

ENVIRONMENTAL PROTECTION



NRA

National Rivers Authority

South West Region

**MONITORING OF FRESHWATERS FOR
E.C. DANGEROUS SUBSTANCES
LIST I AND LIST II, 1990**

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SUMMARY

The assessment of compliance in relation to the EC Dangerous Substances Directive monitoring, undertaken during 1990 has recently been reported to the DoE. Delays have occurred with reporting this year, as DoE introduced a new computerised system of reporting.

Mercury and HCH complied with environmental quality standards(EQS's) at all monitored sites.

Levels in exceedance of the standard for cadmium and List II metals continue to occur in West Cornwall. The principal cause remains historic (abandoned mine workings). EQS exceedances were recorded in the Red River and Carnon River.

List II (zinc and copper) metals non-compliance reported in the River Okement, is thought to be caused by acidic moorland run-off and polluting activities of the local quarry. Recently introduced pollution control measures should resolve the situation.

The List II (zinc and copper) metals non-compliance reported in the River Camel requires investigation.

Sediment results are still showing variation; non homogeneity within the river corridor and sampling methodology is thought to significantly influence this.



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1. INTRODUCTION

This report presents the results of the EC Dangerous Substances monitoring programme undertaken during 1990. Publication of the results has been delayed this year as the system of reporting required by DoE was revised to a computerised format.

Relatively few of the List I and II substances contained in the EC Dangerous Substances Directive are known to be discharged to waters in the South West Region and monitoring is limited to heavy metals and a few organic pesticides. Assessment of compliance with Environmental Quality Standards (EQS) was carried out for the first time, using a compliance testing computer program.

2. RESULTS

List I substances in surface waters namely mercury, cadmium and the isomers hexachlorocyclohexane(HCH), are monitored at environmental network sites and downstream of discharges likely to contain these substances.

List II metals in water, namely arsenic, chromium, copper, lead, nickel and zinc are monitored downstream of discharges likely to contain these substances.

Results for 1990 are summarised in Appendix A.

2.1 MERCURY

There are no discharges of mercury to surface waters, within the region which qualify for registration under the Directive. However, there is a requirement to monitor the environment at key network sites.

The results for 1990 are shown in Table 1, which indicates compliance with the EQS at all locations.

2.2 CADMIUM

Results are shown in Table 2-4b. Most sites complied with the relevant receiving waters EQS, with the exception of the Carnon River at monitoring points located at Devoran and Bissoe Bridges, and the Red River at Gwithian Towans and Roscroghan Bridge. Both rivers receive discharges from mineral extraction processes and from adits draining existing and abandoned mine workings.

Cadmium concentrations in sediment from the River Dart downstream of Buckfast Plating Works, represents only a slight increase from 1989. However, this is thought to be due to the varied distribution of cadmium in the river sediments and sample variation, as Buckfast Plating, the original registered discharger of this substance, no longer operates at this site.

2.3 gamma HCH(unconfirmed)

Results are shown in Tables 5-7. The analytical methods used by the laboratory contracted to do these analyses were unable to confirm the presence of gamma HCH. Therefore if tecnazine is present in samples it will increase the reported gamma-HCH value. Consequently all HCH values should be considered as presumptive and interpretations of non-compliance should be treated with caution.

All monitored receiving water sites complied with the relevant EQS.

Sediment analysis results from the River Camel at Grogley Bridge, the River Torridge at Beam and the River Creedy at Westcott were higher in than in 1989. This is thought to be primarily a consequence of distribution in sediments and the sampling methodology which can produce significant natural variability.

2.4 LIST II METALS

Results of monitoring for List II metals are shown in Table 8. Historic and current mining activities in West Cornwall continue to have a significant effect on the water quality of the Red River and Carnon River with regard to copper, zinc and lead. Concentrations of copper and zinc exceeded the EQS in the River Camel, downstream of Nanstallon STW (Bodmin) and in the River Okement, downstream of Okehampton STW. However, copper and zinc values have been reported and tested for compliance on the basis of total copper and zinc, whereas the EQS's relate to dissolved copper and zinc. Dissolved metal analyses could not be carried out in 1990 due to laboratory constraints. This will be rectified in 1992.

The River Camel also failed to met EQS's in 1989. The repeated EQS non-compliance in the River Camel though not severe, warrants further investigation, particularly as visual pollution has also been recorded.

3.0 CONCLUSION

- 3.1 Monitoring for dangerous substances in the South West Region during 1990 shows no major changes in concentrations of these substances.
- 3.2 Problems with cadmium and List II metals continue to occur in West Cornwall. The principal cause remains historic (abandoned mine workings). Exceedances of the EQS's were recorded in both the Red River and Carnon River.
- 3.3 Marginal non-compliance with copper and zinc criteria was recorded in the River Camel downstream of Nanstallon(Bodmin) STW and River Okement downstream of Okehampton STW.

The metals problem in the River Okement are thought to be caused by acidic moorland run-off and polluting activities of the local quarry. Prosecutions have ensued and pollution control measures put into place, which should alleviate the problem.

