Report on the estimated consumption of aluminium, sulphate, copper, zinc, lead and pH following the contaminatton incident on 6th July 1988.

1. INTRODUCTION.

1.1 The Report.

This report has been prepared in three parts:

- Part 1 discusses the basis on which the report has been prepared and how the problem of assessing the consumption of different substances has been undertaken.
- Part 2 contains the results of the analysis of the data and the calculations and assessments, and includes the estimates of consumptions of the different substances.
- Part 3 contains the supporting Appendices referred to in the report.

1.2 General.

I am a Chartered Chemical Engineer and registered Euro-Engineer. Since 1988 I have worked as an independent consultant in water and wastewater technology and in environmental protection policy and technology. 1 have been retained by South West Water Limited, to advise and offer my *expert* opinion on questions which arise from the contamination incident which occurred at the Lowerrnoor Water Treatment Works on 6th July 1988.

I have been instructed to prepare as assessment of the probable levels *of six* different determinands, namely aluminium, sulphate, pH, coper, zinc and lead, in the water consumed during the period of the incident.

As additional background information, I have prepared a description of the Lowermoor Water Treatment Works and the distribution system as it was at the time of the incident on 6th July 1988. This document is given in Appendix I of this report.

It is impossible to model the distribution network as it was at the time of the incident in such a way that values can be sensibly predicted for the concentrations of *aluminium,* sulphate, copper, zinc and lead - nor *for* the pH values - for *the* period after 6th July 1988. I have explained the reasons for this.

I have seen the results of analyses of many hundreds of samples taken by the South West Water Authority (SWWA) after 6th July 1988 and in my view the *best* evidence for the level of the different determinands in the water in the *distribution* network is the results of that sampling and analysis programme. I have therefore developed simple mathematical and statistical models which use the existing data obtained from the sampling and analysis programme, and from these models I have produced a series of graphs and tables. These graphs and tables provide an assessment of the probable levels of the six different determinands in the areas where consumed the affected water, and I have then applied these assessments to each individual . together with the evidence and other data on water consumption. *in* order to produce figures for their probable consumption of the determinands. This information can then be provided to the medical experts as the basis for their opinion on the health effects of the Contamination incident.

1.3 Data and Assessments in Part 2.

I have used the data available *from* the analysis of samples collected by SWWA to prepare estimates of mean values tor the determinands for each day; I have also estimated the maximum and minimum tikely values of the determinands by means of a simple envelope procedure. I report in the tables, and show on the associated graphs, the values predicted by the mathematical models using the data from the samples together with the maximum and minimum values. I have then used these data to estimate the most likely consumption of the different substances or determinands by together with the likely range - *ie* the minimum likely and maximum likely consumption.

It must be noted that the mean shown in the tabtes *is* nor the same as the mid-paint of the range between the estimated likely maximum and likely minimum values. In mathematical language the mid-point *of* the range may be more correctly termed the "mode"[1].

1.4 Limitations on the Data Used.

I have not used all the data reported from the SWWA sampling programme since, according to the analytical reports, some samples were obtained from sources which were not drinking water. These are identified on the analytical reports as either "non potable water", "spring water" *or* "hot tap" water. I have therefore only used those results from the analytical reports which were clearly for potable water drawn from the supply network.

I did not use water drawn from hot water samples for the following two reasons. Firstly, it is widely accepted that the only tap from which water should be drunk is the tap in the kitchen which is fed directly from the mains; all other raps, in *most* houses in England, are supplied from a tank in the roof, and this tank can be subject to contamination from such things as rodents and birds. It is satisfactory as bath water and for toitet flushing, but should not be used for drinking purposes. Any person drinking from a hot tap is therefore always taking a risk of drinking contaminated water. Secondly, *the* solubility *of* copper, *zinc and* lead in hot water is different from solubilities in cold water, and thus the data are qualitatively of a different class, and to include them would introduce a distortion into the analysis.

I did not use the data reported for sample 054/07652 taken on 21st July 1988 and sample 054/07717 taken an 22nd July 1988 from . in the Delabole/Rockhead area (Area *8*). The analyses of these samples showed sulphate concentrations of 455 mg/l and 381 respectively at a time when all other analyses were showing levels of around 18-24 mg/l. The first sample also had calcium concentrations of 167 mg/l, compared with the normal level of about 10-13 mg/l and a magnesium concentration of 19.4 compared to a normal level of 1.1. The sulphate concentration was roughly twenty times its normal level, the magnesium was also about twenty times its normal level, and the calcium was about 16 times its normal level. Furthermore, the second sample contained only 0.01 mg/l of aluminium, so the 381 mg/l of sulphate was quite evidently not related to aluminium sulphate but more likely to calcium and'magnesium sutphate. Also, the incident was

[1] For example, consider the set of five numbers 1,2,2,3,10.
The average of these values is 18/5=3.6; however, the mid point between 1 and 10 is 5. Thus the average of a set of numbers is not necessarily the mid-point of the range between the maximum and minimum values in that set.

isolated and there were no other records during this time in Area 6 of such a distortion in the analytical results. The analyses were clearly anomalous and not part of the normal population of sutphate results nor of the Lowermoor Incident and I have therefore not included them in my modelling and statistical assessments.

Another anomaly occurred on 18th July 1988 when a value of 20.05 mg copper/l is recorded for a sample taken in a garage in Delabole, ye? the same sample shows only 0.01 mg/l for zinc, 0.009 mg/l for lead and 25.3 mg/l for sulphate and a pH of 8.2 (which is slightly alkaline), all of which are normal and acceptable values. The high reading for copper is unlikely to be caused by the presence of acid since the pH was 8.2. Furthermore, no other analysis from this or any other similar source (le cold potable water) in the period July and August 1988 shows such a very high copper level and in my opinion this result should be properly ignored.

I should also like to comment on a point made in the Reports of the Lowermoor Incident Advisory Group on water quality. In the first report the Advisory Group reports that an aluminium concentration of up to 620 mg/l and a sulphate concentration of up to 1,500 mg/l were recorded. However, these results were obtained from samples, analysed by Somerset County Council, which had been retained for some time between sampling and analysis. The Advisory Group points out in paragraph 16 on page 50 of their second report that the samples were "retained samples" which were collected by consumers in an available but not necessarily suitable container. I have therefore disregarded the results reponed by Somerset County Council since they must be regarded as unreliable.

2. THE DATA

2.1 Locations of during the Lowermoor Incident.

From the documents it is possible to identify three areas in which allegedly drank the affected water.

The addresses at which it is claimed that first and ordinarily consumed the water are as follows:

1. , St. Endellion, Port Isaac.
2. , New Polzeath, Wadebridge.
3. as above
4. as above
5. , Churchtown. St. Minver.
6. , Delabole
   , Delabole.
7. frevethy, Tintagel.
8. ., Boscastle.
9. as above
10. Camelford.

The locations and numbers of

St. Minver,	(1)
Boscastle,	(2)
Port Isaac,	(1)
Tintagel,	(1)
Delabole,	(1)
New Polzeath,	(3)
Camelford.	(1)

These can be divided into three roughly composite areas, A, 3 and C:-

Area A. St. Minver/Port Isaac/New Polzeath, served from the St. Endellion reservoir.

