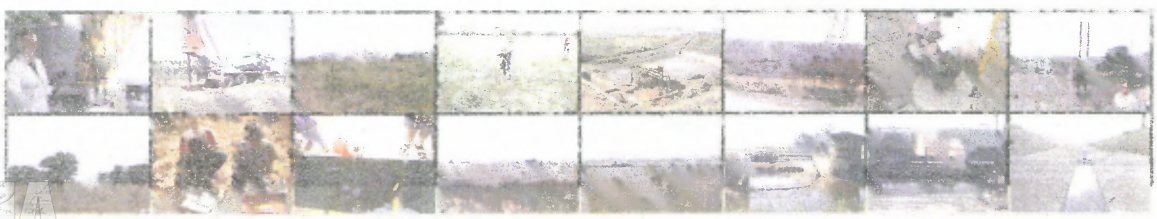
BY

OCKIE FOURIE TOXICOLOGISTS

SERIES IV

DOCUMENT IVS/SR/029(a)

DECEMBER 2002



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ENVIRONMENTAL MASTER PLAN
SPECIALIST REPORT

Identification of Secondary Sources of Pollution Environmental and Human Risk Assessment

DAM 10

Volume 2 of 5

SERIES IV
SPECIALIST REPORT IVS / SR / 029(a)

DECEMBER 2002

Compiled by:

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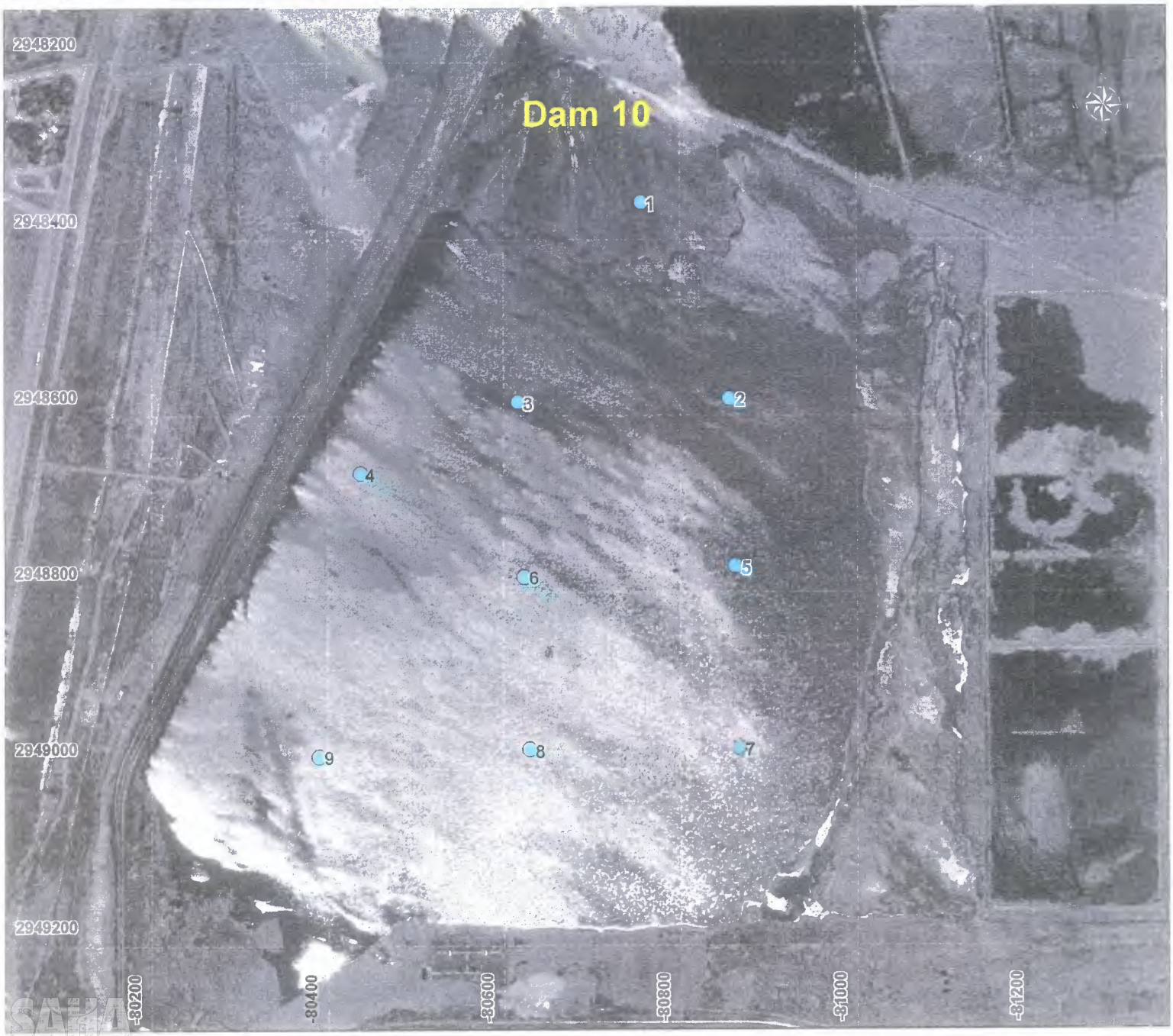

LEGEND

Sampling positions

SCALE 1: 6 000

Client: ISCOR Vanderbijlpark Steel
Project: Secondary Resources of Pollution

Ockie Fourie Toksikoloë

Date: November 2002

FIGURE 1.1

IVS - Dam 10 Sampling Positions

Appendix 1

DAM 10

ENVIRONMENTAL RISK QUANTIFICATION AND HUMAN RISK ASSESSMENT SUMMARY TABLES

FIGURE 1.1

DAM 10: SAMPLING POSITIONS

TABLES 1 - 17

DAM 10: WATERS INORGANIC
ENVIRONMENTAL RISK QUANTIFICATION

Glossary of Abbreviations / Acronyms

[1] Lab Conc. ppm	Laboratory analysis / concentration in parts per million
[2] EEC ppb	Estimated Environmental Concentration in parts per billion
[3] Risk R/AR (Environment)	R - Potential risk to environment AR - Acceptable risk to environment
[4] Probit Model	Risk Model Quantification in percentage (%)
[5] Acc Risk Value (MR/SA) ppb	Acceptable Risk Value according Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (DWAF) in parts per billion (Micro's) AND SA Drinking Water Standards recommended Maximum Guideline Value in parts per billion (Macro's)
[6] Acc. Risk Value RfD/ADI mg/kg/day	Reference Dose (RfD) / Acceptable Daily Intake (ADI) in milligram/kilogram per day: Environmental Protection Agency (EPA) / World Health Organization(WHO) / Republic of South Africa(RSA)
[7] EPA RfD/EPA DWEL/RSA RfD/WHO GV	Potential Daily Intake for a 60/70 kilogram person
[8] Conc. in Dam water ppm	Laboratory analysis / concentration in parts per million
[9] PDI Dam water exposure	Potential Daily Intake for a 60 kilogram person through oral route (dam water) exposure
[10] Margin of Safety %	Potential Daily Intake (PDI) as a percentage of Acceptable Daily Intake (ADI) = Margin of Safety / Risk
[11] Conc. in River water (EEC) ppb	Estimated concentration in river after release of dam water
[12] PDI river water exposure mg/kg/day	Potential Daily Intake for a 60 kilogram person through oral route (river water) exposure
[13] Conc. in groundwater (EEC) ppb	Worst Case Scenario from dam water to groundwater
[14] PDI groundwater exposure mg/kg/day	Potential Daily Intake for a 60 kilogram person through oral route (groundwater) exposure

Table 1

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 1S (INORGANIC - MICRO'S & MACRO'S)
(ISCOR VANDERBIJLPARK STEEL – MASTER PLAN)

SAMPLE NUMBER: 1S — DAM 10: Current Volume = 670,807 kg/ha/m — Total Volume = 1,085,683 kg/ha/m

COMPOUNDS INORGANICS Micro's and Macro's	[5]Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.042	42	AR	0.00E+00	AR	1.4	AR	0.00E+00	AR	19	AR	0.00E+00	AR	30	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6900	0.052	52	AR	0.00E+00	AR	1.7	AR	0.00E+00	AR	23	AR	0.00E+00	AR	37	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.737	737	AR	0.00E+00	AR	25	AR	0.00E+00	AR	326	AR	0.00E+00	AR	528	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.45	3450	R	6.08E+01	R	115	AR	1.35E-08	AR	1527	R	9.35E+00	R	2472	R	3.53E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.049	49	AR	0.00E+00	AR	1.6	AR	0.00E+00	AR	22	AR	0.00E+00	AR	35	AR	0.00E+00	AR
Selenium as Se	260	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.22	220	AR	7.25E-10	AR	7.3	AR	0.00E+00	AR	97	AR	2.22E-14	AR	158	AR	1.14E-11	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.309	309	AR	7.02E-08	AR	10.3	AR	0.00E+00	AR	137	AR	3.19E-12	AR	221	AR	1.30E-09	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1235	1235000	R	8.41E+00	R	41167	AR	3.44E-13	AR	546775	R	1.49E-01	R	884940	R	2.12E+00	R
Fluoride as F	1500	8.4	8400	R	1.29E+01	R	280	AR	1.73E-12	AR	3719	R	3.21E-01	R	6019	R	3.72E+00	R
Magnesium as Mg	70000	80	80000	R	1.13E-03	R	2667	AR	0.00E+00	AR	35419	AR	3.31E-07	AR	57324	AR	5.22E-05	AR
Potassium as K	200000	94	94000	AR	1.44E-07	AR	3133	AR	0.00E+00	AR	41617	AR	7.01E-12	AR	67356	AR	2.86E-09	AR
Sodium as Na	100000	366	366000	R	2.48E+00	R	12200	AR	1.11E-14	AR	162040	R	1.88E-02	R	262258	R	4.45E-01	R
Sulphate as SO_4	200000	1019	1019000	R	9.38E+00	R	33967	AR	5.11E-13	AR	451145	R	1.81E-01	R	730165	R	2.45E+00	R
Boron as B	17000	0.95	950	AR	0.00E+00	AR	32	AR	0.00E+00	AR	421	AR	0.00E+00	AR	681	AR	0.00E+00	AR
Nitrate as N	3000	1.2	1200	AR	2.22E-14	AR	40	AR	0.00E+00	AR	531	AR	0.00E+00	AR	860	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT		R				R						R		R		R		R

