

EA South West Box 11

**WATER QUALITY SECTION
CORNWALL AREA**

FINAL DRAFT REPORT

**RED RIVER (R23A003)
EC DANGEROUS SUBSTANCE
DIRECTIVE FAILURE 1994**

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RED RIVER (R23A003) EC DANGEROUS SUBSTANCE DIRECTIVE FAILURE 1994**1. INTRODUCTION****1.1. Background**

The Red River at R23A003 failed for total zinc and dissolved copper in 1994. This site is the designated downstream monitoring point for South Crofty discharge (P23A/P/7) under EC dangerous substance directive monitoring. R23A104 is immediately downstream of South Crofty discharge but this site has been dropped from the routine monitoring programme and was never used for EC dangerous substance directive monitoring. These sites and associated routine monitoring sites are shown in figure 1. South Crofty discharge is consented for total zinc and total copper.

1.2. Objectives

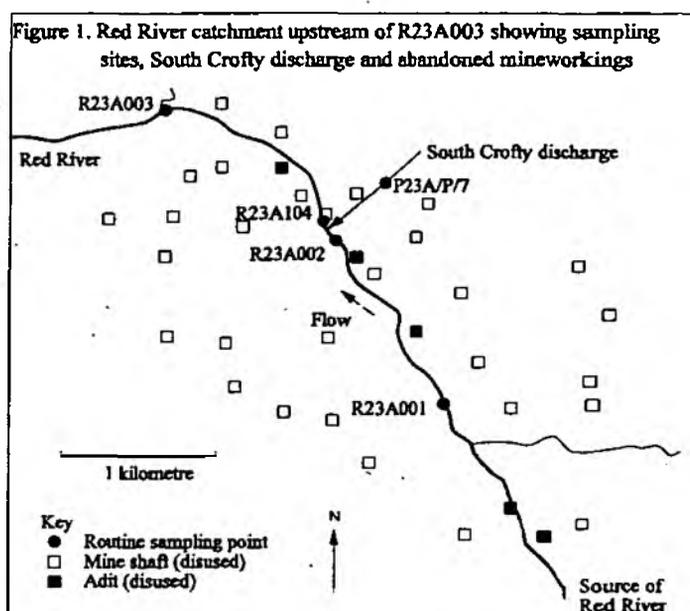
To identify the causes of EC dangerous substance directive failure at R23A003.

2. METHODS

- i) Review water quality and background data.

3. RESULTS

A summary of 1994 water quality data is shown in appendix 1. Abandoned mining areas are shown in figure 1.

**4. DISCUSSION**

Total zinc and dissolved copper standards are exceeded at all Red River sites upstream of R23A003. Abandoned mine workings are thought to be the main source of metals at the two most upstream sites (R23A001 and R23A002). These are upstream of South Crofty discharge and are shown in figure 1.

There is a significant input of total zinc from South Crofty discharge that causes a fourfold increase immediately downstream of the discharge (R23A104) compared with upstream. However, the discharge is well within the consent for total zinc mainly due to the very high maximum allowable concentration. The consent would not appear to be set to achieve the standard required by the EC dangerous substances directive. However, because of the abandoned mining throughout the catchment the achievement of this standard would be impossible in the short term.

There is no data for dissolved copper although comparison with the upstream site and the downstream site at R23A003 shows a decrease in dissolved copper concentrations. Therefore,

abandoned mining upstream of South Crofty discharge can be assumed to be the major source contributing to failure at R23A003.

5. CONCLUSIONS

- i) Total zinc non-compliance at R23A003 was due to South Crofty discharge and abandoned mineworkings.
- ii) Dissolved copper non-compliance at R23A003 was due to abandoned mineworkings.
- iii) All routine sites upstream of South Crofty discharge exceeded total zinc and dissolved copper standards due to abandoned mineworkings.

6. RECOMMENDATIONS

- i) The Red River at R23A003 should be derogated for total zinc and dissolved copper due to inputs from abandoned mineworkings.

