



# EFFLUENT TREATMENT PERFORMANCE

Contaminant	Untreated ug/l	Chemical treatment only ug/l	Chemical & physical treatment ug/l	% Removal	Code
ALACHLOR	115,000	270,000	<1.5	>99.9	B
	795,000		<4.8	>99.9	F
	16,000	5,300	<10	>99.9	J
	15,000	11,000	<1	>99.9	J
AMETRYN	800,000		<5	>99.9	C
	1,000,000		<5	>99.9	C
	5,100,000		4	>99.9	F
ATRAZINE	240,000		<0.06	>99.9	A
	1,000,000		<5.0	>99.9	C
	900,000		<5.0	>99.9	C
	500,000		<5.0	>99.9	C
BENTAZON	480,000		<0.075	>99.9	A
	16,900		<3.0	>99.9	A
BITERTANOL	17,700		<3.0	>99.9	A
	23,900		<3.0	>99.9	A
BROMOXYNIL	600,000	30,500	41 (@pH7)	<99.5	I
	9,300	3,900	<10	>99.8	J
	41,600		<50	>99.8	A
CAPTAN	76,000		<50	>99.9	A
	26,000		<50	>99.8	A
	146,000		<50	>99.9	A
	197,000		<50	>99.9	A
	20,900		<50	>99.7	A
CARBARYL	225,000		<0.04(0.02-0.04)	>99.9	D
CARBOFURAN	34,000,000	6,000	<50	>99.9	A
CHLORADIZON	19,300		<50	>99.7	A
	26,200		<50	>99.8	A
CHLRORTOLURON	158,000	77 MG/L	<0.2	>99.9	B
	880,000		<0.2	>99.9	C
CHLORSULFURON	49,000	<1.0 MG/L	<0.5	>99.9	B
	2,570		<5.0	>99.8	E
CHRRORTHARONIC	750,000		<0.2	>99.9	C
CLOPYRALID	70,000	71 MG/L	<0.15	>99.9	B
	74,000		<0.15	>99.9	B
CYNAZINE	3,400	800	<1	>99.9	J
CYPERMETHRIN	80,000		<0.2	>99.9	C
	50,000		<0.04	>99.9	D
DELTAMETHRIN	70		<0.1	>99.9	A
DICAMBA	35,000		<0.04	>99.99	D
	11,000	890	<10	>99.8	J
DICLOROMID	12,000	6,000	<0.7	>99.9	B
	880	760	<1	>99.9	J
DICURANE	720	610	<1	>99.9	J
	10,800		<10	>99.9	A
DIMETHOATE	8,200		25	>99.7	A
	4,000		<10	>99.7	A
	3,700		<10	>99.9	A
	200,000		<0.04	>99.99	D
	11,000	9,300	<10	>99.9	J
2,4-D	9,400	7,400	<1	>99.9	J
	7,800	5,800	<10	>99.9	J
	105,000	47,000	<1.5	>99.9	B
EPTC	375,000	<1	<1	>99.99	C
FENIPROPIMORPH	89,000	11,000	<1	>99.9	B
FLAMPROP-M-ISOPROPYL	95,000	<1,000	<0.6	>99.99	B
FLUAZIFOP-P-BUTYL	72,000	<1,000	<0.4	>99.99	B
FLUTRIAFOL	44,000	40,000	<5.0	>99.9	B
IOXYNIL	6,000,000	7,500	14(1@pH7)	>99.8	I
PROPICONAZOLE	1,650		<0.05	>99.99	A
	3,200		<0.05	>99.99	A
	1,000,000		<1.0	>99.99	C
	187,500		<1.0	>99.99	C
	125,000		<1.0	>99.99	C
PROPOXUR	75,000		<1.0	>99.99	C
	600		<10	>99.3	A
SIMAZIN	1,000,000	2,600	<5	>99.9	C
	1,000,000	3,400	<5	>99.9	C
	2,400	500	<1	>99.9	J
TEBUCONAZOL	750,000	350	<0.1	>99.9	I
THIABENDAZOL	81,000	66,000	<2.0	>99.9	B
	3,700		<4.0	>99.9	A
	400		<4.0	>99.9	A
	7,400		<4.0	>99.9	A
	34,200		<4.0	>99.8	A
THIRAM	6,200		<1.0	>99.9	A
	3,200		<19.0	>99.9	A
TRIDEMORPH	350,000	<1.0	<1.0	>99.9	C
	429		<5.0	>99.9	E
TRIFLURALIN	2,570		<5.0	>99.8	E
	25,800		<5.0	>99.8	E
	1,140		<5.0	>99.8	E
VINCHLOZOLIN	2,300		<0.05	>99.99	A
	3,200		<0.05	>99.99	A