Draft for discussion
CONFIDENTIAL
Research for IVS

Table 2

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO. 2S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 2S

COMPOUNDS INORGANICS Micro's and Macro's	[5] [illegible] Risk Value (WHO/SA) 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 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
Aluminium as Al	[illegible]	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7500	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	11	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.049	49	AR	0.00E+00	AR	1.6	AR	0.00E+00	AR	22	AR	0.00E+00	AR	35	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	5900	0.051	51	AR	0.00E+00	AR	1.7	AR	0.00E+00	AR	23	AR	0.00E+00	AR	37	AR	0.00E+00	AR
Copper as Cu	400	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	[illegible]	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.752	752	AR	0.00E+00	AR	25	AR	0.00E+00	AR	333	AR	0.00E+00	AR	539	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.48	3480	R	6.14E+01	R	116	AR	1.49E-08	AR	1541	R	9.65E+00	R	2494	R	3.59E+01	R
Mercury as Hg	2.4	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Selenium as Se	200	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.20	200	AR	2.23E-10	AR	6.7	AR	0.00E+00	AR	89	AR	1.11E-14	AR	143	AR	3.18E-12	AR
Vanadium as V	[illegible]	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.314	314	AR	8.44E-08	AR	10.5	AR	0.00E+00	AR	139	AR	3.84E-12	AR	225	AR	1.62E-09	AR
Calcium as Ca	150000	579	579000	R	3.14E+00	R	19300	AR	1.11E-14	AR	256342	R	2.78E-02	R	414883	R	6.01E-01	R
Chloride as Cl	250000	1235	1235000	R	8.41E+00	R	41167	AR	3.44E-13	AR	546775	R	1.49E-01	R	884940	R	2.12E+00	R
Fluoride as F	1500	7.7	7700	R	9.63E+00	R	257	AR	5.77E-13	AR	3409	R	1.89E-01	R	5517	R	2.53E+00	R
Magnesium as Mg	70000	84	84000	R	1.72E-03	R	2800	AR	0.00E+00	AR	37190	AR	5.70E-07	AR	60190	AR	8.38E-05	AR
Potassium as K	[illegible]	94	94000	AR	1.44E-07	AR	3133	AR	0.00E+00	AR	41617	AR	7.01E-12	AR	67356	AR	2.86E-09	AR
Sodium as Na	100000	362	362000	R	2.35E+00	R	12067	AR	1.11E-14	AR	160269	R	1.73E-02	R	259391	R	4.18E-01	R
Sulphate as SO_4	200000	1048	1048000	R	1.03E+01	R	34933	AR	7.33E-13	AR	463984	R	2.15E-01	R	750945	R	2.78E+00	R
Boron as B	[illegible]	0.72	720	AR	0.00E+00	AR	24	AR	0.00E+00	AR	319	AR	0.00E+00	AR	516	AR	0.00E+00	AR
Nitrate as N	[illegible]	1.2	1200	AR	2.22E-14	AR	40	AR	0.00E+00	AR	531	AR	0.00E+00	AR	860	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 3

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 2D [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPAR STEEL – MASTER PLAN]

SAMPLE NUMBER: 2D

COMPOUNDS INORGANICS Micro's and Macro's	Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	1000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	250	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7000	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.061	61	AR	0.00E+00	AR	2.0	AR	0.00E+00	AR	27	AR	0.00E+00	AR	44	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6500	0.045	45	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	32	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	8.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.728	728	AR	0.00E+00	AR	24	AR	0.00E+00	AR	322	AR	0.00E+00	AR	522	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.43	3430	R	6.03E+01	R	114	AR	1.22E-08	AR	1519	R	9.18E+00	R	2458	R	3.49E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Selenium as Se	250	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.18	180	AR	5.95E-11	AR	6.0	AR	0.00E+00	AR	80	AR	0.00E+00	AR	129	AR	8.44E-13	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.316	316	AR	9.08E-08	AR	11	AR	0.00E+00	AR	140	AR	4.22E-12	AR	226	AR	1.71E-09	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1211	1211000	R	7.83E+00	R	40367	AR	2.67E-13	AR	536149	R	1.31E-01	R	867743	R	1.93E+00	R
Fluoride as F	1500	7.5	7500	R	8.78E+00	R	250	AR	4.00E-13	AR	3320	R	1.60E-01	R	5374	R	2.24E+00	R
Magnesium as Mg	70000	83	83000	R	1.55E-03	R	2767	AR	0.00E+00	AR	36747	AR	4.99E-07	AR	59474	AR	7.47E-05	AR
Potassium as K	200000	92	92000	AR	1.13E-07	AR	3067	AR	0.00E+00	AR	40731	AR	5.32E-12	AR	65923	AR	2.20E-09	AR
Sodium as Na	100000	366	366000	R	2.48E+00	R	12200	AR	1.11E-14	AR	162040	R	1.88E-02	R	262258	R	4.45E-01	R
Sulphate as SO_4	200000	1039	1039000	R	1.00E+01	R	34633	AR	6.55E-13	AR	459999	R	2.04E-01	R	744496	R	2.67E+00	R
Boron as B	1000	0.46	460	AR	0.00E+00	AR	15	AR	0.00E+00	AR	204	AR	0.00E+00	AR	330	AR	0.00E+00	AR
Nitrate as N	6500	1.1	1100	AR	1.11E-14	AR	37	AR	0.00E+00	AR	487	AR	0.00E+00	AR	788	AR	0.00E+00	AR
[5]RISK ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 4

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 3S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 3S

COMPOUNDS INORGANICS Micro's and Macro's	[5] Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.060	60	AR	0.00E+00	AR	2.0	AR	0.00E+00	AR	27	AR	0.00E+00	AR	43	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6900	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.674	674	AR	0.00E+00	AR	23	AR	0.00E+00	AR	298	AR	0.00E+00	AR	483	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.38	3380	R	5.92E+01	R	113	AR	1.10E-08	AR	1496	R	8.69E+00	R	2422	R	3.38E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.043	43	AR	0.00E+00	AR	1.4	AR	0.00E+00	AR	19	AR	0.00E+00	AR	31	AR	0.00E+00	AR
Selenium as Se	260	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.21	210	AR	4.08E-10	AR	7.0	AR	0.00E+00	AR	93	AR	1.11E-14	AR	150	AR	5.85E-12	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	[illegible]	0.304	304	AR	5.81E-08	AR	10.1	AR	0.00E+00	AR	135	AR	2.64E-12	AR	218	AR	1.10E-09	AR
Calcium as Ca	[illegible]	583	583000	R	3.24E+00	R	19433	AR	1.11E-14	AR	258113	R	2.92E-02	R	417749	R	6.24E-01	R
Chloride as Cl	250000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.4	7400	R	8.37E+00	R	247	AR	3.44E-13	AR	3276	R	1.47E-01	R	5302	R	2.11E+00	R
Magnesium as Mg	[illegible]	81	81000	R	1.26E-03	R	2700	AR	0.00E+00	AR	35861	AR	3.80E-07	AR	58041	AR	5.89E-05	AR
Potassium as K	[illegible]	94	94000	AR	1.44E-07	AR	3133	AR	0.00E+00	AR	41617	AR	7.01E-12	AR	67356	AR	2.86E-09	AR
Sodium as Na	100000	373	373000	R	2.70E+00	R	12433	AR	1.11E-14	AR	165139	R	2.16E-02	R	267273	R	4.96E-01	R
Sulphate as SO_4	200000	1072	1072000	R	1.12E+01	R	35733	AR	9.88E-13	AR	474609	R	2.47E-01	R	768142	R	3.07E+00	R
Boron as B	[illegible]	0.58	580	AR	0.00E+00	AR	19	AR	0.00E+00	AR	257	AR	0.00E+00	AR	416	AR	0.00E+00	AR
Nitrate as N	[illegible]	1.1	1100	AR	1.11E-14	AR	37	AR	0.00E+00	AR	487	AR	0.00E+00	AR	788	AR	0.00E+00	AR
RISK ACCEPTABLE/NOT TO: ENVIRONMENT		R		R				AR		AR		R		R		R		R

Table 5

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO. 30 [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 30

COMPOUNDS INORGANICS Micro's and Macro's	[5] Acc. RQA Value (MRASA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.063	63	AR	0.00E+00	AR	2.1	AR	0.00E+00	AR	28	AR	0.00E+00	AR	45	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	5900	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.1	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.652	652	AR	0.00E+00	AR	22	AR	0.00E+00	AR	289	AR	0.00E+00	AR	467	AR	0.00E+00	AR
Lead as Pb	180	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.43	3430	R	6.03E+01	R	114	AR	1.22E-08	AR	1519	R	9.18E+00	R	2458	R	3.49E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.041	41	AR	0.00E+00	AR	1.4	AR	0.00E+00	AR	18	AR	0.00E+00	AR	29	AR	0.00E+00	AR
Selenium as Se	250	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.22	220	AR	7.25E-10	AR	7.3	AR	0.00E+00	AR	97	AR	2.22E-14	AR	158	AR	1.14E-11	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.288	288	AR	3.10E-08	AR	9.6	AR	0.00E+00	AR	128	AR	1.33E-12	AR	206	AR	5.50E-10	AR
Calcium as Ca	150000	583	583000	R	3.24E+00	R	19433	AR	1.11E-14	AR	258113	R	2.92E-02	R	417749	R	6.24E-01	R
Chloride as Cl	250000	1235	1235000	R	8.41E+00	R	41167	AR	3.44E-13	AR	546775	R	1.49E-01	R	884940	R	2.12E+00	R
Fluoride as F	1500	7.5	7500	R	8.78E+00	R	250	AR	4.00E-13	AR	3320	R	1.60E-01	R	5374	R	2.24E+00	R
Magnesium as Mg	70000	81	81000	R	1.26E-03	R	2700	AR	0.00E+00	AR	35861	AR	3.80E-07	AR	58041	AR	5.89E-05	AR
Potassium as K	200000	93	93000	AR	1.27E-07	AR	3100	AR	0.00E+00	AR	41174	AR	6.11E-12	AR	66639	AR	2.51E-09	AR
Sodium as Na	100000	367	367000	R	2.51E+00	R	12233	AR	1.11E-14	AR	162483	R	1.92E-02	R	262974	R	4.52E-01	R
Sulphate as SO_4	2[illegible]000	1048	1048000	R	1.03E+01	R	34933	AR	7.33E-13	AR	463984	R	2.15E-01	R	750945	R	2.78E+00	R
Boron as B	17000	0.71	710	AR	0.00E+00	AR	24	AR	0.00E+00	AR	314	AR	0.00E+00	AR	509	AR	0.00E+00	AR
Nitrate as N	9000	1.2	1200	AR	2.22E-14	AR	40	AR	0.00E+00	AR	531	AR	0.00E+00	AR	860	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 6