- 3.4 The use of total metal determinations for assessing compliance has indicated failure at some sites when analysis of dissolved metals may have shown the results to be satisfactory.
- 3.5 HCH complied with receiving water EQS's at all monitored sites. However, some sediment results were higher than in 1989 and the EC Dangerous Substances Directive requires that concentrations should not increase over time. Natural variation of substances within the sediments and sampling methodology are thought to significantly influence this.

4. RECOMMENDATIONS

- 4.1 Investigation of the causes of non-compliance with EQS's for List II metals in the River Camel and River Okement catchments during 1992.
ACTION Freshwater Officer
- 4.2 Investigation into the sources of dangerous substances in the Red River and Carnon River Catchments.
ACTION Freshwater Officer
- 4.3 Confirmation of HCH analysis is required.
ACTION Freshwater Scientist
- 4.4 Review of sediment sampling procedures should be carried out.
ACTION Freshwater Scientist
- 4.5 Dissolved metal analysis should be carried out at all EC Dangerous Substances monitoring sites.
ACTION Freshwater Scientist

APPENDIX A

TABLE 1 : MERCURY IN FRESHWATERS

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 ENVIRONMENTAL MONITORING RESULTS

LIST I

EQS = Environmental Quality Standard

All units are $\mu\text{g/l}$: Less than values are taken at half face value for calculation of mean.

Monitoring location	URN	Grid Reference	Relevant EQS	No. of samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
AXE AT WHITFORD BRIDGE	R02B001	SY2623 9538	1	3	3	0.05	< 0.10	< 0.10	COMPLIES
OTTER AT DOTTON MILL	R04B006	SY0873 8853	1	6	4	0.15	< 0.10	0.50	COMPLIES
EXE AT THORVERTON GAUGING STATION	R05D001	SS9358 0167	1	6	6	0.05	< 0.10	< 0.10	COMPLIES
EXE AT TREWS WEIR EXETER	R05D004	SX9255 9147	1	6	5	0.08	< 0.10	0.20	COMPLIES
TEIGN AT PRESTON	R06B001	SX8550 7452	1	5	3	0.11	< 0.10	0.20	COMPLIES
DART AT TOTNES WEIR	R07B010	SX8010 6122	1	6	5	0.09	< 0.10	0.30	COMPLIES
AVON AT HATCH	R08B005	SX7145 4725	1	6	6	0.05	< 0.10	< 0.10	COMPLIES
ERME AT SEQUER'S BRIDGE	R09B003	SX6321 5188	1	4	4	0.05	< 0.10	< 0.10	COMPLIES
PLYM AT PLYM BRIDGE	R11B006	SX5237 5867	1	13	7	0.07	< 0.05	0.26	COMPLIES
TAVY AT DENHAM BRIDGE	R12C006	SX4769 6776	1	12	6	0.10	< 0.05	0.35	COMPLIES
TAMAR AT GUNNISLAKE BRIDGE	R12E003	SX4332 7224	1	13	4	0.11	< 0.05	0.32	COMPLIES
LYNHER AT NOTTER BRIDGE	R12Q007	SX3850 6090	1	13	8	0.06	< 0.05	0.17	COMPLIES
POWEY AT RESPRYN BRIDGE	R15B025	SX0994 6353	1	12	7	0.05	< 0.05	0.12	COMPLIES
POWEY AT RESTORMEL	R15B006	SX1080 6130	1	17	8	0.20	< 0.05	1.40	COMPLIES
FAL AT TREGONEY GAUGING STATION	R19C006	SW9205 4473	1	13	5	0.12	< 0.05	0.75	COMPLIES
CARNON RIVER AT DEVORAN BRIDGE	R19E004	SW7910 3941	1	13	3	0.17	< 0.05	0.50	COMPLIES
RED RIVER AT GWITHIAN TOMANS	R23A006	SW5825 4222	1	12	1	0.26	< 0.05	0.62	COMPLIES
CAMEL AT POLBROCK	R25B029	SX0138 6949	1	13	7	0.06	< 0.05	0.20	COMPLIES
TORRIDGE AT BEAM BRIDGE	R29B034	SS4737 2092	1	12	11	0.06	< 0.10	0.20	COMPLIES
TAW AT CHAPELTON FOOTBRIDGE	R30B014	SS5822 2610	1	25	22	0.10	< 0.10	1.20	COMPLIES
YEO (BARNSTAPLE) AT COLLARD BRIDGE	R30H006	SS5956 3569	1	7	6	0.06	< 0.10	0.10	COMPLIES

TABLE 2 : CADMIUM IN FRESHWATERS

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 ENVIRONMENTAL MONITORING RESULTS

LIST I

EQS = Environmental Quality Standard

All units are $\mu\text{g/l}$: Less than values are taken at half face value for calculation of mean.