Area B. Delabole/Tintagel/Boscastle, served from the Delabole and Rockhead reservoirs.

Area C. Camelford, served directly from the Lowermoor *site.*

I have therefore prepared data based on these areas

Area A - St. Endellion.

1. , St. Endellion, Port Isaac.
2. , New Polzeath, Wadebridge.
3. as above
4. as above
5. Churchtown, St. Minver.

Area B - Delabole/Rockhead.

6. Delabole
, Delabole.
7. Trevethy, Tintagel.
8. Boscastle.
9. as above

Area C - Camelford.

10. Camelford.

Data for the three areas are given in the pages in Part 2 of this report.

2.2 The substances in the water.

In the tables in this report I give data for the estimated values for the concentrations of the four metals as maxima, minima and mean values. The meanings of these terms are discussed in section 1.2 above.

Although I have commented on sulphate all the measurements show values for sulphate within the value of 250mg/l which is the Maximum Admissible Concentration (MAC) specified in the EC water

quality directive[2]. Details of *the* water quality required by the directive (and subsequently incorporated into English law In 1989) are given in Appendix III to this report. Although all the SWWA data on sulphate show concentrations within the EC MAC limits there is one sample for which there is evidence that the sulphate concentration exceeded the EC MAC. In some cases, where there was no sulphate concentration shown in the analytical reports, I have used the aluminium concentrations to estimate a possible sulphate concentration; these estimates are clearly shown on the graphs and in the relevant tables in Part 2 of this report. One estimation, for 7th July 1988 in the Delabole/Rockhead Area, has 'produced a sulphate concentration of 600 mg/l, substantially in *excess* of the EC MAC. Despite the fact that *most* of the evidence in the documentation suggests that sulphate in the period was below the EC MAC, in order to ensure that this report is complete I have included full data and comments on sulphate consumption.

The *same comments* also apply *to* pH; *the* range within which the pH of drinking water should lie is *5.5* - 9.5, and for all but a brief period the water was within this range. It should be remembered that a pH below *5.5* is not necessarily an indication in itself *of a* health risk; bottled carbonated waters may be below a pH of 5, and some *soft* drinks such as Coca Cola and lemonade can have a pH *of* less than 3. In order to make a useful comparison I have included data on the pH graphs for lemonade. pH is not in itself a problem (pH values as low as 1 may occur naturally, without harm, in the stomach). The potential problem with a pH below 5.5 is that it may increase the pick-up of metals from the domestic pipes which carry drinking water such as copper, zinc and lead.

The presence of copper, zinc and lead is indirectly linked to the discharge of the aluminium sulphate and it has proved impossible to model mathematically the concentrations for these metals, and in estimating values to calculate the consumption I have, in some instances, assumed that on days for which there was no sample the concentration is related to samples taken on adjacent days. Also, values for these metals were frequently below the limits of analytical detection and were therefore recorded as, for example, <0.05mg/l (ie less than 0.05mg/l). In making the estimates *for* consumption I have used the limiting value - ie if a substance is reported as <0.05mg/l I have used a value of 0.05mg/l in the estimate; thus the values in my estimates generally *err an* the high side - maybe excessively so in the case of zinc and lead where many readings are recorded as "less than' some analytical limit.

[2] It appears that the definition *of* whether the water was suitable tor consumption during *the* Lowermoor incident is based on the water quality standards in the EC directive on the quality of drinking water. It should be noted that some of *the* values in the directive are not basad on health considerations but on other aspects such as the aesthetic quality of the water.

2.3 Consumption of substances in the water.

The consumption of substances from the drinking water depends on how much water was drunk. I give in the table below the daily consumption of water I have used in estimating the daily intake of aluminium, copper, zinc and lead. The table is based on statements made where the statements give no estimate of tap water consumption I have used a figure of 2 litres/day which is an accepted average value for normal adults.

Table showing the daily consumption of tap water for each

These figures have been used in estimating the consumption of substances in the tap water.

	Comments in Statement	Quantity in Pints	Quantity in Litres	Comments
Area A				
	Approx. 3 pints a day.	3.0	1.7	
	Normal quantities.		2.0	
	Normal quantities.		2.0	
	Normal quantities.		2.0	
	2 pints hot drinks per day. 3 pints cold drinks per day.	5.0	2.84	Because of a kidney disorder, drank more than average.
Area B				
	1½ to 2 pints a day.	2.0	1.14	
	The usual quantities.		2.0	
	Nothing on quantity consumed		2 0	Also consumed water from bowsar during the period.
	5–6 cups per day.	3.0	1.7	I have assumed a cup to be a BS hall pint cup.
	Usual quantities.		2.0	

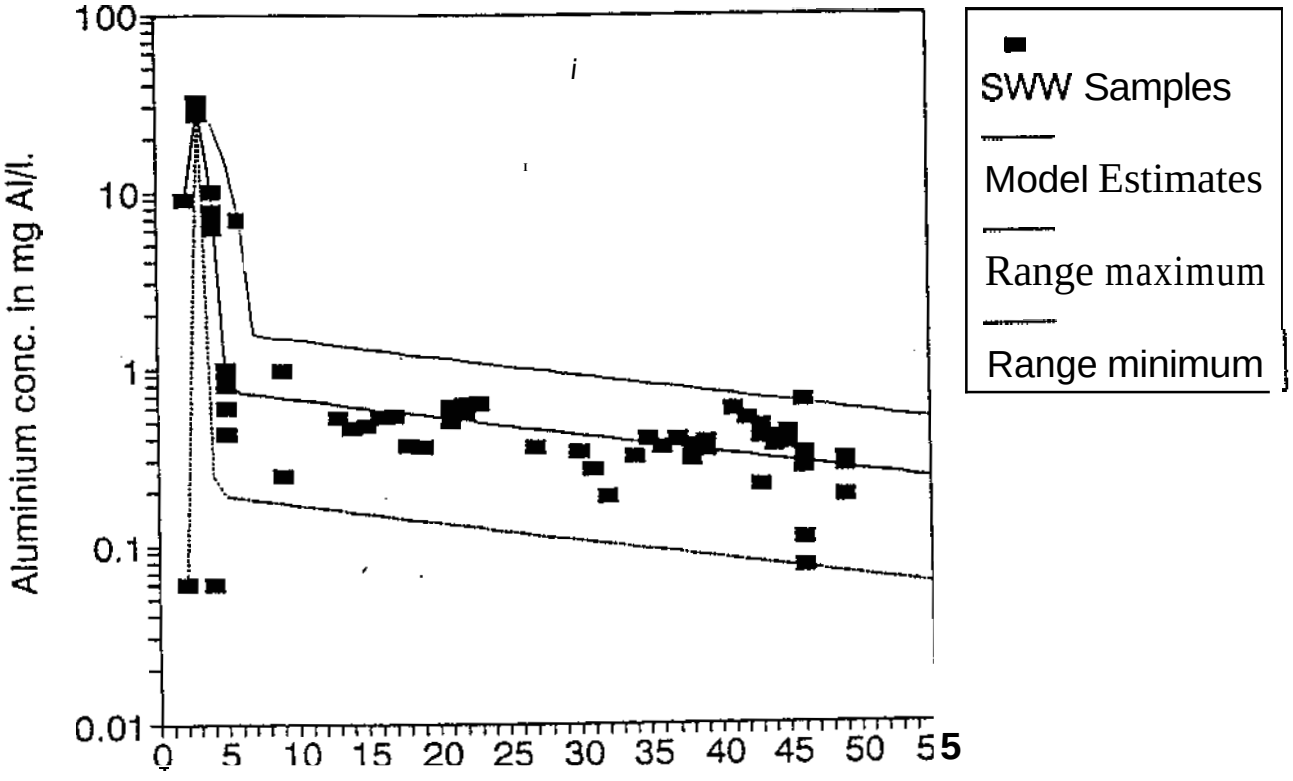
PART 2

Results of analyses of samples from the St. Endellion Area.