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 4S [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 4S

COMPOUNDS INORGANICS Micro's and Macro's	[6] Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.065	65	AR	0.00E+00	AR	2.2	AR	0.00E+00	AR	29	AR	0.00E+00	AR	47	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	3400	0.041	41	AR	0.00E+00	AR	1.4	AR	0.00E+00	AR	18	AR	0.00E+00	AR	29	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.2	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.664	664	AR	0.00E+00	AR	22	AR	0.00E+00	AR	294	AR	0.00E+00	AR	476	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.44	3440	R	6.05E+01	R	115	AR	1.35E-08	AR	1523	R	9.26E+00	R	2465	R	3.51E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1130	0.040	40	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	18	AR	0.00E+00	AR	29	AR	0.00E+00	AR
Selenium as Se	250	< 0.003	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.19	190	AR	1.17E-10	AR	6.3	AR	0.00E+00	AR	84	AR	0.00E+00	AR	136	AR	1.67E-12	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.297	297	AR	4.44E-08	AR	9.9	AR	0.00E+00	AR	131	AR	1.79E-12	AR	213	AR	8.29E-10	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.5	7500	R	8.78E+00	R	250	AR	4.00E-13	AR	3320	R	1.60E-01	R	5374	R	2.24E+00	R
Magnesium as Mg	70000	80	80000	R	1.13E-03	R	2667	AR	0.00E+00	AR	35419	AR	3.31E-07	AR	57324	AR	5.22E-05	AR
Potassium as K	200000	93	93000	AR	1.27E-07	AR	3100	AR	0.00E+00	AR	41174	AR	6.11E-12	AR	66639	AR	2.51E-09	AR
Sodium as Na	400000	363	363000	R	2.38E+00	R	12100	AR	1.11E-14	AR	160712	R	1.77E-02	R	260108	R	4.25E-01	R
Sulphate as SO_4	200000	1058	1058000	R	1.07E+01	R	35267	AR	8.33E-13	AR	468411	R	2.28E-01	R	758111	R	2.90E+00	R
Boron as B	17000	0.75	750	AR	0.00E+00	AR	25	AR	0.00E+00	AR	332	AR	0.00E+00	AR	537	AR	0.00E+00	AR
Nitrate as N	9000	1.1	1100	AR	1.11E-14	AR	37	AR	0.00E+00	AR	487	AR	0.00E+00	AR	788	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT		R		R			AR		AR		R		R		R		R	

Table 7

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 4 [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 4

COMPOUNDS INORGANICS Micro's and Macro's	[5] Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium $^{3+}$ as Cr^{3+}	4700	0.068	68	AR	0.00E+00	AR	2.3	AR	0.00E+00	AR	30	AR	0.00E+00	AR	49	AR	0.00E+00	AR
Chromium $^{6+}$ as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6900	0.039	39	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	17	AR	0.00E+00	AR	28	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.671	671	AR	0.00E+00	AR	22	AR	0.00E+00	AR	297	AR	0.00E+00	AR	481	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.45	3450	R	6.08E+01	R	115	AR	1.35E-08	AR	1527	R	9.35E+00	R	2472	R	3.53E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Selenium as Se	260	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.21	210	AR	4.08E-10	AR	7.0	AR	0.00E+00	AR	93	AR	1.11E-14	AR	150	AR	5.85E-12	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.290	290	AR	3.36E-08	AR	9.7	AR	0.00E+00	AR	128	AR	1.33E-12	AR	208	AR	6.19E-10	AR
Calcium as Ca	150000	583	583000	R	3.24E+00	R	19433	AR	1.11E-14	AR	258113	R	2.92E-02	R	417749	R	6.24E-01	R
Chloride as Cl	250000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.1	7100	R	7.19E+00	R	237	AR	2.00E-13	AR	3143	R	1.13E-01	R	5088	R	1.73E+00	R
Magnesium as Mg	70000	81	81000	R	1.26E-03	R	2700	AR	0.00E+00	AR	35861	AR	3.80E-07	AR	58041	AR	5.89E-05	AR
Potassium as K	200000	92	92000	AR	1.13E-07	AR	3067	AR	0.00E+00	AR	40731	AR	5.32E-12	AR	65923	AR	2.20E-09	AR
Sodium as Na	100000	374	374000	R	2.73E+00	R	12467	AR	1.11E-14	AR	165582	R	2.20E-02	R	267990	R	5.03E-01	R
Sulphate as SO_4	200000	1053	1053000	R	1.05E+01	R	35100	AR	7.77E-13	AR	466197	R	2.21E-01	R	754528	R	2.84E+00	R
Boron as B	17000	0.75	750	AR	0.00E+00	AR	25	AR	0.00E+00	AR	332	AR	0.00E+00	AR	537	AR	0.00E+00	AR
Nitrate as N	9000	1.1	1100	AR	1.11E-14	AR	37	AR	0.00E+00	AR	487	AR	0.00E+00	AR	788	AR	0.00E+00	AR
RISK ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 8

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 5S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 5S

COMPOUNDS INORGANICS Micro's and Macro's	[5] Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	11	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4800	0.038	38	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	17	AR	0.00E+00	AR	27	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6500	0.038	38	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	17	AR	0.00E+00	AR	27	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.1	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	90000	0.920	920	AR	0.00E+00	AR	31	AR	0.00E+00	AR	407	AR	0.00E+00	AR	659	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	5000	3.22	3220	R	5.55E+01	R	107	AR	5.71E-09	AR	1426	R	7.30E+00	R	2307	R	3.04E+01	R
Mercury as Hg	2.2	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	7140	0.044	44	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	19	AR	0.00E+00	AR	32	AR	0.00E+00	AR
Selenium as Se	200	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.22	220	AR	7.25E-10	AR	7.3	AR	0.00E+00	AR	97	AR	2.22E-14	AR	158	AR	1.14E-11	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	400	0.341	341	AR	2.16E-07	AR	11.4	AR	0.00E+00	AR	151	AR	1.11E-11	AR	244	AR	4.33E-09	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	50000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.6	7600	R	9.20E+00	R	253	AR	4.66E-13	AR	3365	R	1.75E-01	R	5446	R	2.39E+00	R
Magnesium as Mg	70000	83	83000	R	1.55E-03	R	2767	AR	0.00E+00	AR	36747	AR	4.99E-07	AR	59474	AR	7.47E-05	AR
Potassium as K	200000	93	93000	AR	1.27E-07	AR	3100	AR	0.00E+00	AR	41174	AR	6.11E-12	AR	66639	AR	2.51E-09	AR
Sodium as Na	100000	359	359000	R	2.26E+00	R	11967	AR	0.00E+00	AR	158941	R	1.63E-02	R	257242	R	3.98E-01	R
Sulphate as SO_4	200000	1048	1048000	R	1.03E+01	R	34933	AR	7.33E-13	AR	463984	R	2.15E-01	R	750945	R	2.78E+00	R
Boron as B	4500	0.80	800	AR	0.00E+00	AR	27	AR	0.00E+00	AR	354	AR	0.00E+00	AR	573	AR	0.00E+00	AR
Nitrate as N	30000	1.2	1200	AR	2.22E-14	AR	40	AR	0.00E+00	AR	531	AR	0.00E+00	AR	860	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

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Research for IVS

Table 9

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO. 5 [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 5

COMPOUNDS INORGANICS Micro's and Macro's	[5] Max Risk Value (MISSA) ppb	RISK TO ENVIRONMENT: RISK OF DAM WATER AS IS — TOTAL ANALYSIS: [1] Lab Conc. ppm	[2] EEC ppb	[3] Risk R / AR	[4] PROBIT MODEL: Risk Quantification %	[3] Risk R / AR	RISK OF DILUTED DAM WATER IN RIVER — DILUTED WATER: [2] EEC ppb	[3] Risk R / AR	[4] PROBIT MODEL: Risk Quantification %	[3] Risk R / AR	RISK OF DAM WATER FOR GROUNDWATER — CURRENT VOLUME: [2] EEC ppb	[3] Risk R / AR	[4] PROBIT MODEL: Risk Quantification %	[3] Risk R / AR	TOTAL VOLUME: [2] EEC ppb	[3] Risk R / AR	[4] PROBIT MODEL: Risk Quantification %	[3] Risk R / AR
Aluminium as Al	10000	<0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	<0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7000	<0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	<0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium[3+] as Cr^{3+}	4700	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Chromium[6+] as Cr^{6+}	20	<0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	[illegible]	0.033	33	AR	0.00E+00	AR	1.1	AR	0.00E+00	AR	15	AR	0.00E+00	AR	24	AR	0.00E+00	AR
Copper as Cu	100	<0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.3	<0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.679	679	AR	0.00E+00	AR	23	AR	0.00E+00	AR	301	AR	0.00E+00	AR	487	AR	0.00E+00	AR
Lead as Pb	100	<0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.16	3160	R	5.40E+01	R	105	AR	4.55E-09	AR	1399	R	6.80E+00	R	2264	R	2.91E+01	R
Mercury as Hg	22	<0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.046	46	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	33	AR	0.00E+00	AR
Selenium as Se	300	<0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.23	230	AR	1.25E-09	AR	7.7	AR	0.00E+00	AR	102	AR	4.44E-14	AR	165	AR	1.98E-11	AR
Vanadium as V	1300	<0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	280	0.286	286	AR	2.86E-08	AR	9.5	AR	0.00E+00	AR	127	AR	1.20E-12	AR	205	AR	5.18E-10	AR
Calcium as Ca	150000	585	585000	R	3.29E+00	R	19500	AR	1.11E-14	AR	258999	R	2.99E-02	R	419182	R	6.36E-01	R
Chloride as Cl	250000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.8	7800	R	1.01E+01	R	260	AR	6.66E-13	AR	3453	R	2.05E-01	R	5589	R	2.68E+00	R
Magnesium as Mg	70000	78	78000	R	9.07E-04	R	2600	AR	0.00E+00	AR	34533	AR	2.49E-07	AR	55891	AR	4.07E-05	AR
Potassium as K	200000	92	92000	AR	1.13E-07	AR	3067	AR	0.00E+00	AR	40731	AR	5.32E-12	AR	65923	AR	2.20E-09	AR
Sodium as Na	100000	364	364000	R	2.41E+00	R	12133	AR	1.11E-14	AR	161155	R	1.80E-02	R	260824	R	4.31E-01	R
Sulphate as SO_4	200000	1063	1063000	R	1.08E+01	R	35433	AR	8.88E-13	AR	470625	R	2.35E-01	R	761693	R	2.96E+00	R
Boron as B	17000	0.69	690	AR	0.00E+00	AR	23	AR	0.00E+00	AR	305	AR	0.00E+00	AR	494	AR	0.00E+00	AR
Nitrate as N	9000	0.9	900	AR	0.00E+00	AR	30	AR	0.00E+00	AR	398	AR	0.00E+00	AR	645	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 10