Monitoring location	URN	Grid Reference	Relevant EQS	No. of samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
AXE AT WHITFORD BRIDGE	R02B001	SY2623 9538	1	26	26	0.35	< 0.7	< 0.7	COMPLIES
OTTER AT DOTTON MILL	R04B006	SY0873 8853	1	26	26	0.47	< 0.7	< 7.0	COMPLIES
EKE AT THORVERTON GAUGING STATION	R05D001	SS9358 0167	1	25	25	0.35	< 0.7	< 0.7	COMPLIES
EKE AT TREWS WEIR EXETER	R05D004	SX9255 9147	1	26	26	0.35	< 0.7	< 0.7	COMPLIES
TEIGN AT PRESTON	R06B001	SX8550 7452	1	27	27	0.47	< 0.7	< 7.0	COMPLIES
DART AT TOTNES WEIR	R07B010	SX8010 6122	1	26	26	0.35	< 0.7	< 0.7	COMPLIES
AVON AT HATCH	R08B005	SX7145 4725	1	12	12	0.35	< 0.7	< 0.7	COMPLIES
ERME AT SEQUER'S BRIDGE	R09B003	SX6321 5188	1	26	26	0.35	< 0.7	< 0.7	COMPLIES
PLYM AT PLYM BRIDGE	R11B006	SX5237 5867	1	23	22	0.61	< 0.9	3.0	COMPLIES
TAVY AT DEGMAN BRIDGE	R12C006	SX4769 6776	1	24	24	0.50	< 1.0	< 1.0	COMPLIES
TAMAR AT GURNISLAKE BRIDGE	R12E003	SX4332 7224	1	26	24	0.54	< 1.0	1.0	COMPLIES
LYTHER AT NOTTER BRIDGE	R12Q007	SX3850 6090	1	26	26	0.50	< 1.0	< 1.0	COMPLIES
POWEY AT RESPRYN BRIDGE	R15B025	SX0994 6353	1	23	22	0.82	< 0.7	8.0	COMPLIES
POWEY AT RESTORMEL	R15B006	SX1080 6130	1	24	23	0.62	< 0.7	3.0	COMPLIES
PAL AT TREGONEY GAUGING STATION	R19C006	SW9205 4473	1	26	25	0.52	< 0.9	1.0	COMPLIES
CARNON RIVER AT DEVORAN BRIDGE	R19E004	SW7910 3941	1	25	0	13.08	3.0	44.0	FAILS
RED RIVER AT GWITHIAN TOWNS	R23AD06	SW5825 4222	1	26	9	2.29	< 1.0	9.0	FAILS
CAMEL AT POLBROCK	R25B029	SX0138 6949	1	26	25	0.56	< 1.0	2.0	COMPLIES
TORRIDGE AT BEAM BRIDGE	R29B034	SS4737 2092	1	13	13	0.35	< 0.7	< 0.7	COMPLIES
TAM AT CHAPELTON FOOTBRIDGE	R30B014	SS5822 2610	1	11	11	0.35	< 0.7	< 0.7	COMPLIES
TEO (BARRSTAPLE) AT COLLARD BRIDGE	R30H006	SS5956 3569	1	12	12	0.35	< 0.7	< 0.7	COMPLIES

TABLE 3 : CADMIUM IN FRESHWATERS DOWNSTREAM OF REGISTERED DISCHARGES

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 RESULTS

LIST I

EQS = Environmental Quality Standard

All units are $\mu\text{g/l}$: Less than values are taken at half face value for calculation of mean.

Discharge	Monitoring location	URN	Grid Reference	Relevant EQS	No. of Samples	No. of less than	Mean	Minimum value	Maximum value	Compliance
ADMINSTER STW	AXE AT SLIMLAKES	R02B021	SY2800 9670	5	19	19	0.35	< 0.7	< 0.7	COMPLIES
HONITON STW	OTTER AT COTTARSON FARM	R04B014	ST1480 0075	5	20	20	0.35	< 0.7	< 0.7	COMPLIES
TIVERTON STW	EKE AT ASHLEY	R05E006	SS9528 0990	5	12	12	0.61	< 0.7	< 7.0	COMPLIES
CULLOMPTON STW	CULM AT MERRY HARRIERS INN WESTCOTT CULM AT A.396 BRIDGE STONE CANON	R05C008	ST0136 0425	5	12	12	0.35	< 0.7	< 0.7	COMPLIES
		R05C013	SX9380 9760	1	12	12	0.35	< 0.7	< 0.7	COMPLIES
CREDITON (LORD MEADOW) STW	CREEDY AT WESTACOTT COTTAGES YEO (CREEDY) AT DOWNES MILLS	R05J003	SX8550 9985	5	12	12	0.35	< 0.7	< 0.7	COMPLIES
		R05K005	SX8560 9910	1	20	20	0.35	< 0.7	< 0.7	COMPLIES
BUCKFAST PLATING COMPANY	DART D/S BUCKFAST PLATING (DART BRIDGE) DART AT AUSTIN'S BRIDGE	R07B038	SX745 668	5	20	20	0.35	< 0.7	< 0.7	COMPLIES
		R07B008	SX7500 6600	1	12	12	0.35	< 0.7	< 0.7	COMPLIES
BUCKFASTLEIGH (KILBURY) STW	DART D/S BUCKFASTLEIGH STW	R07B053	SX7536 6531	5	17	17	0.35	< 0.7	< 0.7	COMPLIES
IVYBRIDGE STW	ERME AT CLEEVE	R09B002	SX6335 5520	5	12	12	0.35	< 0.7	< 0.7	COMPLIES
TAVISTOCK (CROWDALE) STW	TAVY D/S CROWDALE STW	R12C023	SX4702 7211	5	8	8	0.50	< 1.0	< 1.0	COMPLIES
LAUNCESTON (ST LEONARDS) STW	TAMAR AT POLSON BRIDGE	R12J004	SX3559 8490	5	12	11	0.63	< 1.0	2.0	COMPLIES
HOLSWORTHY (DEBBITON) STW	COLESMILL STREAM D/S OF HOLSWORTHY STW	R12K007	SS3387 0317	5	12	12	0.50	< 0.9	< 1.0	COMPLIES
CALLINGTON (NEW) STW	KELLY BROOK AT CADDAPIT	R12Q009	SX3400 6888	5	12	6	1.00	< 1.0	3.0	COMPLIES
LISKEARD (LODGE HILL) STW	EAST LOOE D/S LISKEARD STW	R14B008	SX2422 6280	5	12	12	0.50	< 1.0	< 1.0	COMPLIES
ST AUSTELL (MERRIMERS) STW	ST AUSTELL RIVER AT NOLINGEY GAUGING ST'N	R18A007	SX0071 4945	5	11	11	0.50	< 1.0	< 1.0	COMPLIES
WHICAL CROFTS	CARNON RIVER BELOW CHACENATER S T W	R19E008	SW7560 4308	5	9	6	1.67	< 1.0	6.0	COMPLIES
	CARNON RIVER D/S COUNTYWELLINGTON ADITS	R19E015	SW7669 4146	5	8	1	4.44	< 1.0	11.0	COMPLIES
	CARNON RIVER AT BISSOS BRIDGE	R19E003	SW7758 4115	5	9	0	6.78	2.0	11.0	FAILS
	RED RIVER ABOVE SOUTH CROFTY MINE	R23A002	SW6613 4090	5	12	12	0.48	< 0.8	< 1.0	COMPLIES
	RED RIVER AT ROSCROGGAN BRIDGE	R23A003	SW6502 4201	5	12	5	12.04	< 1.0	41.0	FAILS
	RED RIVER AT KIEVE BRIDGE	R23A005	SW6293 4230	5	12	3	4.21	< 1.0	10.0	COMPLIES