Action - Rosanne Broome

Appendix 1. Summary of 1994 water quality data for Red River catchment upstream of R23A003

Red River upstream Brea Tin Works - R23A001

Date	Hardness (mg/l)	Total zinc (µg/l)	Dissolved copper (µg/l)	pH	Suspended solids (mg/l)	Conductivity (µS/cm)
18/01/94	57.6	108	160	7.1	5	205
16/02/94	42.7	28	10	7.0	3	170
14/03/94	58.4	116	210	6.9	14	192
20/04/94	43.9	29	11	6.7	<2	163
09/05/94	39.8	31	12	7.0	<2	167
22/06/94	40.2	23	12	7.0	2	160
19/07/94	40.6	20	10	7.2	2	151
11/08/94	33.2	22	16	6.9	3	157
14/09/94	35.2	22	13	7.1	12	135
04/10/94	33.5	18	6	7.1	5	145
16/11/94	41.4	23	13	6.8	8	152
08/12/94	41.8	67	11	7.0	96	148
Mean or range	42.4	42	40	6.7 to 7.2	13	
Standard		8	1	6 to 9		

Red River upstream South Crofty - R23A002

Date	Hardness (mg/l)	Total zinc (µg/l)	Dissolved copper (µg/l)	pH	Suspended solids (mg/l)	Conductivity (µS/cm)
18/01/94	58.0	117	172	7.4	5	209
16/02/94	55.9	109	160	7.3	<2	204
14/03/94	58.4	119	170	7.6	2	195
20/04/94	59.6	126	180	7.5	<2	195
09/05/94	54.7	117	135	7.7	2	198
22/06/94	55.1	111	120	7.6	<2	192
19/07/94	55.9	107	72	7.7	<2	186
11/08/94	54.7	75	68	7.6	2	182
14/09/94	48.1	96	62	7.6	30	164
04/10/94	51.0	77	41	7.6	2	178
16/11/94	59.7	111	170	7.4	2	187
08/12/94	52.2	100	105	7.4	22	179
Mean or range	55.3	105	121	7.3 to 7.6	6	
Standard		50	6	6 to 9		

South Crofty discharge - P23A/P/7

Date	Hardness (mg/l)	Total zinc (µg/l)	Dissolved copper (µg/l)	pH	Suspended solids (mg/l)	Conductivity (µS/cm)
18/01/94	No data	1300	No data	6.2	78	No data
16/02/94	No data	1100	No data	6.4	40	No data
14/03/94	No data	1500	No data	6.4	16	No data
20/04/94	No data	900	No data	6.5	34	No data
09/05/94	No data	1500	No data	6.9	11	No data
22/06/94	No data	1000	No data	6.4	55	No data
19/07/94	No data	1000	No data	6.3	27	No data
11/08/94	No data	8000	No data	6.4	28	No data
14/09/94	No data	800	No data	6.4	51	No data
04/10/94	No data	900	No data	6.4	46	No data
16/11/94	No data	1110	No data	6.2	39	No data
08/12/94	No data	1000	No data	6.3	36	No data
Mean or range		1676		6.2 to 6.9	38	
Consent		35000		5.5 to 9.0	250	

Red River downstream of South Crofty - R23A104

Date	Hardness (mg/l)	Total zinc (µg/l)	Dissolved copper (µg/l)	pH	Suspended solids (mg/l)	Conductivity (µS/cm)
18/01/94	169.0	290	No data	7.3	14	659
16/02/94	286.0	350	No data	7.1	13	1270
14/03/94	286.0	620	No data	7.0	9	1140
20/04/94	433.0	550	No data	6.9	17	1830
09/05/94	58.8	130	No data	7.7	<2	203
22/06/94	484.0	540	No data	6.8	31	2090
19/07/94	1010.0	830	No data	6.4	25	3820
11/08/94	1120.0	700	No data	6.5	29	4170
14/09/94	734.0	680	No data	6.6	46	2620
04/10/94	670.0	480	No data	6.7	30	2620
16/11/94	180.0	240	No data	7.0	8	725
08/12/94	175.0	230	No data	7.2	25	774
Mean or range	467.2	470		6.7 to 7.7	21	
Standard		125		6 to 9		

Red River at Roscroghan - R23A003

Date	Hardness (mg/l)	Total zinc (µg/l)	Dissolved copper (µg/l)	pH	Suspended solids (mg/l)	Conductivity (µS/cm)
18/01/94	66.7	175	132	7.5	7	230
16/02/94	333.0	450	84	7.1	17	1390
14/03/94	70.5	155	120	7.7	3	235
20/04/94	421.0	505	95	7.0	26	1710
09/05/94	64.2	146	100	7.7	<2	232
22/06/94	87.1	119	60	7.6	3	327
19/07/94	758.0	700	100	6.7	8	2840
11/08/94	774.0	590	65	6.8	25	2850
14/09/94	82.6	173	66	7.5	8	294
04/10/94	705.0	565	65	6.8	23	2680
16/11/94	325.0	390	90	6.9	17	1250
08/12/94	271.0	342	62	7.1	35	1100
Mean or range	329.8	359	87	6.7 to 7.7	14	
Standard		125	28	6 to 9		