Note: These results are compiled from a number of sources and are intended only to offer a broad indication of treatment quality that may be achieved by the Sentinel process.

CODES: A - Holland D - NRA G - Belgium B - Czech E - Italy I - ICI C - Ciba Gigy F - USA J - Japan



# MIXED TANK PERFORMANCE

Contaminant	Untreated ug/l	Chemical treatment only ug/l	Chemical & physical treatment ug/l	% Removal	Code
MECOPROP	122,000	110,000	<0.2	>99.9	B
CLOPYRALID	70,000	71,000	<0.15	>99.9	B
MANCOZEB	139,000	42,000	<0.25	>99.9	B
NAPROPAMID	105,000	50,000	<0.1	>99.9	B
PENDIMETHALIN	112,000	<1,000	<1.0	>99.9	B
FENITROTHION	89,000	11,000	<1.0	>99.9	B
MEVINPHOS	170,000	18,000	<2	>99.9	B
THIABENDAZOL	81,000	66,000	<2	>99.9	B
IMPACT	44,000	40,000	<5	>99.9	B
PROCHLORAZ	3,000	<200	<0.5	>99.9	B
EPTC	105,000	47,000	<1.5	>99.9	B
DICOROMID	9,000	6,000	<0.7	>99.9	B
CHLORADIZON	138,000	132,000	<0.7	>99.9	B
ALACHLOR	106,000	27,000	<1.5	>99.9	B
FLAMPROP-N-ISOPROPYL	95,000	<1,000	<0.5	>99.9	B
FLUAZIFOP-P-BUTYL	72,000	<1,000	<0.4	>99.9	B
CHLORTOLURON	158,000	77,000	<0.2	>99.9	B
LINURON	131,000	39,000	<0.4	>99.9	B
CHLORSULFURON	49,000	<1,000	<0.5	>99.9	B
PARAQUAT ION	95,000	93,000	>0.35	>99.9	B
TERBUTRYN	43,000	4,500	<0.1	>99.9	B
TERBUTRYLAZIN	41,000	5,500	<0.15	>99.9	B
PROMETRYN	62,000	7,000	<0.1	>99.9	B
MECOPROP	120,000		<0.2	>99.9	B
CLOPYRALID	74,000		<0.15	>99.9	B
MANCOZEB	147,000		<0.25	>99.9	B
NAPROPAMID	106,000		<0.1	>99.9	B
PENDIMETHALIN	101,000		>1	>99.9	B

Note: These results are compiled from a number of sources and are intended only to offer a broad indication of treatment quality that may be achieved by the Sentinel process.

CODES: A - Holland D - NRA G - Belgium B - Czech E - Italy I - ICI C - Ciba Gigy F - USA J - Japan