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMLE NO. 6S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 6S

COMPOUNDS INORGANICS Micro's and Macro's	[5] Risk Value ppb	RISK TO ENVIRONMENT: RISK OF DAM WATER AS IS — TOTAL ANALYSIS			PROBIT MODEL [4]		RISK OF DILUTED DAM WATER IN RIVER — DILUTED WATER		PROBIT MODEL [4]		RISK OF DAM WATER FOR GROUNDWATER — CURRENT VOLUME		PROBIT MODEL [4]		TOTAL VOLUME		PROBIT MODEL [4]	
		[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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7300	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.058	58	AR	0.00E+00	AR	1.9	AR	0.00E+00	AR	26	AR	0.00E+00	AR	42	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	3000	0.030	30	AR	0.00E+00	AR	1.0	AR	0.00E+00	AR	13	AR	0.00E+00	AR	21	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	5000	0.713	713	AR	0.00E+00	AR	24	AR	0.00E+00	AR	316	AR	0.00E+00	AR	511	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.34	3340	R	5.83E+01	R	111	AR	8.85E-09	AR	1479	R	8.35E+00	R	2393	R	3.29E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.039	39	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	22	AR	0.00E+00	AR	35	AR	0.00E+00	AR
Selenium as Se	265	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.230	230	AR	1.25E-09	AR	7.7	AR	0.00E+00	AR	102	AR	4.44E-14	AR	165	AR	1.98E-11	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	760	0.270	270	AR	1.45E-08	AR	9.0	AR	0.00E+00	AR	120	AR	5.77E-13	AR	193	AR	2.45E-10	AR
Calcium as Ca	[illegible]	585	585000	R	3.29E+00	R	19500	AR	1.11E-14	AR	258999	R	2.99E-02	R	419182	R	6.36E-01	R
Chloride as Cl	250000	1235	1235000	R	8.41E+00	R	41167	AR	3.44E-13	AR	546775	R	1.49E-01	R	884940	R	2.12E+00	R
Fluoride as F	1500	7.1	7100	R	7.19E+00	R	237	AR	2.00E-13	AR	3143	R	1.13E-01	R	5088	R	1.73E+00	R
Magnesium as Mg	70000	79	79000	R	1.01E-03	R	2633	AR	0.00E+00	AR	34976	AR	2.87E-07	AR	56608	AR	4.62E-05	AR
Potassium as K	200000	92	92000	AR	1.13E-07	AR	3067	AR	0.00E+00	AR	40731	AR	5.32E-12	AR	65923	AR	2.20E-09	AR
Sodium as Na	100000	366	366000	R	2.48E+00	R	12200	AR	1.11E-14	AR	162040	R	1.68E-02	R	262258	R	4.45E-01	R
Sulphate as SO_4	200000	1087	1087000	R	1.17E+01	R	36233	AR	1.18E-12	AR	481250	R	2.39E-01	R	778891	R	3.27E+00	R
Boron as B	17000	0.66	660	AR	0.00E+00	AR	22	AR	0.00E+00	AR	292	AR	0.00E+00	AR	473	AR	0.00E+00	AR
Nitrate as N	9000	1.1	1100	AR	1.11E-14	AR	37	AR	0.00E+00	AR	487	AR	0.00E+00	AR	788	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 11

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 6D [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 6D

COMPOUNDS INORGANICS Micro's and Macro's	[6] Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.084	84	AR	0.00E+00	AR	2.8	AR	0.00E+00	AR	37	AR	0.00E+00	AR	60	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6900	0.028	28	AR	0.00E+00	AR	0.90	AR	0.00E+00	AR	12	AR	0.00E+00	AR	20	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	5300	2.01	2010	AR	1.73E-11	AR	67	AR	0.00E+00	AR	890	AR	0.00E+00	AR	1440	AR	2.33E-13	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.26	3260	R	5.65E+01	R	109	AR	7.12E-09	AR	1443	R	7.63E+00	R	2336	R	3.12E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.038	38	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	17	AR	0.00E+00	AR	27	AR	0.00E+00	AR
Selenium as Se	260	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.27	270	AR	8.67E-09	AR	9.0	AR	0.00E+00	AR	120	AR	3.33E-13	AR	193	AR	1.43E-10	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.411	411	AR	1.70E-06	AR	13.7	AR	0.00E+00	AR	182	AR	1.18E-10	AR	295	AR	4.10E-08	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1235	1235000	R	8.41E+00	R	41167	AR	3.44E-13	AR	546775	R	1.49E-01	R	884940	R	2.12E+00	R
Fluoride as F	1500	7.8	7800	R	1.01E+01	R	260	AR	6.66E-13	AR	3453	R	2.05E-01	R	5589	R	2.68E+00	R
Magnesium as Mg	70000	83	83000	R	1.55E-03	R	2767	AR	0.00E+00	AR	36747	AR	4.99E-07	AR	59474	AR	7.47E-05	AR
Potassium as K	200000	92	92000	AR	1.13E-07	AR	3067	AR	0.00E+00	AR	40731	AR	5.32E-12	AR	65923	AR	2.20E-09	AR
Sodium as Na	100000	370	370000	R	2.60E+00	R	12333	AR	1.11E-14	AR	163811	R	2.04E-02	R	265124	R	4.74E-01	R
Sulphate as SO_4	200000	1063	1063000	R	1.08E+01	R	35433	AR	8.88E-13	AR	470625	R	2.35E-01	R	761693	R	2.96E+00	R
Boron as B	17000	0.67	670	AR	0.00E+00	AR	22	AR	0.00E+00	AR	297	AR	0.00E+00	AR	480	AR	0.00E+00	AR
Nitrate as N	9000	1.6	1600	AR	9.22E-13	AR	53	AR	0.00E+00	AR	708	AR	0.00E+00	AR	1146	AR	1.11E-14	AR
RISK ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 12

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 7S [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJL – MASTER PLAN]

SAMPLE NUMBER: 7S

COMPOUNDS INORGANICS Micro's and Macro's	[5] Risk Value (WRSA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7300	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.053	53	AR	0.00E+00	AR	1.8	AR	0.00E+00	AR	23	AR	0.00E+00	AR	38	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	26	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	9000	0.026	26	AR	0.00E+00	AR	0.87	AR	0.00E+00	AR	12	AR	0.00E+00	AR	19	AR	0.00E+00	AR
Copper as Cu	100	< 0.026	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	6.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.734	734	AR	0.00E+00	AR	24	AR	0.00E+00	AR	325	AR	0.00E+00	AR	526	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	500	3.36	3360	R	5.88E+01	R	112	AR	9.85E-09	AR	1488	R	8.63E+00	R	2408	R	3.34E+01	R
Mercury as Hg	22	< 0.003	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.038	38	AR	0.00E+00	AR	1.3	AR	0.00E+00	AR	17	AR	0.00E+00	AR	27	AR	0.00E+00	AR
Selenium as Se	260	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.230	230	AR	1.25E-09	AR	7.7	AR	0.00E+00	AR	102	AR	4.44E-14	AR	165	AR	1.98E-11	AR
Vanadium as V	6.13	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.280	280	AR	2.23E-08	AR	9.3	AR	0.00E+00	AR	124	AR	8.77E-13	AR	201	AR	4.06E-10	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1211	1211000	R	7.83E+00	R	40367	AR	2.67E-13	AR	536149	R	1.31E-01	R	867743	R	1.93E+00	R
Fluoride as F	1500	7.4	7400	R	8.37E+00	R	247	AR	3.44E-13	AR	3276	R	1.47E-01	R	5302	R	2.11E+00	R
Magnesium as Mg	70000	81	81000	R	1.26E-03	R	2700	AR	0.00E+00	AR	35861	AR	3.80E-07	AR	58041	AR	5.89E-05	AR
Potassium as K	20000	91	91000	AR	9.94E-08	AR	3033	AR	0.00E+00	AR	40289	AR	4.62E-12	AR	65206	AR	1.93E-09	AR
Sodium as Na	100000	369	369000	R	2.57E+00	R	12300	AR	1.11E-14	AR	163368	R	2.00E-02	R	264407	R	4.66E-01	R
Sulphate as SO_4	200000	1039	1039000	R	1.00E+01	R	34633	AR	6.55E-13	AR	459999	R	2.04E-01	R	744493	R	2.67E+00	R
Boron as B	17000	0.71	710	AR	0.00E+00	AR	24	AR	0.00E+00	AR	314	AR	0.00E+00	AR	509	AR	0.00E+00	AR
Nitrate as N	9000	4.4	4400	AR	2.25E-07	AR	147	AR	0.00E+00	AR	1948	AR	1.16E-11	AR	3153	AR	4.60E-09	AR
RISK ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 13

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 7 [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 7