Page	Date	Day	pH	Sulphate	Aluminium	Copper	Zinc	Lead
242	07-Jul-88	2			9.00			
410	07-Jul-88	2			0.06			
246	08-Jul-88	3	*5.0*		27.50	0.45	0.41	0.03
244	08-Jul-88	3	4.0		32.50	0.57	0.85	0.04
357	09-Jul-88	4	4.7		7.70	*0.06*	0.57	<0.01
358	09-Jul-88	4	4.8	110.0	10.08	*0.57*	0.73	<0.01
360	09-Jul-88	4	4.6	83.0	6.20	0.77	0.21	<0.01
359	09-Jul-88	4	8.8		0.06	<0.01	<0.02	<0.01
356	09-Jul-88	4	4.6	115.0	6.93	8.8	1.2	<0.01
363	10-Jul-88	5	6.8	16.0	0.43	<0.01	0.02	<0.03
361	10-Jul-88	5	4.8	37.0	1.00	0.39	0.09	<0.03
382	10-Jul-88	*5*	5.0	35.0	0.80	0.03	0.18	<0.03
365	10-Jul-88	5	6.1	33.0	0.96	0.18	0.08	<0.03
364	10-Jul-88	*5*	6.8	16.0	0.60	0.01	0.02	<0.03
248	11-Jul-88	6	*7.5*	29.0	6.90	0.05	<0.05	<0.05
249	14-Jul-88	9	*7.8*	24.0	0.98	<0.005	<0.005	<0.005
250	14-Jul-88	9	5.8	*27.0*	*0.25*	0.04	0.016	<0.005
251	18-Jul-88	13	8.0	23.6	*0.53*	<0.005	0.011	<0.005
366	19-Jul-88	14	*7.9*	*31.2*	0.40	0.013	0.01	0.005
252	20-Jul-88	15	*8.4*	*27.0*	0.48			
253	21-Jul-88	16	7.6	22.1	0.53	<0.05	<0.05	<0.05
254	22-Jul-88	17	8.1	11.4	0.54	<0.05	<0.05	<0.05
255	23-Jul-88	18	7.7	19.7	0.37	<0.05	<0.05	<0.05
256	24-Jul-88	19	8.0	19.1	0.36	<0.05	<0.05	<0.05
257	26-Jul-88	21	7.8	19.1	0.51	<0.05	<0.05	<0.05
369	26-Jul-88	21			0.61			
370	27-Jul-88	22	8.0	21.6	0.62	<0.05	<0.05	<0.05
258	27-Jul-88	22	7.9	21.8	0.56	<0.05	<0.05	<0.05
259	28-Jul-88	23	7.7	22.5	*0.64*	<0.05	<0.05	<0.05
260	01-Aug-88	27	7.8	22.7	0.36	<0.05	<0.05	<0.05
261	03-Aug-88	29	7.8	*20.2*	0.34	<0.05	<0.05	<0.05
372	03-Aug-88	29	7.8	19.0	0.34	0.028	0.006	<0.005
263	04-Aug-88	30	7.9		0.27	<0.05	<0.05	<0.05
264	05-Aug-88	31	*7.8*	*20.7*	0.19	<0.05	<0.05	<0.05
265	07-Aug-88	33	*7.9*	18.5	0.32	<0.05	<0.05	<0.05
266	08-Aug-88	34	*7.7*	18.6	0.40	<0.05	<0.05	<0.05
267	09-Aug-88	35	*7.5*	20.5	0.36	<0.05	<0.05	<0.05
268	10-Aug-88	36	*7.7*	19.0	0.40	<0.05	<0.05	<0.05
269	11-Aug-88	37	8.1	18.8	0.37	<0.05	<0.05	<0.05
270	11-Aug-88	37	8.1	19.0	0.31	<0.05	<0.05	<0.05
374	12-Aug-88	38	8.2	15.8	0.39	0.008	0.013	<0.005
271	12-Aug-88	38	ao	*19.0*	0.35	<0.05	<0.05	<0.05
272	14-Aug-88	*40*	8.0	18.4	0.59	<0.05	<0.05	<0.05
375	15-Aug-88	41	8.2	18.2	0.52	0.013	0.009	<0.005
276	16-Aug-88	42	7.6	20.1	0.22	<0.05	<0.05	<0.08
281	16-Aug-88	42	*8.7*	10.4	0.41	<0.05	<0.05	<0.05
283	16-Aug-88	42	*8.0*	18.4	0.46	<0.05	<0.05	<0.05
275	16-Aug-88	42	7.7	20.9	0.43	10.05	0.07	<0.08
273	16-Aug-88	42	7.8	21.1	0.45	<0.05	<0.05	<0.08
274	16-Aug-88	42	7.8	20.(	0.47	<0.05	<0.05	<0.08
285	17-Aug-88	43	7.8		0.41	<0.05	<0.05	<0.05
284	17-Aug-88	43	7.8		0.37	<0.05	<0.05	<0.05
412	17-Aug-88	43	8.1	16.2	0.37	<0.005	<0.005	<0.005
287	18-Aug-88	44	*7.6*	17.2	0.38	<0.05	<0.05	<0.08
286	18-Aug-88	44	7.6	17.	0.435	<0.05	<0.05	<0.08
288	18-Aug-88	44	7.7	17.2	0.406	<0.05	<0.05	<0.08
296	19-Aug-88	45	7.6	17.3	0.526	<0.05	<0.05	<0.08
297	19-Aug-88	45	7.8	17.(	0.277	<0.05	<0.05	<0.08
294	19-Aug-88	45	*7.1*	12.:	0.111	<0.05	<0.05	<0.08
293	19-Aug-88	45	7.5	10.	0.076	<0.05	<0.05	<0.08
294	19-Aug-88	45	7.1	16.:	0.313	<0.05	<0.05	<0.08
295	19-Aug-88	45	7.8	17.	0.654	<0.05	<0.05	<0.08
309	22-Aug-88	48			0.31	*0.02*	0.03	<0.01
312	22-Aug-88	48	9.:	17.	*0.28*	<0.01	<0.01	0.01
311	22-Aug-88	48			*0.31*	0.05	0.03	<0.01
310	22-Aug-88	48	9.:	17.	0.19	0.01	0.03	<0.01

NOTE: Concentration re in mg of substance/litre.

Aluminium concentrations for the St. Endellion **Area.**



Results of analyses for aluminium in samples from the St. Endellion Area.