Contaminant	Untreated ug/l	Chemical treatment only ug/l
2,5-DICHLOROPHENOL	<100	not present
3,4-XYLENOL	<100	not present
BIPHENYL	<100	not present
2,3-DIMETHYL NAPHTHALENE	<100	not present
FLUORENE	<100	not present
MOLINATE	<100	not present
DIFLUFENICAN	<100	not present
BENALAXYL	<100	not present
2-METHYL NAPHTHALENE	136.1	not present
4-CHLORO-3-METHYL PHENOL	5,646.70	not present
3,4-DICHLORANILINE	199.4	not present
ETHYLENETHIOUREA	426.7	not present
CYCLOATE	3,187.70	<0.5
CHLORPROMPHAM	7,995.10	<0.5
BROMOXYNIL	4,045.70	not present
TRIALATE	249.7	not present
PIRIMICARB	17,891.70	not present
TERBUTRYNE	406.1	not present
LINURON	1177.6	not present
ETHOFUMESATE	29,893.20	not present
CYANAZINE	6249	not present
ISOMETHIOZIN	5,219.20	not present
FLUSILAZOLE	980.7	not present
PYRAZON	997	not present
TEBUCONAZOLE	2,105.40	not present
EPOXICONAZOLE	1,397.10	not present
BENZONITRILE	1,417.80	not present
3,5,5-TRIMETHYL 20CYCLOHEXAN-1-ONE	3,801.30	not present
1,2-DICHLORO-4-ISOCYANATO BENZENE	312.6	not present
BENZAMIDE	399.3	not present
2,6-DIBROMO PHENOL	207.9	not present
ETHIOFENCARB	134	not present
PROPAMOCARB	1,187.50	not present
CARBAMIC ACID, (3-METHYLPHENYL)-, METHYL ESTER	199.4	not present
((4-CHLORO-O-TOLY)OXY) ACETIC ACID	198.6	not present
(4-METHYLPHENYL) UREA	440.7	not present
BENTAZONE	257.9	not present
N-BUTYL BENZENE SULFONAMIDE	2,963.80	not present
BENZENESULFONANILIDE	269.5	not present
7-AMINO-2-ETHYL-1-PROPYL-5-(TRIFLUOROMETHYL) BENZIMADAZOLE	297.6	not present
2-BUTOXY ETHANOL PHOSPHATE	6,327.90	not present
LENACIL	6,881.10	not present
MCPB	325.7	not present
TRIBUTYL PHOSPHATE		<0.5
DIAZINON		<0.5
M-TERT-BUTYLY PHENOL		<0.5
O-CYANOBENZOIC ACID		<0.5
2,4 BIS (1,1-DIMETHYLETHYL) PHENOL		<0.5
CHOLESTEROL		1.8



Parameter	Unit	Untreated	Treated
pH		7.06	6.55
suspended matter	mg/L	1290	8
BOD5	mg/L		<3
COD	mg/L	2950	<30
TOC	mg/L	736	23
N total	mg/L	85.4	13.8
P total	mg/L	84.7	1.3
hydrocarbures	mg/L	11.4	<0,05
AOX	mg/L	0.64	0.02
As	mg/L	<0,05	0.31
Cd	mg/L	<0,01	<0,01
Cr	mg/L	<0,02	<0,02
Cu	mg/L	17.6	<0,02
Hg	µg/L	<1	<1
Ni	mg/L	<0,02	<0,02
Pb	mg/L	<0,06	<0,06
Zn	mg/L	2.95	<0,02
Métox			
CE50-24h	%	0.0097	>90
MI		10309	<1,1

Parameter	Unit	Untreated	Treated
deltaméthrine	µg/L	14	<LQ
cymoxanil	µg/L	6890	22
chlorthalonil	µg/L	3070	<LQ
folpel xxx	µg/L	47120	<LQ
phtalimide xxx	µg/L	8600	4.6
folpel total	µg/L	64490	<9,3
difénoconazole	µg/L	650	<LQ
procymidone	µg/L	9450	7.4
diméthomorphe	µg/L	7290	19
fludioxonil	µg/L	5880	2.4
chlorpyrifos éthyl	µg/L	3080	<LQ
pyriméthanol	µg/L	17490	55.8
glyphosate	µg/L	15847	710.4
AMPA	µg/L	967	24.4
fufénoxuron	µg/L		
fosétyl-al	µg/L		
aminotriazole	µg/L		
Total	µg/L	190838	846



Contaminant	Sample no:	Untreated ug/l	Chemical & physical treatment ug/l	% Removal
TENEURS EN THIABENDAZOLE	1	27.07	11.9	99.96
	2	9.567	2.9	99.96
	3	32.055	127	99.96
DIPHENYLAMINE	1	93.26	41.9	99.96
	2	122.074	8.9	99.99
	3	123.446	36.3	99.97