TABLE 3 : CADMIUM IN FRESHWATERS DOWNSTREAM OF REGISTERED DISCHARGES

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 RESULTS

LIST I

EQS = Environmental Quality Standard

All units are $\mu\text{g/l}$: Less than values are taken at half face value for calculation of mean.

Discharge	Monitoring location	URN	Grid Reference	Relevant EQS	No. of Samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
WHEAL PNDARVES TIN MINE	REEN STREAM AT RAMSGATE	R23A007	SW6416 3849	5	7	6	0.84	< 0.8	3.0	COMPLIES
	ROSEWORTHY STREAM AT PENPORDS	R23A008	SW6302 3908	1	12	11	0.70	< 0.8	3.0	COMPLIES
ST COLUMB (JOINT) STW	MENALHYL BELOW ST COLUMB STW	R25A011	SW9041 6413	5	12	12	0.50	< 1.0	< 1.0	COMPLIES
CAMELFORD STW	CAMEL AT CAMELFORD BRIDGE	R25B001	SK1067 8383	5	12	12	0.50	< 1.0	< 1.0	COMPLIES
BODMIN ST LAWRENCE (RAMSTALLON) STW	ST LAWRENCE STREAM PRIOR TO RIVER CAMEL	R25B038	SK0433 6731	5	12	12	0.50	< 1.0	< 1.0	COMPLIES
BODMIN (SCARLETS WELL) STW	DUNMERE STREAM AT DUNMERE	R25B026	SK0476 6771	5	16	15	1.09	< 1.0	10.0	COMPLIES
GREAT TORRINGTON STW	TORRIDGE AT ROTHERN BRIDGE	R29B004	SS4791 1974	5	12	12	0.61	< 0.7	< 7.0	COMPLIES
OSKHAMPTON (HILL BARTON) STW	OKEMENT AT SOUTH DORNAPORD	R29D004	SS5995 0013	5	12	12	0.35	< 0.7	< 0.7	COMPLIES

TABLE 4A : CADMIUM IN SEDIMENTS

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 ENVIRONMENTAL MONITORING RESULTS

LIST I

EQS = Environmental Quality Standard

All units are mg/kg : Less than values are taken at half face value for calculation of mean.

Monitoring location	URN	Grid Reference	Previous Result	No. of samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
DART AT TOTNES WEIR	R07B010	SX8010 6122	< 0.7	1	1	0.35	< 0.7	< 0.7	COMPLIES
CARNON RIVER AT DEVORAN BRIDGE	R19E004	SX7910 3941	149.0	1	0	7.50	7.5	7.5	COMPLIES
RED RIVER AT GWITHIAN TOMANS	R23A006	SW5825 4222	64.2	1	1	2.50	< 5.0	< 5.0	COMPLIES

TABLE 4B : CADMIUM IN SEDIMENTS DOWNSTREAM OF REGISTERED DISCHARGES

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 RESULTS

LIST I

EQS = Environmental Quality Standard

All units are mg/kg : Less than values are taken at half face value for calculation of mean.