COMPOUNDS INORGANICS Micro's and Macro's	[5] Risk Value (SANSA) ppb	RISK TO ENVIRONMENT: RISK OF DAM WATER AS IS — TOTAL ANALYSIS			[4] PROBIT MODEL		RISK OF DILUTED DAM WATER IN RIVER — DILUTED WATER		[4] PROBIT MODEL		RISK OF DAM WATER FOR GROUNDWATER — CURRENT VOLUME		[4] PROBIT MODEL		TOTAL VOLUME		[4] 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	130	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7300	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.832	832	AR	8.77E-13	AR	28	AR	0.00E+00	AR	368	AR	0.00E+00	AR	596	AR	1.11E-14	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	5000	0.054	54	AR	0.00E+00	AR	1.8	AR	0.00E+00	AR	24	AR	0.00E+00	AR	39	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.5	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	34	34000	R	2.86E+00	R	1133	AR	1.11E-14	AR	15053	R	2.37E-02	R	24363	R	5.33E-01	R
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	4.35	4350	R	7.66E+01	R	145	AR	1.98E-07	AR	1926	R	1.93E+01	R	3117	R	5.30E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.085	85	AR	0.00E+00	AR	2.8	AR	0.00E+00	AR	38	AR	0.00E+00	AR	61	AR	0.00E+00	AR
Selenium as Se	260	0.006	6.00	AR	0.00E+00	AR	0.20	AR	0.00E+00	AR	2.7	AR	0.00E+00	AR	4.3	AR	0.00E+00	AR
Titanium as Ti	731	0.39	390	AR	5.97E-07	AR	13	AR	0.00E+00	AR	173	AR	3.60E-11	AR	279	AR	1.28E-08	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	3.08	3080	R	5.43E+00	R	103	AR	7.77E-14	AR	1364	R	6.96E-02	R	2207	R	1.20E+00	R
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.8	7800	R	1.01E+01	R	260	AR	6.66E-13	AR	3453	R	2.05E-01	R	5589	R	2.68E+00	R
Magnesium as Mg	70000	83	83000	R	1.55E-03	R	2767	AR	0.00E+00	AR	36747	AR	4.99E-07	AR	59474	AR	7.47E-05	AR
Potassium as K	200000	91	91000	AR	9.94E-08	AR	3033	AR	0.00E+00	AR	40289	AR	4.62E-12	AR	65206	AR	1.93E-09	AR
Sodium as Na	100000	390	390000	R	3.29E+00	R	13000	AR	1.11E-14	AR	172666	R	2.99E-02	R	279455	R	6.36E-01	R
Sulphate as SO_4	200000	1058	1058000	R	1.07E+01	R	35267	AR	8.33E-13	AR	468411	R	2.28E-01	R	758111	R	2.90E+00	R
Boron as B	17000	0.38	380	AR	0.00E+00	AR	13	AR	0.00E+00	AR	168	AR	0.00E+00	AR	272	AR	0.00E+00	AR
Nitrate as N	9000	3.9	3900	AR	5.67E-08	AR	30	AR	0.00E+00	AR	1727	AR	2.48E-12	AR	2795	AR	1.07E-09	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 14

DAM 10: ENVIROMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 8S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 8S

COMPOUNDS INORGANICS Micro's and Macro's	[2] Aq. Risk Value (WARSA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	330	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	1800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.055	55	AR	0.00E+00	AR	1.8	AR	0.00E+00	AR	24	AR	0.00E+00	AR	39	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6000	0.041	41	AR	0.00E+00	AR	1.4	AR	0.00E+00	AR	18	AR	0.00E+00	AR	29	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.660	660	AR	0.00E+00	AR	22	AR	0.00E+00	AR	292	AR	0.00E+00	AR	473	AR	0.00E+00	AR
Lead as Pb	130	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.35	3350	R	5.85E+01	R	112	AR	9.85E-09	AR	1483	R	8.43E+00	R	2400	R	3.31E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.048	48	AR	0.00E+00	AR	1.6	AR	0.00E+00	AR	21	AR	0.00E+00	AR	34	AR	0.00E+00	AR
Selenium as Se	200	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.23	230	AR	1.25E-09	AR	7.7	AR	0.00E+00	AR	102	AR	4.44E-14	AR	165	AR	1.98E-11	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.289	289	AR	3.23E-08	AR	9.6	AR	0.00E+00	AR	128	AR	1.33E-12	AR	207	AR	5.84E-10	AR
Calcium as Ca	150000	585	585000	R	3.29E+00	R	19500	AR	1.11E-14	AR	258999	R	2.99E-02	R	419182	R	6.36E-01	R
Chloride as Cl	250000	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	1500	7.6	7600	R	9.20E+00	R	253	AR	4.66E-13	AR	3365	R	1.75E-01	R	5446	R	2.39E+00	R
Magnesium as Mg	70000	78	78000	R	9.07E-04	R	2600	AR	0.00E+00	AR	34533	AR	2.49E-07	AR	55891	AR	4.07E-05	AR
Potassium as K	230000	92	92000	AR	1.13E-07	AR	3067	AR	0.00E+00	AR	40731	AR	5.32E-12	AR	65923	AR	2.20E-09	AR
Sodium as Na	100000	389	389000	R	3.25E+00	R	12967	AR	1.11E-14	AR	172223	R	2.94E-02	R	278738	R	6.27E-01	R
Sulphate as SO_4	350000	1092	1092000	R	1.19E+01	R	36400	AR	1.26E-12	AR	483464	R	2.76E-01	R	782473	R	3.33E+00	R
Boron as B	17000	0.73	730	AR	0.00E+00	AR	24	AR	0.00E+00	AR	323	AR	0.00E+00	AR	523	AR	0.00E+00	AR
Nitrate as N	10000	3.8	3800	AR	4.19E-08	AR	127	AR	0.00E+00	AR	1682	AR	1.77E-12	AR	2723	AR	7.73E-10	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT		R		R		R		AR		AR		R		R		R		R

Table 15

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 8 [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 8

COMPOUNDS INORGANICS Micro's and Macro's	[illegible] 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 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
Aluminium as Al	[illegible]	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	[illegible]	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	[illegible]	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	[illegible]	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	[illegible]	1.96	1960	AR	3.63E-08	AR	65	AR	0.00E+00	AR	868	AR	1.51E-12	AR	1404	AR	6.61E-10	AR
Chromium^{6+} as Cr^{6+}	[illegible]	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	[illegible]	0.056	56	AR	0.00E+00	AR	1.9	AR	0.00E+00	AR	25	AR	0.00E+00	AR	40	AR	0.00E+00	AR
Copper as Cu	[illegible]	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	[illegible]	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	[illegible]	57	57000	R	1.86E+01	R	1900	AR	8.43E-12	AR	25236	R	6.48E-01	R	40843	R	6.13E+00	R
Lead as Pb	[illegible]	1.01	1010	R	5.08E+01	R	34	AR	3.21E-09	AR	2.7	AR	0.00E+00	AR	4.3	AR	0.00E+00	AR
Manganese as Mn	[illegible]	4.87	4870	R	8.28E+01	R	162	AR	6.82E-07	AR	2156	R	2.59E+01	R	3490	R	6.16E+01	R
Mercury as Hg	[illegible]	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	[illegible]	0.091	91	AR	0.00E+00	AR	3.0	AR	0.00E+00	AR	40	AR	0.00E+00	AR	65	AR	0.00E+00	AR
Selenium as Se	[illegible]	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	[illegible]	1.7	1700	R	2.18E-01	R	57	AR	0.00E+00	AR	753	R	4.52E-04	R	1218	R	2.31E-02	R
Vanadium as V	[illegible]	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	[illegible]	18	18000	R	9.68E+01	R	600	AR	8.13E-05	AR	7969	R	6.00E+01	R	12898	R	8.84E+01	R
Calcium as Ca	[illegible]	583	583000	R	3.24E+00	R	19433	AR	1.11E-14	AR	258113	R	2.92E-02	R	417749	R	6.24E-01	R
Chloride as Cl	[illegible]	1223	1223000	R	8.12E+00	R	40767	AR	3.00E-13	AR	541462	R	1.40E-01	R	876342	R	2.03E+00	R
Fluoride as F	[illegible]	7.6	7600	R	9.20E+00	R	253	AR	4.66E-13	AR	3365	R	1.75E-01	R	5446	R	2.39E+00	R
Magnesium as Mg	[illegible]	80	80000	R	1.13E-03	R	2667	AR	0.00E+00	AR	35419	AR	3.31E-07	AR	57324	AR	5.22E-05	AR
Potassium as K	[illegible]	93	93000	AR	1.27E-07	AR	3100	AR	0.00E+00	AR	41174	AR	6.11E-12	AR	66639	AR	2.51E-09	AR
Sodium as Na	[illegible]	357	357000	R	2.21E+00	R	11900	AR	0.00E+00	AR	158056	R	1.56E-02	R	255809	R	3.86E-01	R
Sulphate as SO_4	[illegible]	1043	1043000	R	1.02E+01	R	34767	AR	6.88E-13	AR	461770	R	2.09E-01	R	747362	R	2.72E+00	R
Boron as B	[illegible]	0.79	790	AR	0.00E+00	AR	26	AR	0.00E+00	AR	350	AR	0.00E+00	AR	566	AR	0.00E+00	AR
Nitrate as N	[illegible]	0.9	900	AR	0.00E+00	AR	30	AR	0.00E+00	AR	398	AR	0.00E+00	AR	645	AR	0.00E+00	AR
RISK ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 16

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION • DAM WATER • SAMPLE NO. 9S [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 9S