Physical attributes of sample		Sample 1	Sample 2	Sample 3
pH	Untreated	6.2	11.85	7
	Treated	7.85	7.6	6.7
COD (O2 mg/l)	Untreated	3,890	4,030	8,250
	Treated	160	205	190
BOD5 (O2 mg/l)	Untreated	1410	1,670	2,300
	Treated	58	67	65
SS (mg/l)	Untreated	1200	630	1,700
	Treated	39	20	38



# CZECH 1

Trial no:	COMPOSITION OF RAW EFFLUENT				ANALYTICAL DETERMINATION OF ACTIVE INGREDIENT			pH		
	Product		Active Ingredient		Untreated	After coagulation	Treated water	Untreated	After coagulation	Treated water
	Name	mg/l	Name	cca mg/l	mg/l	mg/l	ug/l / ppb			
1		~		~	~	~	~	6.93	sample was not taken	12.31
2	U46 KV Fluid	250 ml	mecoprop	140	122	110	<0.2	8.69	12.6	12.4
	Lontrel 300	300 ml	clopyralid	90	70	71	<0.15			
	Novozir MN 80	200 g	mancozeb	160	139	42	<0.25			
	Deverinol 45 F	260 ml	napropamid	117	105	50	<0.1			
3	Stomp 330E	300 ml	pendimethalin	99	112	<1	<1.0	8.46	12.32	12.18
	Metation E 50	250 ml	fenitro thio	125	89	11	<0.1			
	Phosdrin 24 EC	800 ml	mevinphos	194	170	18	<2			
	Lucotec	200 ml	thiabendazol	90	81	66	<2			
	Impact	500 ml		63	44	40	<5			
	Sportac 45 EC	300 ml	prochloraz	135	3	<0.2	<0.5			
	Eradicane 705	200 ml	EPTC	144	105	47	<1.5			
			diclormid	12	9	6	<0.7			
4	Burex 80	260 g	chlortoluron	160	138	132	<0.7	8.81	12.3	12.21
	Lasso N40 EC	300 ml	alchlor	115	106	27	<1.5			
	Superbarnon 20 EC	500 ml	flamprop-N-iso-propyl	100	95	<1	<0.6			
	Fusilade super	500 ml	flazifop-P-butyl	63	72	<1	<0.4			
	Syncuran 80	200 g	chlortoluron	160	158	77	<0.2			
	AFALON 50 WP	300 g	linuron	142	131	39	<0.4			
	Glean 75 DF	50 g	chlorsulfuron	38	49	<1	<0.5			
	Gram oxone	500 ml	paraquat-ion	100	95	93	<0.35			
	Topogard 50 WP	300 g	terbutryn	99	43	4.5	<0.1			
			terbutylazin	43	41	5.5	<0.15			
5	Gesagard 80 WP	200 g	prometryn	160	62	7	<0.1	7.73	11.44	11.63
	Same as trial 2 +		mecoprop	140	120		<0.2			
	DAM	2000 ml	clopyralid	90	74		<0.15			
	Mineral Oil	250 ml	mancozeb	160	147		<25			
	Oil	250 ml	napropamid	117	106		<0.1			
6	Sapon	40 ml	pendimethalin	99	101		<1.0	8.69	12.1	11.46
	Same as trial 2		mecoprop	140		115	<0.2			
	Reagents 1+2		clopyralid	90		69	<0.15			
	substituted by local		mancozeb	160		53	<25			
	in treatment		napropamid	117		51	<0.1			
		pendimethalin	49		<1	<1.0				