Discharge	Monitoring location	URN	Grid Reference	Previous Result	No. of Samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
BUCKFAST PLATING COMPANY	DART D/S BUCKFAST PLATING(DART BRIDGE)	R07B038	SX745 668	< 0.7	1	0	0.80	0.8	0.8	FAILS
	DART AT AUSTIN'S BRIDGE	R07B008	SX7500 6600	2.3	1	1	0.35	< 0.7	< 0.7	COMPLIES
WHEAL CONCORD TIN MINE	CARNON RIVER BELOW CHACEWATER S T W	R19E008	SW7560 4308	40.9	1	1	2.50	< 5.0	< 5.0	COMPLIES
WHEAL JANE TIN MINE	CARNON RIVER AT BISSOE BRIDGE	R19E003	SW7758 4115	65.3	1	1	2.50	< 5.0	< 5.0	COMPLIES
WEDGAY TIN LIMITED	RED RIVER ABOVE SOUTH CROFTY MINE	R23A002	SW6613 4090	13.4	1	1	2.50	< 5.0	< 5.0	COMPLIES
SOUTH CROFTY TIN MINE	RED RIVER AT ROSCROGGAN BRIDGE	R23A003	SW6502 4201	229.0	1	0	22.50	22.5	22.5	COMPLIES
DOLCOATH ADIT	RED RIVER AT KIEVE BRIDGE	R23A005	SW6293 4230	< 10.0	1	0	5.00	5.0	5.0	COMPLIES
WHEAL PENDARVES TIN MINE	REEN STREAM AT RAMSGATE	R23A007	SW6416 3849	4.9	1	1	2.50	< 5.0	< 5.0	COMPLIES
	ROSEWORTHY STREAM AT PENPONDS	R23A008	SW6302 3908	7.5	1	1	2.50	< 5.0	< 5.0	COMPLIES

Table 5 : GAMMA HCH IN FRESHWATERS

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 ENVIRONMENTAL MONITORING RESULTS

LIST I

EQS = Environmental Quality Standard

All units are ng/l : Less than values are taken at half face value for calculation of mean.

Monitoring location	URN	Grid Reference	Relevant EQS	No. of samples	No. of less than	Mean	Minimum value	Maximum value	Compliance
AJAX AT WHITFORD BRIDGE	R02B001	SY2623 9538	50	10	1	2.35	< 1	4	COMPLIES
LOTTER AT DOTTON MILL	R04B006	SY0873 8853	50	19	0	5.53	1	12	COMPLIES
EXE AT THORVERTON GAUGING STATION	R05D001	SS9358 0167	50	18	6	2.28	< 1	6	COMPLIES
EXE AT TREWS WEIR EXETER	R05D004	SX9255 9147	50	20	3	5.28	< 1	40	COMPLIES
TEIGN AT PRESTON	R06B001	SX8550 7452	50	19	4	5.16	< 1	41	COMPLIES
DART AT TOTNES WEIR	R07B010	SX8010 6122	50	18	2	4.06	< 1	14	COMPLIES
AVON AT HATCH	R08B005	SX7145 4725	50	11	3	1.68	< 1	5	COMPLIES
ERME AT SEQUER'S BRIDGE	R09B003	SX6321 5188	50	12	2	4.67	< 1	12	COMPLIES
PLYM AT PLYM BRIDGE	R11B006	SX5237 5867	50	6	3	1.92	< 1	6	COMPLIES
TAVY AT DENHAM BRIDGE	R12C006	SX4769 6776	50	6	1	3.42	< 1	9	COMPLIES
TAMAR AT GUNWISLAKE BRIDGE	R12E003	SX4332 7224	50	7	3	2.93	< 1	9	COMPLIES
LYNHIER AT NOTTER BRIDGE	R12Q007	SX3850 6090	50	6	0	4.33	1	9	COMPLIES
POWEY AT RESPRYN BRIDGE	R15B025	SX0994 6353	50	6	1	5.08	< 1	22	COMPLIES
POWEY AT RESTORMEL	R15B006	SX1080 6130	50	6	4	1.00	< 1	2	COMPLIES
FAL AT TREGONEY GAUGING STATION	R19C006	SW9205 4473	50	6	0	4.33	2	9	COMPLIES
CARRON RIVER AT DEVORAN BRIDGE	R19E004	SW7910 3941	50	6	1	3.75	< 1	7	COMPLIES
RED RIVER AT GWITHIAN TOMANS	R23A006	SW5825 4222	50	6	4	1.00	< 1	2	COMPLIES
CAMEL AT POLBROCK	R25B029	SX0138 6949	50	6	0	3.17	2	5	COMPLIES
TORRIDGE AT BEAM BRIDGE	R29B034	SS4737 2092	50	18	3	3.03	< 1	7	COMPLIES
TAW AT CHAPELTON FOOTBRIDGE	R30B014	SS5822 2610	50	19	8	3.32	< 1	9	COMPLIES
YEO (BARRSTAPLE) AT COLLARD BRIDGE	R30H006	SS5956 3569	50	10	8	0.90	< 1	3	COMPLIES

TABLE 6 : GAMMA HCH IN FRESHWATERS DOWNSTREAM OF REGISTERED DISCHARGES

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 RESULTS

LIST I

EQS = Environmental Quality Standard

All units are ng/l : Less than values are taken at half face value for calculation of mean.