COMPOUNDS INORGANICS Micro's and Macro's	[6] Acc. Risk Value (MR&SA) 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 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
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	430	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7800	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium^{3+} as Cr^{3+}	4700	0.072	72	AR	0.00E+00	AR	2.4	AR	0.00E+00	AR	32	AR	0.00E+00	AR	52	AR	0.00E+00	AR
Chromium^{6+} as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6900	0.028	28	AR	0.00E+00	AR	0.93	AR	0.00E+00	AR	12	AR	0.00E+00	AR	20	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	6.3	< 0.05	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Iron as Fe	9000	0.580	580	AR	0.00E+00	AR	19.3	AR	0.00E+00	AR	257	AR	0.00E+00	AR	416	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.37	3370	R	5.90E+01	R	112	AR	9.85E-09	AR	1492	R	8.61E+00	R	2415	R	3.36E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.045	45	AR	0.00E+00	AR	1.5	AR	0.00E+00	AR	20	AR	0.00E+00	AR	32	AR	0.00E+00	AR
Selenium as Se	260	0.002	2.00	AR	0.00E+00	AR	0.07	AR	0.00E+00	AR	3.1	AR	0.00E+00	AR	5.0	AR	0.00E+00	AR
Titanium as Ti	431	0.21	210	AR	4.08E-10	AR	7.0	AR	0.00E+00	AR	93	AR	1.11E-14	AR	150	AR	5.85E-12	AR
Vanadium as V	1200	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.257	257	AR	8.07E-09	AR	8.6	AR	0.00E+00	AR	114	AR	3.00E-13	AR	184	AR	1.35E-10	AR
Calcium as Ca	150000	585	585000	R	3.29E+00	R	19500	AR	1.11E-14	AR	258999	R	2.99E-02	R	419182	R	6.36E-01	R
Chloride as Cl	250000	1235	1235000	R	8.41E+00	R	41167	AR	3.44E-13	AR	546775	R	1.49E-01	R	884940	R	2.12E+00	R
Fluoride as F	1500	7.3	7300	R	7.97E+00	R	243	AR	2.78E-13	AR	3232	R	1.35E-01	R	5231	R	1.98E+00	R
Magnesium as Mg	70000	80	80000	R	1.13E-03	R	2667	AR	0.00E+00	AR	35419	AR	3.31E-07	AR	57324	AR	5.22E-05	AR
Potassium as K	300000	93	93000	AR	1.27E-07	AR	3100	AR	0.00E+00	AR	41174	AR	6.11E-12	AR	66639	AR	2.51E-09	AR
Sodium as Na	100000	364	364000	R	2.41E+00	R	12133	AR	1.11E-14	AR	161155	R	1.80E-02	R	260824	R	4.31E-01	R
Sulphate as SO_4	200000	1159	1159000	R	1.43E+01	R	38633	AR	2.70E-12	AR	513127	R	3.92E-01	R	830482	R	4.29E+00	R
Boron as B	17000	0.81	810	AR	0.00E+00	AR	27	AR	0.00E+00	AR	359	AR	0.00E+00	AR	580	AR	0.00E+00	AR
Nitrate as N	9000	1.2	1200	AR	2.22E-14	AR	40	AR	0.00E+00	AR	531	AR	0.00E+00	AR	860	AR	0.00E+00	AR
ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

Table 17

DAM 10: ENVIRONMENTAL RISK QUANTIFICATION ♦ DAM WATER ♦ SAMPLE NO. 9D [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL – MASTER PLAN]

SAMPLE NUMBER: 9D

COMPOUNDS INORGANICS Micro's and Macro's	[5] SANS Risk Value (MRSSA) ppb	RISK TO ENVIRONMENT: RISK OF DAM WATER AS IS – TOTAL ANALYSIS: [1] Lab Conc. ppm	[2] EEC ppb	[3] Risk R / AR	PROBIT MODEL[4]: Risk Quantification %	[3] Risk R / AR	RISK OF DILUTED DAM WATER IN RIVER – DILUTED WATER: [2] EEC ppb	[3] Risk R / AR	PROBIT MODEL[4]: Risk Quantification %	[3] Risk R / AR	RISK OF DAM WATER FOR GROUNDWATER – CURRENT VOLUME: [2] EEC ppb	[3] Risk R / AR	PROBIT MODEL[4]: Risk Quantification %	[3] Risk R / AR	TOTAL VOLUME: [2] EEC ppb	[3] Risk R / AR	PROBIT MODEL[4]: Risk Quantification %	[3] Risk R / AR
Aluminium as Al	10000	< 0.100	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Arsenic as As	450	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Barium as Ba	7000	< 0.10	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cadmium as Cd	31	< 0.010	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Chromium[3+] as Cr^{3+}	4700	0.072	72	AR	0.00E+00	AR	2.4	AR	0.00E+00	AR	32	AR	0.00E+00	AR	52	AR	0.00E+00	AR
Chromium[6+] as Cr^{6+}	20	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cobalt as Co	6900	0.033	33	AR	0.00E+00	AR	1.1	AR	0.00E+00	AR	15	AR	0.00E+00	AR	24	AR	0.00E+00	AR
Copper as Cu	100	< 0.025	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Cyanide as CN	5.3	0.05	50	R	4.55E+01	R	1.70	AR	1.58E-09	AR	22	R	4.29E+00	R	36	R	2.25E+01	R
Iron as Fe	9000	0.732	732	AR	0.00E+00	AR	24	AR	0.00E+00	AR	324	AR	0.00E+00	AR	525	AR	0.00E+00	AR
Lead as Pb	100	< 0.050	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Manganese as Mn	300	3.43	3430	R	6.03E+01	R	114	AR	1.25E-08	AR	1519	R	9.18E+00	R	2458	R	3.49E+01	R
Mercury as Hg	22	< 0.002	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Nickel as Ni	1140	0.043	43	AR	0.00E+00	AR	1.4	AR	0.00E+00	AR	19	AR	0.00E+00	AR	31	AR	0.00E+00	AR
Selenium as Se	260	< 0.005	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Titanium as Ti	731	0.23	230	AR	1.25E-09	AR	7.7	AR	0.00E+00	AR	102	AR	4.44E-14	AR	165	AR	1.98E-11	AR
Vanadium as V	1300	< 0.03	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR	0.00	AR	0.00E+00	AR
Zinc as Zn	700	0.307	307	AR	6.51E-08	AR	10.2	AR	0.00E+00	AR	136	AR	2.91E-12	AR	220	AR	1.23E-09	AR
Calcium as Ca	150000	581	581000	R	3.19E+00	R	19367	AR	1.11E-14	AR	257228	R	2.85E-02	R	416316	R	6.12E-01	R
Chloride as Cl	250000	1211	1211000	R	7.83E+00	R	40367	AR	2.67E-13	AR	536149	R	1.31E-01	R	867743	R	1.93E+00	R
Fluoride as F	1500	7.1	7100	R	7.19E+00	R	237	AR	2.00E-13	AR	3143	R	1.13E-01	R	5088	R	1.73E+00	R
Magnesium as Mg	70000	83	83000	R	1.55E-03	R	2767	AR	0.00E+00	AR	36747	AR	4.99E-07	AR	59474	AR	7.47E-05	AR
Potassium as K	200000	91	91000	AR	9.94E-08	AR	3033	AR	0.00E+00	AR	40289	AR	4.62E-12	AR	65206	AR	1.93E-09	AR
Sodium as Na	100000	358	358000	R	2.24E+00	R	11933	AR	0.00E+00	AR	158498	R	1.59E-02	R	256525	R	3.92E-01	R
Sulphate as SO_4	200000	1058	1058000	R	1.07E+01	R	35267	AR	8.33E-13	AR	468411	R	2.28E-01	R	758111	R	2.90E+00	R
Boron as B	17000	0.73	730	AR	0.00E+00	AR	24	AR	0.00E+00	AR	323	AR	0.00E+00	AR	523	AR	0.00E+00	AR
Nitrate as N	9000	1.3	1300	AR	6.66E-14	AR	43	AR	0.00E+00	AR	576	AR	0.00E+00	AR	932	AR	0.00E+00	AR
RISK / ACCEPTABLE RISK TO: ENVIRONMENT				R		R		AR		AR		R		R		R		R

TABLES 18 – 34

DAM 10: WATERS INORGANIC
HUMAN RISK ASSESSMENT

Table 18

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 1S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 1S

COMPOUNDS INORGANICS Micro's and Macro'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 — [8] Conc. in Dam water ppm	[9] PDI Dam water exposure mg/kg/day	[10] Margin of Safety %	RISK OF DILUTED DAM WATER IN RIVER — [11] Conc. in River water (EEC) ppb	[12] PDI river water exposure mg/kg/day	[10] Margin of Safety %	RISK OF DAM WATER FOR GROUNDWATER — [13] Conc. in groundwater (EEC) ppb	[14] PDI groundwater exposure mg/kg/day	[10] Margin of Safety %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.042	0.0014	0.093	1.4	0.00005	0.003	19	0.0006	0.042
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.052	0.0017	21.7	1.7	0.00006	0.708	23	0.0008	9.68
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.737	0.0246	819	25	0.0008	27.8	326	0.011	362
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.45	0.115	250	115	0.0038	8.33	1527	0.051	111
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.049	0.0016	8.17	1.6	0.00005	0.267	22	0.0007	3.67
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.22	0.0073	244	7.3	0.0002	8.1	97	0.0032	108
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.309	0.0103	3.4	10.3	0.0003	0.11	137	0.0046	1.53
Calcium as Ca	5.0	RSA RfD	581	19.4	387	19367	0.646	12.9	257228	8.57	171
Chloride as Cl	8.3	RSA RfD	1235	41.2	496	41167	1.37	16.5	546775	18.2	220
Fluoride as F	0.06	EPA RfD	8.4	0.28	467	280	0.009	15.6	3719	0.124	207
Magnesium as Mg	2.3	RSA RfD	80	2.67	116	2667	0.089	3.87	35419	1.18	51.3
Potassium as K	6.7	RSA RfD	94	3.13	46.8	3133	0.104	1.56	41617	1.39	20.7
Sodium as Na	3.3	RSA RfD	366	12.2	370	12200	0.407	12.3	162040	5.40	164
Sulphate as SO_4	6.7	RSA RfD	1019	34.0	507	33967	1.13	16.9	451145	15.0	224
Boron as B	0.09	EPA RfD	0.95	0.0317	35.2	31.7	0.0011	1.17	421	0.014	15.6
Nitrate as N	1.6	EPA RfD	1.2	0.04	2.5	40	0.0013	0.08	531	0.018	1.11
RISK / ACCEPTABLE RISK TO: HUMAN				Dam water	R		River water	AR		Groundwater	R

Table 19

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 2S [INORGANIC - MICRO'S & MACRO'S]
[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 2S