Date	Day	Aluminium Samples	Date	Day	Aluminium Samples
07-Jul-88	2	9.00	05-Aug-88	32	0.19
07-Jul-88	2	0.06	07-Aug-88	34	0.32
08-Jul-88	3	27.50	08-Aug-88	35	0.40
08-Jul-88	3	3250	09-Aug-88	36	0.36
09-Jul-88	4	7.70	10-Aug-88	37	0.40
09-Jul-88	4	10.08	11-Aug-88	38	0.37
09-Jul-88	4	6.20	11-Aug-88	38	0.31
09-Jul-88	4	0.06	12-Aug-88	39	0.39
09-Jul-88	4	6.93	12-Aug-88	39	0.35
10-Jul-88	5	0.43	14-Aug-88	41	0.59
10-Jul-88	5	1.00	15-Aug-88	42	0.52
10-Jul-88	5	0.80	16-Aug-88	43	0.22
10-Jul-88	5	0.96	16-Aug-88	43	0.41
10-Jul-88	5	0.60	16-Aug-88	43	0.46
11-Jul-88	6	6.90	16-Aug-88	43	0.48
14-Jul-88	9	0.48	16-Aug-88	43	0.45
14-Jul-88	9	0.25	16-Aug-88	43	0.47
18-Jul-88	13	0.53	17-Aug-88	44	0.41
19-Jul-88	14	0.46	17-Aug-88	44	0.37
20-Jul-88	15	0.48	17-Aug-88	44	0.37
21-Jul-88	16	0.53	18-Aug-88	45	0.38
22-Jul-88	17	0.54	18-Aug-88	45	0.435
23-Jul-88	18	0.37	18-Aug-88	45	0.404
24-Jul-88	19	0.36	19-Aug-88	46	0.328
26-Jul-88	21	0.51	19-Aug-88	46	0.277
26-Jul-88	21	0.61	19-Aug-88	46	0.111
27-Jul-88	22	0.62	19-Aug-88	46	0.076
27-Jul-88	22	0.56	19-Aug-88	46	0.313
28-Jul-88	23	0.64	19-Aug-88	46	0.654
01-Aug-88	27	0.36	22-Aug-88	49	0.310
03-Aug-88	30	0.34	22-Aug-88	49	0.280
03-Aug-88	30	0.34	22-Aug-88	49	0.310
04-Aug-88	31	0.27	22-Aug-88	49	0.190

Estimated Aluminium Concentrations in mg Al/litre for the St. Endellion Area.

Date	Day	Aluminium Concentrations Est.	Max.	Min.
07-Jul-88	2	8.4	9.0	0.06
08-Jul-88	3	32.5	325	32.50
09-Jul-88	4	92	24.0	0.25
10-Jul-88	5	0.90	15.5	0.191
11-Jul-88	6	0.74	6.9	0.186
12-Jul-88	7	0.72	1.56	0.182
13-Jul-88	8	*0.70*	1.53	0,178
14-Jul-88	9	0.69	1.49	0.174
15-Jul-88	10	*0.07*	1.46	0.170
16-Jul-88	11	0.66	1.43	0.166
17-Jul-88	12	0.64	1.39	0.162
18-Jul-88	13	0.63	1.36	0.159
19-Jul-88	14	0.61	1.33	0.155
20-Jul-88	15	0.60	1.30	0.152
21-Jul-88	16	0.59	1.27	0.148
22-Jul-88	17	0.57	1.24	0.145
23-Jul-88	18	0.56	1.21	0.142
24-Jul-88	19	0.55	1.19	0.138
25-Jul-88	20	0.54	1.16	0.135
26-Jul-88	21	0.52	1.13	0.132
27-Jul-88	22	0.51	1.11	0.129
28-Jul-88	23	*0.50*	1.08	0.126
29-Jul-88	24	0.49	1.06	0.123
30-Jul-88	25	0.48	1.03	0.121
31-Jul-88	26	0.47	1.01	0.118
01-Aug-88	27	*0.46*	0.99	0.115
02-Aug-88	28	0.45	0.97	0.113
03-Aug-88	29	0.44	0.94	0.110
04-Aug-88	30	0.43	*0.92*	0.108
05-Aug-88	31	0.42	0.90	*0*.105
06-Aug-88	32	0.41	0.88	0.10
07-Aug-88	33	0.40	0.86	0.100
08-Aug-88	34	*0.39*	*0.84*	0.098
09-Aug-88	35	0.38	0.82	0.096
10-Aug-88	36	0.37	0.80	0.094
11-Aug-88	37	0.36	*0.76*	0.092
12-Aug-88	38	*0.35*	0.77	0.090
13-Aug-88	39	*0.35*	0.75	0.088
14-Aug-88	40	0.34	0.73	0.086
15-Aug-88	41	0.33	0.72	0.084
16-Aug-88	42	*0.32*	0.70	0.082
17-Aug-88	43	0.32	*0.61*	0.080
18-Aug-88	44	0.31	0.67	0.078
19-Aug-88	45	*0.302*	0.654	0.076
20-Aug-88	46	*0.295*	0.639	0.075
21-Aug-88	47	0.289	0.625	*0.07:*
22-Aug-88	48	0.282	0.611	0.07'
23-Aug-88	49	0.276	0.59:	0.076
24-Aug-88	50	0.269	0.583	0.06(
25-Aug-88	51	0.263	0.57(	0.06(
26-Aug-88	52	0.257	0.55'	0.06:
27-Aug-88	53	0.251	0.54(	0.06-
28-Aug-08	54	*0.244*	0.53:	0.06:
29-Aug-08	55	0.240	0.52	0.06
30-Aug-08	56	0.23:	0.50	*0.05*
31-Aug-08	57	0.22:	0.49	*0.05*
01-Sep-08	58	0.22(	0.48	*0.05*
02-Sep-08	59	0.21(	0.47	0.05
03-Sep-08	60	0.21(	0.464	*0.05*
04-Sep-08	61	0.20:	0.454	*0.05*
05-Sep-08	62	0.20:	0.443	*0.05*

Comments on the aluminium intake of

The table on the following page gives an estimate of the aluminium intake for the period up *to* 31st August, after which *date* there are insufficient data to be able *to* make any satisfactory prediction.

I have not seen any data for samples taken from the premises where resided at the time of the incident.