Discharge	Monitoring location	URN	Grid Reference	Relevant EQS	No. of Samples	No. of less than	Mean	Minimum value	Maximum value	Compliance
WIMBORNE STW	LAKE AT SLYMLAKES	R02B021	SY2800 9670	100	2	0	3.00	1	5	COMPLIES
HONITON STW	OTTER AT COTTARSON FARM	R04B014	ST1480 0075	100	2	0	11.00	3	19	COMPLIES
TIVERTON STW	LAKE AT ASHLEY	R05E006	SS9528 0990	100	3	0	3.33	2	6	COMPLIES
CULLINGTON STW	CULM AT MERRY HARRIERS INN WESTCOTT CULM AT A.396 BRIDGE STOKE CANON	R05C008	ST0136 0425	100	2	0	2.00	1	3	COMPLIES
		R05C013	SX9380 9760	50	3	1	4.17	< 1	7	COMPLIES
CREDITON (LORD MEADOW) STW	CREEDY AT WESTACOTT COTTAGES YED (CREEDY) AT DOWNES MILLS	R05J003	SX8550 9985	100	2	0	3.50	1	6	COMPLIES
		R05K005	SX8560 9910	50	5	1	3.90	< 1	8	COMPLIES
BUCKFAST PLATING COMPANY	DART D/S BUCKFAST PLATING (DART BRIDGE) DART AT AUSTIN'S BRIDGE	R07B038	SX745 668	100	2	2	0.50	< 1	< 1	COMPLIES
		R07B008	SX7500 6600	50	2	2	0.50	< 1	< 1	COMPLIES
BUCKFASTLEIGH (KILBURY) STW	DART D/S BUCKFASTLEIGH STW	R07B053	SX7536 6531	100	2	0	12.50	3	22	COMPLIES
IVYBRIDGE STW	ERME AT CLEEVE	R09B002	SX6335 5520	100	3	0	14.67	8	25	COMPLIES
TAVISTOCK (CROWDALE) STW	TAVY D/S CROWDALE STW	R12C023	SX4702 7211	100	1	0	61.00	61	61	COMPLIES
LAURCESTON (ST LEONARDS) STW	TAMAR AT POLSON BRIDGE	R12J004	SX3559 8490	100	5	1	3.90	< 1	9	COMPLIES
HOLSWORTHY (DEGRITON) STW	COLESHILL STREAM D/S OF HOLSWORTHY STW	R12K007	SS3387 0317	100	1	0	29.00	29	29	COMPLIES
CALLINGTON (NEW) STW	KELLY BROOK AT CADDAPIT	R12Q009	SX3400 6888	100	4	1	72.88	< 1	150	COMPLIES
LISKEARD (LODGE HILL) STW	EAST LOOE D/S LISKEARD STW	R14B008	SX2422 6280	100	4	0	17.75	5	31	COMPLIES
ST AUSTELL (MENDOWINS) STW	ST. AUSTELL RIVER AT MOLINGEY GAUGING ST'N	R18A007	SX0071 4945	100	6	1	22.42	< 1	88	COMPLIES
WHEAL PENDARVES TIN MINE	ROSEWORTHY STREAM AT PENPORDS	R23A008	SW6302 3908	100	3	1	1.83	< 1	3	COMPLIES
ST COLUMB (JOINT) STW	RIVER MENALHYL BELOW ST COLUMB STW	R25A011	SW9041 6413	100	2	0	3.00	1	5	COMPLIES
BODMIN (SCARLETS WELL) STW	DUNMERE STREAM AT DUNMERE	R25B026	SX0478 6771	100	2	0	10.50	5	16	COMPLIES
GREAT TORRINGTON STW	TORRIDGE AT ROTHERN BRIDGE	R29B004	SS4791 1974	100	3	3	0.50	< 1	< 1	COMPLIES
ORKHAMPTON (HILL BARTON) STW	ORKMENT AT SOUTH DORNAPORD	R29D004	SS5995 0013	100	2	2	0.50	< 1	< 1	COMPLIES

TABLE 7A : GAMMA HCH IN SEDIMENTS

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 ENVIRONMENTAL MONITORING RESULTS

LIST I

EQS = Environmental Quality Standard

All units are $\mu\text{g}/\text{kg}$: Less than values are taken at half face value for calculation of mean.