COMPDUNDS INORGANICS Micro's and Macro'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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.049	0.0016	0.109	1.6	0.00005	0.0036	22	0.0007	0.049
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.051	0.0017	21.3	1.7	0.00006	0.708	23	0.0008	9.58
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.752	0.025	836	25	0.00084	27.9	333	0.011	370
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.048	EPA RfD	3.48	0.116	252	116	0.0039	8.41	1541	0.051	112
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.046	0.0015	7.67	1.5	0.00005	0.256	20	0.0007	3.3
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.2	0.0067	222	6.7	0.0002	7.44	89	0.0030	99.3
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.314	0.0105	3.49	10.5	0.00035	0.117	139	0.0046	1.54
Calcium as Ca	5.0	RSA RfD	579	19.3	386	19300	0.643	12.9	256342	8.54	171
Chloride as Cl	8.3	RSA RfD	1235	41.2	496	41167	1.37	16.5	546775	18.2	220
Fluoride as F	0.1	EPA RfD	7.7	0.257	428	257	0.0086	14.3	3409	0.114	189
Magnesium as Mg	2.3	RSA RfD	84	2.80	122	2800	0.093	4.06	37190	1.24	54
Potassium as K	0.7	RSA RfD	94	3.13	46.8	3133	0.104	1.56	41617	1.39	20.7
Sodium as Na	3.3	RSA RfD	362	12.1	366	12067	0.402	12.2	160269	5.34	162
Sulphate as SO_4	6.7	RSA RfD	1048	34.9	521	34933	1.16	17.4	463984	15.5	231
Boron as B	0.09	EPA RfD	0.72	0.024	26.7	24	0.0008	0.889	319	0.011	11.8
Nitrate as N	1.6	EPA RfD	1.2	0.040	2.5	40	0.0013	0.083	531	0.018	1.11
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water	AR		Groundwater	R	

Table 20

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 20 [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 20

COMPOUNDS INORGANICS Micro's and Macro's	[6] RfD/ ADI / GV mg/kg/da	[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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.061	0.0020	0.133	2.0	0.00007	0.0044	27	0.0009	0.06
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.050	RSA RfD	0.045	0.0015	18.8	1.5	0.00005	0.625	20	0.0007	8.33
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.728	0.024	809	24	0.0008	26.7	322	0.011	358
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.04	EPA RfD	3.43	0.114	249	114	0.0038	8.20	1519	0.051	110
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.046	0.0015	7.67	1.5	0.00005	0.250	20	0.0007	3.33
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.005	RSA RfD	0.18	0.006	200	6.0	0.0002	6.67	80	0.003	88.9
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.316	0.011	3.81	11	0.0004	0.127	140	0.005	1.59
Calcium as Ca	5.0	RSA RfD	581	19.4	387	19367	0.646	12.9	257228	8.57	171
Chloride as Cl	8.3	RSA RfD	1211	40.4	486	40367	1.35	16.2	536149	17.9	215
Fluoride as F	0.06	EPA RfD	7.5	0.25	417	250	0.0083	13.9	3320	0.11	184
Magnesium as Mg	2.5	RSA RfD	83	2.77	120	2767	0.092	4.01	36747	1.22	53.0
Potassium as K	6.7	RSA RfD	92	3.07	45.8	3067	0.102	1.53	40731	1.36	20.3
Sodium as Na	3.3	RSA RfD	366	12.2	370	12200	0.407	12.3	162040	5.40	164
Sulphate as SO_4	6.7	RSA RfD	1039	34.6	517	34633	1.15	17.2	459999	15.3	229
Boron as B	0.09	EPA RfD	0.46	0.0153	17.04	15	0.0005	0.567	204	0.007	7.86
Nitrate as N	1.6	EPA RfD	1.1	0.0367	2.29	37	0.0012	0.076	487	0.016	1.01
RISK / ACCEPTABLE RISK TO: HUMAN				Dam water	R		River water	AR		Groundwater	R

Table 21

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 3S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 3S

COMPDUNDS INORGANICS Micro's and Macro'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 DF 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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0003	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.5	EPA RfD	0.060	0.002	0.133	2.0	0.00007	0.0044	27	0.0009	0.06
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.003	RSA RfD	0.046	0.0015	18.2	1.5	0.00005	0.625	20	0.0007	8.33
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.674	0.022	749	23	0.0008	25.6	298	0.010	331
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.38	0.113	245	113	0.0038	8.15	1496	0.050	109
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.043	0.0014	7.17	1.4	0.00005	0.233	19	0.001	3.17
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.21	0.0070	233	7.0	0.0002	7.78	93	0.0031	103
Vanadium as V	0.003	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.304	0.010	3.38	10	0.0003	0.113	135	0.0045	1.5
Calcium as Ca	5.0	RSA RfD	583	19.4	389	19433	0.648	13.0	258113	8.60	172
Chloride as Cl	8.3	RSA RfD	1223	40.8	491	40767	1.36	16.4	541462	18.05	217
Fluoride as F	0.06	EPA RfD	7.4	0.247	411	247	0.0082	13.7	3276	0.109	182
Magnesium as Mg	2.3	RSA RfD	81	2.7	117	2700	0.090	3.91	35861	1.20	52.0
Potassium as K	0.7	RSA RfD	94	3.13	46.8	3133	0.104	1.56	41617	1.39	20.7
Sodium as Na	3.3	RSA RfD	373	12.4	377	12433	0.414	12.6	165139	5.50	167
Sulphate as SD_4	0.7	RSA RfD	1072	35.7	533	35733	1.19	17.8	474609	15.8	236
Boron as B	0.03	EPA RfD	0.58	0.019	21.5	19	0.0006	0.715	257	0.0086	9.52
Nitrate as N	1.6	EPA RfD	1.1	0.037	2.29	37	0.0012	0.076	287	0.0162	1.01
RISK / ACCEPTABLE RISK TO: HUMAN				Dam water	R		River water	AR		Groundwater	R

Table 22

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 3D [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 3D

COMPOUNDS INORGANICS Micro's and Macro'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 — [8] Conc. in Dam water ppm	[9] PDI Dam water exposure mg/kg/day	[10] Margin of Safety %	RISK OF DILUTED DAM WATER IN RIVER — [11] Conc. in River water (EEC) ppb	[12] PDI river water exposure mg/kg/day	[10] Margin of Safety %	RISK OF DAM WATER FOR GROUNDWATER — [13] Conc. in groundwater (EEC) ppb	[14] PDI groundwater exposure mg/kg/day	[10] Margin of Safety %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.063	0.0021	0.14	2.1	0.00007	0.0047	28	0.0009	0.057
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.006	RSA RfD	0.046	0.0015	25.2	1.5	0.00005	0.825	20	0.0007	11.55
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.652	0.022	724	22	0.00073	24.4	289	0.0096	321
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.040	EPA RfD	3.43	0.114	249	114	0.0038	8.3	1519	0.051	110
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.041	0.0014	6.83	1.4	0.00005	0.225	18	0.0006	3.00
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.22	0.0073	244	7.3	0.0002	6.67	97	0.0032	108
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.288	0.0096	3.2	10	0.0003	0.107	128	0.0043	1.42
Calcium as Ca	5.0	RSA RfD	583	19.4	389	19433	0.648	13.0	258113	8.60	172
Chloride as Cl	8.3	RSA RfD	1235	41.2	496	41167	1.37	16.5	546775	18.2	220
Fluoride as F	0.06	EPA RfD	7.5	0.250	417	250	0.0083	13.9	3320	0.111	184
Magnesium as Mg	2.3	RSA RfD	81	2.7	117	2700	0.09	3.91	35861	1.20	52
Potassium as K	6.7	RSA RfD	93	3.1	46.3	3100	0.103	1.54	41174	1.37	20.5
Sodium as Na	3.3	RSA RfD	367	12.2	371	12233	0.408	12.4	162483	5.42	164
Sulphate as SO_4	6.7	RSA RfD	1048	34.9	521	34933	1.164	17.4	463984	15.5	231
Boron as B	0.09	EPA RfD	0.71	0.024	26.3	24	0.0008	0.874	314	0.010	11.6
Nitrate as N	1.6	EPA RfD	1.2	0.04	2.5	40	0.0013	0.083	531	0.018	1.11
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water	AR		Groundwater	R	

Table 23

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 4S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 4S

COMPDUNDS INORGANICS Micro's and Macro'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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.065	0.0022	0.14	2.2	0.00007	0.0048	29	0.0010	0.06
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.041	0.0014	17.1	1.4	0.00005	0.593	18	0.0006	7.50
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.664	0.022	738	22	0.00073	24.4	294	0.0098	327
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.44	0.115	249	115	0.0038	8.26	1523	0.051	110
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.040	0.0013	6.7	1.3	0.00004	0.217	18	0.0006	3.00
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.19	0.0063	211	6.3	0.0002	7.0	84	0.0028	93.3
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.297	0.0099	3.3	9.9	0.0003	0.110	131	0.0044	1.48
Calcium as Ca	5.0	RSA RfD	581	19.4	387	19367	0.646	12.9	257228	8.57	171
Chloride as Cl	8.3	RSA RfD	1223	40.8	491	40767	1.36	16.4	541462	18.05	217
Fluoride as F	0.06	EPA RfD	7.5	0.250	417	250	0.0083	13.9	3320	0.111	184
Magnesium as Mg	2.3	RSA RfD	80	2.7	116	2667	0.089	3.87	35419	1.18	51
Potassium as K	6.7	RSA RfD	93	3.1	46.3	3100	0.103	1.54	41174	1.37	20.5
Sodium as Na	3.3	RSA RfD	363	12.1	367	12100	0.403	12.2	160712	5.36	162
Sulphate as SO_4	6.7	RSA RfD	1058	35.3	526	35267	1.18	17.5	468411	15.6	233
Boron as B	0.09	EPA RfD	0.75	0.025	28	25	0.0008	0.926	332	0.011	12.3
Nitrate as N	1.6	EPA RfD	1.1	0.037	2.3	37	0.0012	0.076	487	0.016	1.01
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water		AR	Groundwater		R

Table 24

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 4 [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 4