Predicted daiiy intake of aluminium in mg/day by

91/2737

Crowther Clayton Associates

Date	Day	Aluminium intake in mg/day		
		By Model	Maximum	Minimum
07-Jul-88	2	14.3	15.3	0.1
08-Jul-88	3	55.3	55.3	55.3
09-Jul-88	4	15.7	40.7	0.4
10-Jul-88	5	1.5	26.3	0.3
11-Jul-88	6	1.3	11.8	0.3
12-Jul-88	7	1.2	2.7	0.3
13-Jul-88	8	1.2	2.6	0.3
14-Jul-88	9	1.2	2.5	0.3
15-Jul-88	10	1.1	2.5	0.3
16-Jul-88	It	1.1	2.4	0.3
17-Jul-88	12	1.1	2.4	0.3
18-Jul-88	13	1.1	2.3	0.3
19-Jul-88	14	1.0	2.3	0.3
20-Jul-88	15	1.0	2.2	0.3
21-Jul-88	16	1.0	2.2	0.3
22-Jul-88	17	1.0	2.1	0.2
23-Jul-88	18	1.0	2.1	0.2
24-Jul-88	19	0.9	2.0	0.2
25-Jul-88	20	0.9	2.0	0.2
26-Jul-88	21	0.9	1.9	0.2
27-Jul-88	22	0.9	1.9	0.2
28-Jul-88	23	0.8	1.8	0.2
29-Jul-88	24	0.8	1.8	0.2
30-Jul-88	25	0.8	1.8	0.2
31-Jul-88	26	0.8	1.7	0.2
01-Aug-88	27	0.8	1.7	0.2
02-Aug-88	29	0.8	1.6	0.2
03-Aug-88	30	0.7	1.6	0.2
04-Aug-88	31	0.7	1.6	0.2
05-Aug-88	32	0.7	1.5	0.2
06-Aug-88	33	0.7	1.5	0.2
07-Aug-88	34	0.7	1.5	0.2
08-Aug-88	35	0.7	1.4	0.2
09-Aug-88	36	0.6	1.4	0.2
10-Aug-88	37	0.6	1.4	0.2
11-Aug-88	38	0.6	1.3	0.2
12-Aug-88	39	0.6	1.3	0.2
13-Aug-88	40	0.6	1.3	0.1
14-Aug-88	41	0.6	1.2	0.1
15-Aug-88	42	0.6	1.2	0.1
16-Aug-88	43	0.5	1.2	0.1
17-Aug-88	44	0.5	1.2	0.1
18-Aug-88	45	0.5	1.1	0.1
19-Aug-88	46	0.5	1.1	0.1
20-Aug-88	47	0.5	1.1	0.1
21-Aug-88	48	0.5	1.1	0.1
22-Aug-88	49	0.5	1.0	0.1
23-Aug-88	50	0.5	1.0	0.1
24-Aug-88	51	0.5	1.0	0.1
25-Aug-88	52	0.4	1.0	0.1
26-Aug -68	53	0.4	0.9	0.1
27-hug88	54	0.4	0.9	0.1
28-Aug-08	55	0.4	0.9	0.1
29-Aug-08	56	0.4	0.9	0.1
30-Aug-08	57	0.4	0.9	0.1
31-Aug-08	58	0.4	0.1	0.1

Comments on the aluminium intake of

The table on the following page gives an estimate of the aluminium intake for the period up to 31st August, after which date there are insufficient data to be able to make any satisfactory prediction.

I have not seen any data for samples taken from the premises where resided at the time of the incident. The only data for I have seen are the analyses of samples taken on 27th April 1989 and 4th May 1989 in which the aluminium concentrations were *0.08* mg/l and 0.05 mg/l, both well below the EC MAC of 0.2 mg/l.

Predicted daily intake of aluminium in mg/day by

91/2737

Crowther Clayton Associates

Date	Day	Aluminium Intake in mg/day		
		By Model	Maximum	Minimum
07-Jul-88	2	16.9	18.0	0.1
08-Jul-88	3	65.1	65.0	65.0
09-Jul-88	4	18.4	47.9	0.5
10-Jul-88	5	1.8	31.0	0.4
11-Jul-88	6	1.5	13.9	0.4
12-Jul-88	7	1.4	3.1	0.4
13-Jul-88	8	1.4	3.1	0.4
14-Jul-88	9	1.4	3.0	0.3
15-Jul-88	10	1.3	2.9	0.3
16-Jul-88	11	1.3	2.9	0.3
17-Jul-88	12	1.3	2.8	0.3
18-Jul-88	13	1.3	2.7	0.3
19-Jul-88	14	1.2	2.7	0.3
20-Jul-88	15	1.2	2.6	0.3
21-Jul-88	16	1.2	2.5	0.3
22-Jul-88	17	1.1	2.5	0.3
23-Jul-88	18	1.1	2.4	0.3
24-Jul-88	19	1.1	2.4	0.3
25-Jul-88	20	1.1	2.3	0.3
26-Jul-88	21	1.0	2.3	0.3
27-Jul-88	22	1.0	2.2	0.3
28-Jul-88	23	1.0	2.2	0.3
29-Jul-88	24	1.0	2.1	0.2
30-Jul-88	25	1.0	2.1	0.2
31-Jul-88	26	0.9	2.0	0.2
01-Aug-88	27	0.9	2.0	0.2
02-Aug-88	29	0.9	1.9	0.2
03-Aug-88	30	0.9	1.9	0.2
04-Aug-88	31	0.9	1.8	0.2
05-Aug-88	32	0.8	1.8	0.2
06-Aug-88	33	0.8	1.8	0.2
07-Aug-88	34	0.8	1.7	0.2
08-Aug-88	35	0.8	1.7	0.2
09-Aug-88	36	0.8	1.6	0.2
10-Aug-88	37	0.7	1.6	0.2
11-Aug-88	38	0.7	1.6	0.2
12-Aug-88	39	0.7	1.5	0.2
13-Aug-88	40	0.7	1.5	0.2
14-Aug-88	41	0.7	1.5	0.2
15-Aug-88	42	0.7	1.4	0.2
16-Aug-88	43	0.6	1.4	0.2
17-Aug-88	44	0.6	1.4	0.2
18-Aug-88	45	0.6	1.3	0.2
19-Aug-88	46	0.6	1.3	0.2
20-Aug-88	47	0.6	1.3	0.1
21-Aug-88	48	0.6	1.2	0.1
22-Aug-88	49	0.6	1.2	0.1
23-Aug-88	50	0.6	1.2	0.1
24-Aug-88	51	0.5	1.2	0.1
25-Aug-88	52	0.5	1.1	0.1
26-Aug-88	53	0.5	1.1	0.1
27-Aug-88	54	0.5	1.1	0.1
28-Aug-08	55	0.5	1.1	0.1
29-Aug-08	56	0.5	1.0	0.1
30-Aug-08	57	0.5	1.0	0.1
31-Aug-08	58	0.5	1.0	0.1

Comments on the aluminium intake of

The table on the following page gives an estimate of the aluminium intake for the period up to 31st August, after which date there are insufficient data to be able to make any satisfactory prediction.

I have not seen any data for samples taken from the premises where resided at the time of the incident. The only data I have seen are the analyses of samples taken on 27th April 1989 and 4th May 1989 in which the aluminium concentrations were 0.08 mg/l and 0.05 mg/l respectively, both well betow the EC MAC of 0.2 mg/l.