Monitoring location	URN	Grid Reference	Previous Result	No. of samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
AXE AT WHITFORD BRIDGE	R02B001	SY2623 9538	< 1	1	1	0.5	< 1	< 1	COMPLIES
OTTER AT DOTTON MILL	R04B006	SY0873 8853	1	1	1	0.5	< 1	< 1	COMPLIES
EXE AT TREWS WEIR EXETER	R05D004	SX9255 9147	12	1	0	2.0	2	2	COMPLIES
DART AT TOTNES WEIR	R07B010	SX8010 6122	9	1	1	0.5	< 1	< 1	COMPLIES
ERME AT SEQUER'S BRIDGE	R09B003	SX6321 5188	< 1	1	1	0.5	< 1	< 1	COMPLIES
TAMAR AT GUNNISLAKE BRIDGE	R12E003	SX4332 7224	-	1	1	0.5	< 1	< 1	-
LYNHER AT NOTTER BRIDGE	R12Q007	SX3850 6090	-	1	1	0.5	< 1	< 1	-
CAMEL AT GROGLEY BRIDGE	R25B008	SX0153 6850	< 1	1	0	5.0	5	5	FAILS
TORRIDGE AT BEAM BRIDGE	R29B034	SS4737 2092	< 1	1	0	3.0	3	3	FAILS

TABLE 7B : GAMMA HCH IN SEDIMENTS DOWNSTREAM OF REGISTERED DISCHARGES

EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 RESULTS

LIST I

EQS = Environmental Quality Standard

All units are $\mu\text{g}/\text{kg}$: Less than values are taken at half face value for calculation of mean.

Discharge	Monitoring location	URN	Grid Reference	Previous Result	No. of Samples	No. of less thans	Mean	Minimum value	Maximum value	Compliance
AXMINSTER STW	AXE AT SLYMLAKES	R02B021	SY2800 9670	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
HONITON STW	OTTER AT COTTARSON FARM	R04B014	ST1480 0075	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
TIVERTON STW	EXE AT ASHLEY	R05E006	SS9528 0990	1.0	1	1	0.5	< 1	< 1	COMPLIES
CULLOMPTON STW	CULM D/S CULLOMPTON STW	R05C043	ST022 060	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
	CULM AT A.396 BRIDGE STOKE CANON	R05C013	SX9380 9760	1.0	1	1	0.5	< 1	< 1	COMPLIES
CREDITON (LORD MEADOW) STW	CREEDY AT WESTACOTT COTTAGES	R05J003	SX8550 9985	< 1.0	1	0	17.0	17	17	FAILS
	YEO (CREEDY) AT DOWNES MILLS	R05K005	SX8560 9910	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
BUCKFAST PLATING COMPANY	DART AT AUSTIN'S BRIDGE	R07B008	SX7500 6600	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
BUCKFASTLEIGH (KILBURY) STW	DART D/S BUCKFASTLEIGH STW	R07B053	SX7536 6531	< 1.3	1	1	0.5	< 1	< 1	COMPLIES
IVYBRIDGE STW	ERME AT CLEEVE	R09B002	SX6335 5520	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
TAVISTOCK (CROWDALE) STW	TAVY D/S CROWDALE STW	R12C023	SX4702 7211	2.0	1	1	0.5	< 1	< 1	COMPLIES
LAUNCESTON (ST LEONARDS) STW	TAMAR AT POLSON BRIDGE	R12J004	SX3559 8490	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
HOLSWORTHY (DERRITON) STW	COLESMILL STREAM D/S OF HOLSWORTHY STW	R12R007	SS3387 0317	-	1	1	0.5	< 1	< 1	-
CALLINGTON (NEW) STW	KELLY BROOK AT CADDAPIT	R12Q009	SX3400 6888	25.0	1	1	0.5	< 1	< 1	COMPLIES
LISKEARD (LODGE HILL) STW	EAST LOOE D/S LISKEARD STW	R14B008	SX225 651	7.0	1	1	0.5	< 1	< 1	COMPLIES
ST AUSTELL (MENAGWINS) STW	ST.AUSTELL RIVER AT MOLINGEY GAUGING ST'N	R18A007	SX0071 4945	-	1	1	0.5	< 1	< 1	COMPLIES
ST COLUMB (JOINT) STW	MENALHYL BELOW ST COLUMB STW	R25A011	SW9041 6413	1.0	1	1	0.5	< 1	< 1	COMPLIES
CAMELFORD STW	CAMEL AT CAMELFORD BRIDGE	R25B001	SX1067 8383	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
BODMIN ST LAWRENCE(NANSTALLON)STW	ST LAWRENCE STREAM PRIOR TO RIVER CAMEL	R25B038	SX0433 6731	-	1	1	0.5	< 1	< 1	-
BODMIN (SCARLETS WELL) STW	DUNMERE STREAM AT DUNMERE	R25B026	SX0478 6771	8.0	1	1	0.5	< 1	< 1	COMPLIES
GREAT TORRINGTON STW	TORRIDGE AT ROTHERN BRIDGE	R29B004	SS4791 1974	< 1.0	1	1	0.5	< 1	< 1	COMPLIES
OKEHAMPTON (HILL BARTON) STW	OKEMENT AT SOUTH DORNAFORD	R29D004	SS5995 0013	< 1.0	1	1	0.5	< 1	< 1	COMPLIES

**TABLE 8 : LIST II IN FRESHWATERS DOWNSTREAM OF REGISTERED DISCHARGES
EC DANGEROUS SUBSTANCES EQS COMPLIANCE : 1990 ENVIRONMENTAL MONITORING RESULTS
ID = INDETERMINANT**