COMPOUNDS INORGANICS Micro's and Macro'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 %
Aluminium as Al	0.003	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	2.06	0.00	0.00	0.06
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.068	0.0023	0.15	2.3	0.00008	0.005	30	0.0010	0.067
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.039	0.0013	16.3	1.3	0.00004	0.542	17	0.0006	7.08
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.671	0.022	746	22	0.00073	24.4	297	0.010	330
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.45	0.115	250	115	0.0038	8.33	1527	0.051	111
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.04	EPA RfD	0.046	0.0015	7.7	1.5	0.00005	0.250	20	0.0007	3.33
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.21	0.0070	233	7.0	0.0002	7.75	93	0.0031	103
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.290	0.0097	3.2	9.7	0.0003	0.108	128	0.004	1.42
Calcium as Ca	5.0	RSA RfD	583	19.4	389	19433	0.648	13.0	258113	8.60	172
Chloride as Cl	8.3	RSA RfD	1223	40.8	491	40767	1.36	16.4	541462	18.0	217
Fluoride as F	0.06	EPA RfD	7.1	0.237	394	237	0.0079	13.2	3143	0.105	175
Magnesium as Mg	2.3	RSA RfD	81	2.70	117	2700	0.09	3.91	35861	1.20	52
Potassium as K	6.7	RSA RfD	92	3.1	46.6	3067	0.102	1.53	40731	1.36	20.3
Sodium as Na	3.3	RSA RfD	374	12.5	378	12467	0.416	12.6	165582	5.52	167
Sulphate as SO_4	6.7	RSA RfD	1053	35.1	524	35100	1.17	17.5	466197	15.5	232
Boron as B	0.09	EPA RfD	0.75	0.025	27.8	25	0.0008	0.926	332	0.0111	12.3
Nitrate as N	1.6	EPA RfD	1.1	0.037	2.3	37	0.0012	0.075	487	0.0162	1.01
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water		AR	Groundwater		R

Table 25

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 5S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 5S

COMPOUNDS INORGANICS Micro's and Macro'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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.038	0.0013	0.084	1.3	0.00004	0.0025	17	0.0006	0.038
Chromium^{6+} as Cr^{3+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.038	0.0013	16.8	1.3	0.00004	0.542	17	0.0006	7.08
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.093	RSA RfD	0.920	0.0307	1022	31	0.0010	34.4	407	0.0136	452
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.22	0.107	233	107	0.0036	7.8	1426	0.0475	103
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.044	0.0015	7.33	1.5	0.00005	0.250	19	0.0006	3.17
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.22	0.0073	244	7.3	0.0002	8.11	97	0.0032	108
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.341	0.011	3.79	11.4	0.00038	0.127	151	0.005	1.68
Calcium as Ca	5.0	RSA RfD	581	19.4	387	19367	0.646	12.9	257228	8.57	171
Chloride as Cl	8.3	RSA RfD	1223	40.8	491	40767	1.36	16.4	541462	18.0	217
Fluoride as F	0.06	EPA RfD	7.6	0.25	422	253	0.0084	14.1	3365	0.112	187
Magnesium as Mg	2.3	RSA RfD	83	2.8	120	2767	0.092	4.01	36747	1.22	53.3
Potassium as K	6.7	RSA RfD	93	3.1	46	3100	0.103	1.54	41174	1.37	20.5
Sodium as Na	3.3	RSA RfD	359	12.0	363	11967	0.399	12.1	158941	5.30	161
Sulphate as SO_4	6.7	RSA RfD	1048	34.9	521	34933	1.16	17.4	463984	15.5	231
Boron as B	0.09	EPA RfD	0.80	0.0267	29.6	27	0.0009	0.999	354	0.012	13.1
Nitrate as N	1.0	EPA RfD	1.2	0.0400	2.5	40	0.0013	0.083	531	0.018	1.11
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water		AR	Groundwater		R

Table 26

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 5D [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 5D

COMPOUNDS INORGANICS Micro's and Macro'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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.046	0.0015	0.102	1.5	0.00005	0.0033	20	0.0007	0.044
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.033	0.0011	13.75	1.1	0.00004	0.458	15	0.0005	6.25
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.679	0.023	754	23	0.0008	25.6	301	0.010	334
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.16	0.105	229	105	0.0035	7.61	1399	0.047	101
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.046	0.0015	7.97	1.5	0.00005	0.265	20	0.0007	3.73
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.23	0.0077	256	7.7	0.0003	8.56	102	0.0034	113
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.286	0.0095	3.18	9.5	0.0003	0.106	127	0.0042	1.41
Calcium as Ca	5.0	RSA RfD	585	19.5	390	19500	0.650	13.0	258999	8.63	173
Chloride as Cl	8.3	RSA RfD	1223	40.8	491	40767	1.36	16.4	541462	18.0	217
Fluoride as F	0.06	EPA RfD	7.8	0.260	433	260	0.009	14.4	3453	0.115	192
Magnesium as Mg	2.3	RSA RfD	78	2.6	113	2600	0.087	3.77	34533	1.15	50.0
Potassium as K	6.7	RSA RfD	92	3.1	45.8	3067	0.102	1.53	40731	1.36	20.3
Sodium as Na	3.3	RSA RfD	364	12.1	368	12133	0.404	12.2	161155	5.37	163
Sulphate as SD_4	6.7	RSA RfD	1063	35.4	529	35433	1.18	17.6	470625	15.7	234
Boron as B	0.09	EPA RfD	0.69	0.023	25.6	23	0.0008	0.852	305	0.010	11.3
Nitrate as N	1.6	EPA RfD	0.90	0.03	1.88	30	0.0010	0.063	398	0.013	0.829
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water	AR		Groundwater	R	

Table 27

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 6S [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 6S

COMPOUNDS INORGANICS Micro's and Macro'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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.058	0.0019	0.13	1.9	0.00006	0.0042	26	0.0009	0.058
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.030	0.0010	12.5	1.0	0.00003	0.417	13	0.0004	5.42
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	0.713	0.024	792	24	0.0008	26.7	316	0.011	351
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.34	0.111	242	111	0.0037	8.0	1479	0.049	107
Mercury as Hg	0.0003	EPA RfD	< 0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.039	0.0013	6.5	1.3	0.00004	0.217	22	0.0007	3.67
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.23	0.0077	256	7.7	0.0003	8.56	102	0.0034	113
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.270	0.0090	3.0	9.0	0.0003	0.100	120	0.0040	1.33
Calcium as Ca	5.0	RSA RfD	585	19.5	390	19500	0.650	13.0	258999	8.63	173
Chloride as Cl	8.3	RSA RfD	1235	41.2	496	41167	1.37	16.5	546775	18.2	220
Fluoride as F	0.06	EPA RfD	7.1	0.237	394	237	0.0079	13.2	3143	0.105	175
Magnesium as Mg	2.3	RSA RfD	79	2.6	114	2633	0.088	3.8	34976	1.17	50.7
Potassium as K	6.7	RSA RfD	92	3.1	46.8	3067	0.102	1.5	40731	1.36	20.3
Sodium as Na	3.3	RSA RfD	366	12.2	370	12200	0.407	12.3	162040	5.40	164
Sulphate as SO_4	6.7	RSA RfO	1087	36.2	541	36233	1.21	18.0	481250	16.0	239
Boron as B	0.09	EPA RfD	0.66	0.022	24.4	22	0.0007	0.815	292	0.0097	10.8
Nitrate as N	1.6	EPA RfD	1.1	0.037	2.3	37	0.0012	0.076	487	0.0162	1.01
RISK / ACCEPTABLE RISK TO: HUMAN					Dam water	R	River water	AR			Groundwater R

Table 28

DAM 10: HUMAN RISK ASSESSMENT • DAM WATER • SAMPLE NO. 6D [INORGANIC - MICRO'S & MACRO'S]

[ISCOR VANDERBIJLPARK STEEL - MASTER PLAN]

SAMPLE NUMBER: 6D

COMPOUNDS INORGANICS Micro's and Macro's	[6] RfD/ ADI / SV 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 %
Aluminium as Al	0.005	RSA RfD	< 0.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic as As	0.0003	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barium as Ba	0.07	EPA RfD	< 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium as Cd	0.0005	EPA RfD	< 0.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromium^{3+} as Cr^{3+}	1.50	EPA RfD	0.084	0.0028	0.19	2.8	0.00009	0.006	37	0.0012	0.082
Chromium^{6+} as Cr^{6+}	0.003	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt as Co	0.008	RSA RfD	0.028	0.0009	11.7	0.9	0.00003	0.375	12	0.0004	5.0
Copper as Cu	0.04	EPA RfD	< 0.025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanide as CN	0.04	EPA RfD	< 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron as Fe	0.003	RSA RfD	2.01	0.067	2233	67	0.0022	74.4	890	0.030	990
Lead as Pb	0.002	RSA RfD	< 0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese as Mn	0.046	EPA RfD	3.26	0.109	236	109	0.0036	7.90	1443	0.048	105
Mercury as Hg	0.0003	EPA RfD	< 0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel as Ni	0.02	EPA RfD	0.038	0.00127	6.3	1.3	0.00004	0.217	17	0.0006	2.93
Selenium as Se	0.005	EPA RfD	< 0.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Titanium as Ti	0.003	RSA RfD	0.27	0.0090	300	9.0	0.0003	10.0	120	0.0040	133
Vanadium as V	0.009	EPA RfD	< 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zinc as Zn	0.3	EPA RfD	0.411	0.0137	4.6	13.7	0.0005	0.152	182	0.0061	2.02
Calcium as Ca	5.0	RSA RfD	581	19.4	387	19367	0.646	12.9	257228	8.57	171
Chloride as Cl	8.3	RSA RfD	1235	41.2	496	41167	1.37	16.5	546775	18.2	220
Fluoride as F	0.06	EPA RfD	7.8	0.260	433	260	0.0087	14.4	3453	0.115	192
Magnesium as Mg	2.3	RSA RfD	83	2.77	120	2767	0.092	4.0	36747	1.22	53.2
Potassium as K	6.7	RSA RfD	92	3.1	46	3067	0.102	1.53	40731	1.36	20
Sodium as Na	3.3	RSA RfD	370	12.3	374	12333	0.411	12.5	163811	5.46	165
Sulphate as SO_4	6.7	RSA RfD	1063	35.4	529	35433	1.18	17.6	470625	15.7	234
Boron as B	0.09	EPA RfD	0.67	0.022	25	22	0.0007	0.826	297	0.010	11.0
Nitrate as N	1.6	EPA RfD	1.6	0.053	3.3	53	0.0018	0.111	708	0.024	1.48
RISK / ACCEPTABLE RISK TO: HUMAN			Dam water	R		River water		AR	Groundwater		R