Predicted daily intake of aluminium in mg/day by

Date	Day	Aluminium intake in mg/day By Model	Maximum	Minimum
07-Jul-88	2	14.3	15.3	0.1
08-Jul-88	3	55.3	55.3	55.3
09-Jul-88	4	15.7	40.7	0.4
10-Jul-88	5	1.5	26.3	0.3
11-Jul-88	6	1.3	11.8	0.3
12-Jul-88	7	1.2	27	0.3
13-Jul-88	8	1.2	2.6	0.3
14-Jul-88	9	1.2	2.5	0.3
15-Jul-88	10	1.1	2.5	0.3
16-Jul-88	11	1.1	2.4	0.3
17-Jul-88	12	1.1	2.4	0.3
18-Jul-88	13	1.1	2.3	0.3
19-Jul-88	14	1.0	2.3	0.3
20-Jul-88	15	1.0	2.2	0.3
21-Jul-88	16	1.0	2.2	0.3
22-Jul-88	17	1.0	2.1	0.2
23-Jul-88	10	1.0	2.1	0.2
24-Jul-88	19	0.4	2.0	0.2
25-Jul-88	20	0.9	2.0	0.2
26-Jul-88	21	0.9	1.9	0.2
27-Jul-88	22	0.9	1.9	0.2
28-Jul-88	23	0.8	1.8	0.2
29-Jul-88	24	0.8	1.8	0.2
30-Jul-88	25	0.8	1.8	0.2
31-Jul-88	26	0.0	1.7	0.2
01-Aug-88	27	0.8	1.7	0.2
02-Aug-88	29	0.8	1.6	0.2
03-Aug-88	30	0.7	1.6	0.2
04-Aug-88	31	0.7	1.6	0.2
05-Aug-88	32	0.7	1.5	0.2
06-Aug-88	33	0.7	1.5	0.2
07-Aug-88	34	0.7	1.5	0.2
08-Aug-88	35	0.7	1.4	0.2
09-Aug-88	36	0.6	1.4	0.2
10-Aug-88	37	0.6	1.4	0.2
11-Aug-88	38	0.6	1.3	0.2
12-Aug-88	39	0.6	1.3	0.2
13-Aug-88	40	0.6	1.3	0.1
14-Aug-88	41	0.6	1.2	0.1
15-Aug-88	42	0.6	1.2	0.1
16-Aug-88	43	0.5	1.2	0.1
17-Aug-88	44	0.5	1.2	0.1
18-Aug-88	45	0.5	1.1	0.1
19-Aug-88	46	0.5	1.1	0.1
20-Aug-88	47	0.5	1.1	0.1
21-Aug-88	48	0.5	1.1	0.1
22-Aug-88	49	0.5	1.0	0.1
23-Aug-88	50	0.5	1.0	0.1
24-Aug-88	51	0.5	1.0	0.1
25-Aug-88	52	0.4	1.0	0.1
26-Aug-88	53	0.4	0.9	0.1
27-Aug-88	54	0.4	0.9	0.1
28-Aug-08	55	0.4	0.9	0.1
29-Aug-08	56	0.4	0.9	0.1
30-Aug-08	57	0.4	0.5	0.1
31-Aug-08	58	0.4	0.8	0.1

Comments on the aluminium intake of

The table on *the* following page *gives* an estimate of the aluminium intake for the period up to 31st August, after which date there are insufficient data to be able to make any satisfactory prediction.

I have not seen any data for samples taken from the premises where resided at the time of the Incident. The only data for I have seen are the analyses of samples taken on 27th April 1989 and 4th May 1989 in which the aluminium concentrations were 0.08 mg/l and *0.05* mg/l, both well below the EC MAC of 0.2 mg/l.

Predicted daily intake of aluminium in mg/day by

Date	Day	Aluminium Intake in mg/day		
		By Model	Maximum	Minimum
07-Jul-88	2	16.9	16.0	0.1
08-Jul-88	3	65.1	65.0	65.0
09-Jul-88	4	18.4	47.9	0.5
10-Jul-88	5	1.8	31.0	0.4
11-Jul-88	6	1.5	13.9	0.4
12-Jul-88	7	1.4	3.1	0.4
13-Jul-88	8	1.4	3.1	0.4
14-Jul-88	9	1.4	3.0	0.3
15-Jul-88	10	1.3	2.9	0.3
16-Jul-88	11	1.3	2.9	0.3
17-Jul-88	12	1.3	2.8	0.3
18-Jul-88	13	1.3	2.7	0.3
19-Jul-88	14	1.2	2.7	0.3
20-Jul-88	15	1.2	2.6	0.3
21-Jul-88	16	1.2	2.5	0.3
22-Jul-88	17	1.1	2.5	0.3
23-Jul-88	18	1.1	2.4	0.3
24-Jul-88	19	1.1	2.4	0.3
25-Jul-88	20	1.1	2.3	0.3
26-Jul-88	21	1.0	2.3	0.3
27-Jul-88	22	1.0	2.2	0.3
28-Jul-88	23	1.0	2.2	0.3
29-Jul-88	24	1.0	2.1	0.2
30-Jul-88	25	1.0	2.1	0.2
31-Jul-88	26	0.9	2.0	0.2
01-Aug-88	27	0.9	2.0	0.2
02-Aug-88	29	0.9	1.9	0.2
03-Aug-88	30	0.9	1.9	0.2
04-Aug-88	31	0.9	1.8	0.2
05-Aug-88	32	0.8	1.8	0.2
06-Aug-88	33	0.8	1.8	0.2
07-Aug-88	34	0.8	1.7	0.2
08-Aug-88	35	0.8	1.7	0.2
09-Aug-88	36	0.8	1.6	0.2
10-Aug-88	37	0.7	1.6	0.2
11-Aug-88	38	0.7	1.6	0.2
12-Aug-88	39	0.7	1.5	0.2
13-Aug-88	40	0.7	1.5	0.2
14-Aug-88	41	0.7	1.5	0.2
15-Aug-88	42	0.7	1.4	0.2
16-Aug-88	43	0.6	1.4	0.2
17-Aug-88	44	0.6	1.4	0.2
18-Aug-88	45	0.6	1.3	0.2
19-Aug-88	46	0.6	1.3	0.2
20-Aug-88	47	0.6	1.3	0.1
21-Aug-88	48	0.6	1.2	0.1
22-Aug-88	49	0.6	1.2	0.1
23-Aug-88	50	0.6	1.2	0.1
24-Aug-88	51	0.5	1.2	0.1
25-Aug-88	52	0.5	1.1	0.1
26-Aug-88	53	0.5	1.1	0.1
27-Aug-88	54	0.5	1.1	0.1
28-Aug-08	55	0.5	1.1	0.1
29-Aug-08	56	0.5	1.0	0.1
30-Aug-08	57	0.5	1.0	0.1
31-Aug-08	58	0.5	1.0	0.1

Comments on the aluminium **intake of**

The table on the following page *gives* an estimate of the aluminium intake for the **period up to 31st August, after which date there are insufficient data *to* be able to make any satisfactory prediction.**

I note that on 27th August the analysis of a sample of water taken from **the cold tap** in **residence gave 0.31** mg Al/litre. **This compares well with the estimated values for that day of**

Maximum	1.5 mg/l
Model predlction:	0.7 mg/l
Minimum	0.2 mg/l

The actual result fo water is close *to* the minimum value predicted, and since the difference between the actual quantity ingested, based on 0.31 mg/l, **and the quantities based** on **the estimated values is small, and since the estimates of water consumption can only be approximate,** I **have not changed the values in the table for the 27th August.**