Trial no:	Name of substance	CONCENTRATION			EFFICENCY		
		K/A - effluent mg/l	K/K - after coagulant mg/l	K/V - treated water ug/l	Coagulation %	Adsorption %	Total efficacy %
2	mecoprop		110		9.8	>99.999	>99.999
5			~	<0.2	~	~	>99.999
6			115		5.7	>99.999	>99.999
2	clopyralid		71		0	>99.999	>99.999
5			~	<0.15	~	~	>99.999
6			69		0	>99.999	>99.999
2	pen dimethalin		<1		>99.1	~	>99.999
5			~	<1.0	~	~	>99.999
6			<1		>99.9	~	>99.999
2	napropamid		50		50.9	>99.999	>99.999
5			~	<0.1	~	~	>99.999
6			51		50	>99.999	>99.999
2	mancozeb		42		69.7	>99.9	>99.98
5			~	<25	~	~	>99.98
6			53		61.9	>99.9	>99.98
3		89	11		87.6	>99.99	>99.99
3		170	18		89.4	>99.9	>99.99
3		3	<0.2		>93	~	>99.98
3		105	47		55.2	>99.99	>99.99
3		9	6		33.3	>99.98	>99.99
3		44	40		9.1	>99.98	>99.98
3		81	66		18.5	>99.99	>99.99
3		138	132		4.3	>99.999	>99.999
4		95	93		2.1	>99.999	>99.999
4		49	<1		>98	~	>99.99
4		106	27		74.5	>99.99	>99.99
4		95	<1		>98.9	~	>99.999
4		72	<1		98.6	~	>99.999
4		158	77		51.2	>99.999	>99.999
4		131	39		70.2	>99.99	>99.999
4		62	7		88.7	>99.99	>99.999
4		41	5.5		86.6	>99.99	>99.999
4		43	4.5		89.5	>99.99	>99.999



# CZECH 2

Trial no:	Parameter determined	Poecilia Reticlata				Tubifex Tubifex Muller				Daphnia magna				Scenedesmus quadricaud		Sinapis alba	
		Raw Effluent		Treated Water		Raw Effluent		Treated Water		Raw Effluent		Treated Water		Raw Effluent	Treated Water	Raw Effluent	Treated Water
		24h	48h	24h	48h	24h	48h	24h	48h	24h	48h	24h	48h	72h	72h		
1	pH			12.02				12.02				12.02				12.02	
	EC 50			70.7	39.6			55.1	47.2			39.4	30.4			134	
	Harmless concentration			16.9				12.3				12.3				9.9	16.4
2	pH	8.69		12.09		8.69		12.09		8.69		12.09		8.69	12.09	8.69	12.09
	EC 50	39.8	22.9	39.2	27	28.5	25.2	49.1	39.7	24.1	22.9	34.5	25.4	10.4	143		
	Harmless concentration	12.3		10		5		9.9		12.5		9.9		1	10	2.5	16.4
3	pH	8.46		12.18		8.46		12.18		8.46		12.18		8.46	12.18	8.46	12.18
	EC 50	7.2	4.7	94.1	62.3	8.1	7.5	75.4	65.9	7.2	5.1	58.1	42.9	1	93.8		
	Harmless concentration	2.5		24.4		2.5		19.6		2		16.4		0.1	19.6	909	18.5
4 without pH adjust	pH	8.87		12.21		8.81		12.21		8.81		12.21		8.81	12.21	8.81	12.21
	EC 50	7.1	505	144	85.9	7.1	6.6	73.8	67	5.6	5	85	70.3	3.7	122		
	Harmless concentration	2.2		24.4		2		16.4		2		24.4		0.1	10	2	16.4
4 after neutralisation	pH			6.85				6.85				6.85				6.85	6.85
	EC 50			900	900			935	911			946	840			808	
	Harmless concentration			666				500				143				167	91
5	pH	7.73		11.63		7.73		11.63		7.73		11.63		7.73	11.63	7.73	11.63
	EC 50	5.1	3	130	69.8	6.1	5.5	68.1	63.9		2.5	96.7	64.7	8	117		
	Harmless concentration	1.7		24.4		2		19.6		1.2		24.4		1	20	0.25	10
6 without pH adjust	pH			11.64				11.64				11.64				11.64	
	EC 50	Equal to Trial 2		244	194	Equal to Trial 2		179	173	Equal to Trial 2		71.8	67.6	Equal to Trial 2		144	Equal to Trial 2
	Harmless concentration			111				91				16.4				2	12.3
6 after neutralisation	pH			6.7				6.7				6.7				6.7	
	EC 50			Couldn't be determined				Couldn't be determined				906	883				
	Harmless concentration			500				500				143				167	167