Discharge	Description Of Monitoring Point	URN	Grid Reference	Copper (ug/l)		Zinc (ug/l)		Lead (ug/l)		Chromium (ug/l)		Nickel (ug/l)		Arsenic (ug/l)		EQS						Pass or Fail
				No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	Cu	Zn	Pb	Cr	
Axminster STW	River Axe at Slymlakes	R02B021	SY 2800 9670	19	2.5	19	6.1	19	7.2	19	2.6	19	3.5	0	--	10	75	20	20	150	50	P
Honiton STW	River Otter at Cottarson Farm	R04B014	ST 1480 0075	20	3.4	20	8.5	20	3.6	20	4.4	20	3.2	0	--	10	250	125	200	150	50	P
Tiverton STW	River Exe at Ashley	R05E006	SS 9528 0990	12	4.4	12	6.0	12	5.4	12	4.9	12	5.4	12	4.2	6	50	10	10	100	50	P
Crediton STW	River Creedy at Westacott Cottages	R05J003	SX 8550 9985	12	6.5	12	11.7	12	8.7	12	4.8	12	3.4	12	4.2	10	75	10	20	150	50	P
Crediton STW	River Yeo (Creedy) at Downes Mill	R05K005	SX 8560 9910	20	3.6	20	7.1	20	10.0	20	4.7	20	5.1	11	4.1	10	75	10	20	150	50	P
Heathfield STW	River Bovey at Twinyeo Farm	R06D004	SX 8447 7605	12	2.9	12	7.6	12	3.5	12	2.7	12	3.0	11	4.3	1	8	4	5	50	50	ID
Buckfastleigh STW	River Dart 200m below railway bridge	R07B053	SX 7536 6531	17	2.7	17	4.8	17	3.4	17	2.5	17	2.5	0	--	1	8	4	5	50	50	ID
Buckfast Plating Co.	River Dart at Austins Bridge	R07B008	SX 745 668	12	2.5	12	4.8	12	3.5	12	2.5	12	2.5	0	--	1	8	4	5	50	50	ID
South Brent STW	River Avon at A38 road bridge	R08B008	SX 6978 5925	20	2.8	20	5.2	20	3.4	20	2.8	20	2.8	0	--	1	8	4	5	50	50	ID
Wheal Concord Ltd	Camon River D/S Chacewater STW	R19E008	SW 7560 4308	9	140.0	9	884.6	9	53.5	9	1.4	9	24.3	9	46.7	6	175	125	175	100	50	F
Camon Consolidated Mines Ltd	Camon River D/S Mount Wellington and County adits	R19E015	SW 7669 4146	8	706.5	8	2878.0	8	9.6	8	1.0	8	89.6	8	24.4	10	250	125	200	150	50	F
Camon Consolidated Mines Ltd	Camon River at Bissoe Bridge	R19E003	SW 7758 4115	9	424.3	9	4551.1	9	10.6	9	1.0	9	71.3	9	20.6	28	300	250	250	200	50	F
Camon Consolidated Mines Ltd	Camon River at Devoran Bridge	R19E004	SW 7910 3941	25	450.8	25	8615.0	25	13.1	25	1.1	25	84.5	24	39.0	28	500	250	250	200	50	F
Great Western Ore	Reen Stream at Ramagate	R23A007	SW 6419 3849	7	45.0	7	74.7	7	1.5	7	1.4	7	3.1	7	5.7	6	175	125	175	100	50	F
Great Western Ore	Roseworthy Stream at Penponds	R23A008	SW 6302 3908	12	28.0	12	129.3	12	2.9	12	1.1	12	4.3	12	5.8	6	175	125	175	100	50	ID
Medway Tin Ltd	River Red above South Crofty	R23A002	SW 6613 4090	12	76.8	12	65.0	12	2.2	12	1.0	12	2.7	12	26.2	6	175	125	175	100	50	ID
South Crofty Ltd	River Red at Roscroghan Bridge	R23A003	SW 6502 4201	12	274.8	12	3875.3	12	1249.8	12	1.9	12	23.9	12	31.7	28	500	250	250	200	50	F
South Crofty Ltd	River Red at Kieve Bridge	R23A005	SW 6293 4230	12	165.7	12	1437.1	12	337.5	12	1.2	12	22.9	12	33.3	28	500	250	250	200	50	F
Concord Mineral Processors Ltd	Portreath Stream below Cambrose	R23A015	SW 6739 4485	12	216.0	12	494.3	12	3.6	12	1.0	12	30.1	12	21.4	6	175	250	175	100	50	F
Bodmin (Nanstallon) STW	River Camel at Dunmora Bridge	R25B006	SX 0480 6781	12	2.3	12	8.5	12	1.9	12	1.0	12	0.8	12	5.0	1	8	4	5	50	50	F
Bodmin (Nanstallon) STW	River Camel at Nanstallon Bridge	R25B007	SX 0348 6741	12	3.7	12	12.1	12	2.2	12	1.0	12	1.6	12	5.0	1	8	4	5	50	50	F
Great Torrington STW	River Torridge at Rothem Bridge	R29B004	SS 4791 1974	12	3.2	12	6.7	12	5.4	12	4.7	12	10.5	11	4.5	6	50	10	10	100	50	P
Okhampton STW	River Okement at South Dornaford	R29D004	SS 5995 0013	12	2.5	12	41.8	12	3.5	12	2.5	12	14.3	0	--	1	8	4	5	50	50	F