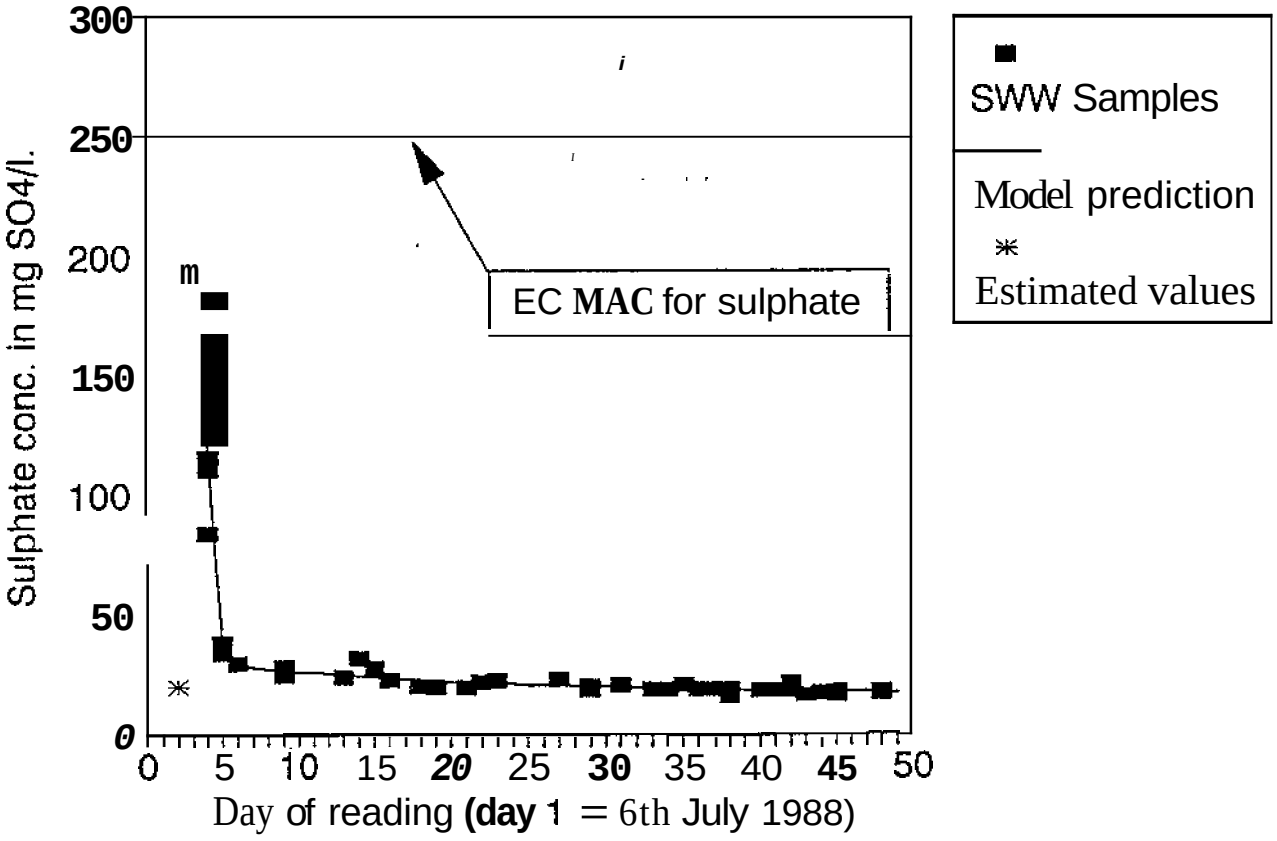
91/2737

Predicted daily intake of aluminium in mg/day by

Crowther Clayton Associates

Date	Day	Aluminium Intake in mg/day		
		By Model	Maximum	Minimum
07-Jul-88	2	24.0	25.6	0.2
08-Jul-88	3	92.4	92.3	92.3
09-Jul-88	4	26.1	68.1	0.7
10-Jul-88	5	2.6	44.0	0.5
11-Jul-88	6	2.1	19.7	0.5
12-Jul-88	7	2.0	4.4	0.5
13-Jul-88	8	2.0	4.3	0.5
14-Jul-88	9	2.0	4.2	0.5
15-Jul-88	10	1.9	4.1	0.5
16-Jul-88	11	1.9	4.0	0.5
17-Jul-88	12	1.8	4.0	0.5
18-Jul-88	13	1.8	3.9	0.5
19-Jul-88	14	1.7	3.8	0.4
20-Jul-88	15	1.7	3.7	0.4
21-Jul-88	16	1.7	3.6	0.4
22-Jul-88	17	1.6	3.5	0.4
23-Jul-88	18	1.6	3.4	0.4
24-Jul-88	19	1.6	3.4	0.4
25-Jul-88	20	1.5	3.3	0.4
26-Jul-88	21	1.5	3.2	0.4
27-Jul-88	22	1.5	3.1	0.4
28-Jul-88	23	1.4	3.1	0.4
29-Jul-88	24	1.4	3.0	0.4
30-Jul-88	25	1.4	2.9	0.3
31-Jul-88	26	1.3	2.9	0.3
01-Aug-88	27	1.3	2.8	0.3
02-Aug-88	29	1.3	2.7	0.3
03-Aug-88	30	1.2	2.7	0.3
04-Aug-88	31	1.2	2.6	0.3
05-Aug-88	32	1.2	2.6	0.3
06-Aug-88	33	1.2	2.5	0.3
07-Aug-88	34	1.1	2.4	0.3
08-Aug-88	35	1.1	2.4	0.3
09-Aug-88	36	1.1	2.3	0.3
10-Aug-88	37	1.1	2.3	0.3
11-Aug-88	38	1.0	2.2	0.3
12-Aug-88	39	1.0	2.2	0.3
13-Aug-88	40	1.0	2.1	0.2
14-Aug-88	41	1.0	2.1	0.2
15-Aug-88	42	0.9	2.0	0.2
16-Aug-88	43	0.9	2.0	0.2
17-Aug-88	44	0.9	1.9	0.2
18-Aug-88	45	0.9	1.9	0.2
19-Aug-88	46	0.9	1.9	0.2
20-Aug-88	47	0.8	1.8	0.2
21-Aug-88	48	0.8	1.8	0.2
22-Aug-88	49	0.8	1.7	0.2
23-Aug-88	50	0.8	1.7	0.2
24-Aug-88	51	0.8	1.7	0.2
25-Aug-88	52	0.7	1.6	0.2
26-Aug-88	53	0.7	1.6	0.2
27-Aug-88	54	0.7	1.5	0.2
28-Aug-08	55	0.7	1.5	0.2
29-Aug-08	56	0.7	1.5	0.2
30-Aug-08	57	0.7	1.4	0.2
31-Aug-08	58	0.7	1.4	0.2