Trial no:	BSK5			CHSK			Apperance			Dissolved Materials			Remainder after Annealing		
	Raw Effluent	After coag.	Treated water	Raw Effluent	After coag.	Treated water	Raw Effluent	After coag.	Treated water	Raw Effluent	After coag.	Treated water	Raw Effluent	After coag.	Treated water
	mg/l	mg/l	mg/l	mg O2/l	mg O2/l	mg O2/l				mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	2.1	-	0	1.62	-	0.97	Condensate clear liquid, without sparkle	Sample not taken	Clear colourless odourless liquid with sparkle	20	-	848	6	-	641
2	2061	125	0	335	158	2.18	Highly turbid grey-yellow odorous liquid	Pink to orange odorous liquid, slightly turbid	Clear colourless odourless liquid with sparkle	130	1202	844	0	158	582
3	5141	531	0	493	343	6.7	Highly turbid, dirty yellow odorous liquid	Orange liquid smelling of organic solvent, slightly turbid	Clear colourless odourless liquid with sparkle	382	1232	833	0	897	733
4	1761	228	0	485	190	7.4	Highly turbid odorous liquid	Pink slightly turbid liquid	Clear colourless odourless liquid with sparkle	449	1225	1090	56	735	825
5	3261	182	0	227	279	10.1	Highly turbid, grey/yellow odorous liquid	Pink - orange slightly turbid liquid, strong smell of NH3	clear colourless odourless liquid with sparkle - strong smell of NH3	1542	2367	1631	2	725	681
6	see trial 2	-	0.6	see trial 2	-	18.7			Clear colourless odourless liquid with sparkle	see trial 2	-	871	see trial 2	-	578



Product	Effluent initial loading ug/l(ppb)	Residue in treated water ug/l(ppb)	Reduction %	Limit of detection ug/l(ppb)
Atrazine	5,100,000	4	>99.9	0.4
Alachlor	795,000	<4.8	>99.9	0.4
Permethrin	237,500	non detectable	>99.9	0.4
Atrazine	924,000	4	>99.9	0.4
Alachlor	510,000	non detectable	>99.9	0.4
Permethrin	1,052,000	non detectable	>99.9	0.4





# WESSEX NRA

Product tank mix	Effluent initial loading ug/l(ppb)	Residue in treated water ug/l(ppb)	Reduction %	Limit of detection ug/l(ppb)
2,4-d	200,000	non detectable	>99.9	0.02-0.04
Dicamba	35,000	non detectable	>99.9	0.02-0.04
Carbaryl	225,000	non detectable	>99.9	0.02-0.04
Pirimicarb	225,000	non detectable	>99.9	0.02-0.04
Cypermethrin	50,000	non detectable	>99.9	0.02-0.04
Paraquat	200,000	non detectable	>99.9	0.02-0.04



SOREX

Product tank mix	Effluent initial loading ug/l(ppb)	Residue in treated water ug/l(ppb)	Reduction %	Limit of detection ug/l(ppb)
Permethrin	182,000	non detectable	>99.9	



# WAGENINGEN

Range of products	Effluent initial loading ug/l(ppb)	Residue in treated water ug/l(ppb)	Reduction %	Limit of detection ug/l(ppb)
Atrazine	240,000	non detectable	>99.9	0.06
Bentazon	480,000	non detectable	>99.9	0.075
Organo-N	<2 to <25	non detectable	~	0.1
Organo-P	<0.1 to 88	non detectable	~	0.05
Organo-C1	<0.1 to 100	non detectable	~	0.01



## SLUDGE CONCENTRATION

Active ingredient	Quantity treated g	Pesticide content g/kg			% of total pesticide in sludge		
		3 month	6 month	12 month	3 month	6 month	12 month
2,4D	200	42	43	52	66.7	67.4	79.1
Pirimicarb	225	2	2.6	3.1	3.2	4.1	4.7
Cypermethrin	50	7.8	8.9	10	12.4	13.9	15.2
Paraquat	200	11.2	9.3	0.56	17.8	14.6	0.8
Dicamba	35	0.02	0.03	0.1	0.03	0.05	0.15
Carbaryl	225	0	0	0	0	0	0
<b>Total</b>	<b>675</b>	<b>63</b>	<b>63.8</b>	<b>65.76</b>	<b>100</b>	<b>100</b>	<b>100</b>