Sulphate concentrations for the St. Endellion **Area.**



Sulphate concentrations for the St. Endellion Area

Date	Day	Sulphate concentrations		
		Samples	Model	Estimated
07-Jul-88	2			
07-Jul-88	2			19.3
08-Jul-88	3		184.0	165.7
08-Jul-88	3		184.0	192.3
09-Jul-88	4	110.0	115.7	
09-Jul-88	4	*83.0*	115.7	
09-Jul-88	4	*115.0*	115.7	
10-Jul-88	5	37.0	36.3	
10-Jul-88	5	35.0	36.3	
10-Jul-88	5	*33.0*	38.3	
11-Jul-88	6	29.0	28.9	
12-Jul-88	7		28.9	
13-Jul-88	8		26.4	
14-Jul-88	9	24.0	25.9	
14-Jul-88	9	27.0	25.9	
15-Jul-88	10		25.5	
16-Jul-88	11		25.1	
17-Jul-88	12		24.7	
18-Jul-88	13	23.6	24.3	
19-Jul-88	14	31.2	23.9	
20-Jul-88	15	27.0	23.6	
21-Jul-88	16	22.1	23.2	
22-Jul-88	17		22.9	
23-Jul-88	18	19.7	22.6	
24-Jul-88	19	19.1	22.3	
25-Jul-88	20		22.0	
26-Jul-88	21	19.1	21.8	
27-Jul-88	22	21.6	21.5	
27-Jul-88	22	21.8	21.5	
28-Jul-88	23	22.5	21.2	
29-Jul-08	24		21.0	
30-Jul-88	25		20.8	
31-Jul-88	26		20.5	
01-Aug-88	27	22.7	20.3	
02-Aug-88	28		20.1	
03-Aug-88	29	20.2	19.9	
03-Aug-88	29	19.0	*19.9*	
04-Aug-88	30		19.7	
05-Aug-88	31	*20.7*	19.5	
06-Aug-88	32		19.3	
07-Aug-88	33	18.5	19.2	
08-Aug-88	34	18.6	19.0	
09-Aug-88	35	20.5i	18.9	
10-Aug-88	36	19.0	18.7	
11-Aug-88	37	18.8	18.8	
11-Aug-88	37	19.0	18.6	
12-Aug-88	38	15.8	10.4	
12-Aug-88	38	19.0	18.4	
13-Aug-88	39		18.3	
14-Aug-88	40	18.4	18.2	
15-Aug-88	41	18.2	18.0	
16-Aug-88	42	20.1	17.9	
16-Aug-88	42	18.4	17.9	
16-Aug-88	42	18.4	17.9	
16-Aug-88	42	20.9	17.9	
16-Aug-88	42	21.1	17.9	
16-Aug-88	42	20.0	17.9	
17-Aug-88	43	16.2	17.8	
18-Aug-88	44	17.2	17.1	
18-Aug-88	44	17.1	17.7	
18-Aug-88	44	17.2	17.1	
19-Aug-88	45	17.7	17.6	
19-Aug-88	45	17.6	17.6	
19-Aug-88	45	16.3	17.6	
19-Aug-88	45	17.5	17.1	
20-Aug-88	46		17.5	
21-Aug-88	47		17.4	
22-Aug-88	48	17.3	17.3	
22-Aug-88	48	17.0	17.3	
23-Jul-88	49		17.2	
24-Aug-88	50		17.1	

NOTE:
The estimated values were calculated from the aluminium concentrations plus 19 mg/l to account for the naturally occuring sulphate.

The results of the analyses on all the samples collected by South West Water Authority from the St. Endellion Area (Area A in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations on 7th and 8th July 1988, but there are data for the aluminium concentration an these two days. I have therefore calculated the equivalent theoretical sulphate concentration *for* the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sutphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still *in solution,* However, these are the only data available and it enables an *approximate* evaluation of sulphate intake to be made for the *first* two *days* when the statistical model for sulphate concentration *is* less reliable because of the shortage of data.

The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	9.0	48.0
07-Jul-88	2	0.6	3.2
08-Jul-88	3	27.5	146.7
08-Jul-88	3	32.5	173.3
09-Jul-88	4	7.7	41.1

All other data reported for sulphate concentration in the St. Endellion Area, including those samples taken from residence, are also for values below the EC MAC of 250 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate; thus the maximum value for 8th July, used in my estimation for total sulphate ingested, is 192.3 mg/l. On the basis of the available data it is not possible to say that ingested concentrations of sulphate in excess of the acceptable limits.

The results of the analyses on all the samples collected by South West Water Authority from the St. Endellion Area (Area A in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations on 7th and 8th July 1988, but there are data for the aluminium Concentration on these two days. I have therefore calculated the equivalent theoretical sulphate concentration for the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still in solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the first two days when the statistical model for sulphate concentration is less reliable because of the shortage of data.

The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	9.0	48.0
07-Jul-88			3.2
08-Jul-88			146.7
08-Jul-88	3	32.5	173.3
09-Jul-88	4	7.7	41.1

All other data reported for sulphate concentration in the St. Endellion Area, including those samples taken from residence, are also for values below the EC MAC of 250 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate; thus the maximum value for 8th July, used in my estimation for total sulphate ingested, is 192.3 mg/l. On the basis of the available data it is not possible to say that ingested concentrations of sulphate in excess of the acceptable limits.

The results of the analyses on all the samples collected by South West Water Authority from the St. Endellion Area (Area A in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations on 7th and 8th July 1988, but there are data for the aluminium concentration on these two days. I have therefore calculated the equivalent theoretical sulphate concentration for the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still in solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the first two days when the statistical model for sulphate concentration is less reliable because of the shortage of data.

The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	9.0	48.0
07-Jul-88	2	0.6	3.2
08-Jul-88	3	27.5	146.7
08-Jul-88	3	32.5	173.3
09-Jul-88	4	7.7	41.1

All other data reported for sulphate concentration in the St. Endellion Area, including those samples taken from residence, are also for values below the EC MAC of 250 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate; thus the maximum value for 8th July, used in my estimation for total sulphate ingested, is 192.3 mg/l. On the basis of the available data it is not possible to say that ingested concentrations of sulphate in excess of the acceptable limits.

The results of the analyses on all the samples collected by South West Water Authority from the St. Endellion Area (Area A in this report) show sulphateconcentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrationsan 7th and 8th July t 988, but there are data for the aluminium concentration on these two days. I have therefore calculated the equivalent theoretical sulphate concentration *for* the aluminium concentrations for the 7th and 8th July. These values can only be approximate since tho sulphate concentrations are not necessarily the stoichiometric equivalent *of the* aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still In solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the first two days when the statistical model far sulphate concentration *is* less reliable because of the shortage of data.

The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	9.0	48.0
07-Jul-88	2	*0.6*	3.2
08-Jul-88	3	27.5	146.7
08-Jul-88	3	32.5	173.3
09-Jul-88	4	*7.7*	41.1

All other data reported for sulphate concentration in the St. Endellion Area, Including those samples taken from residence, are also for vatues below the EC MAC of *250* mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the *water* naturally contains roughly 16-20mg/l sulphate; thus *the* maximum value for8th July, used in my.estimation for total sulphate ingested, is 192.3mg/l. On the basis of the available data it is not possible to say that ingested concentrations *of* sulphate in excess of the acceptable limits.

The results of the analyses on all the samples collected by South West Water Authority from the St. Endellion Area (Area A in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of *250* mg/l.

I could find no data for sulphate concentrations on 7th and 8th July 1988, but there are data for the aluminium concentration on *these two* days. I have therefore calculated the equivalent theoretical sulphate concentration far the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as !he hydroxide leaving the associated sulphate still In solution. However, *these* are the only data available and it enables an approximate evaluation of sutphate intake to be made for the first two days when the statistical model for sulphate concentration is less reliable because of the shortage of data.

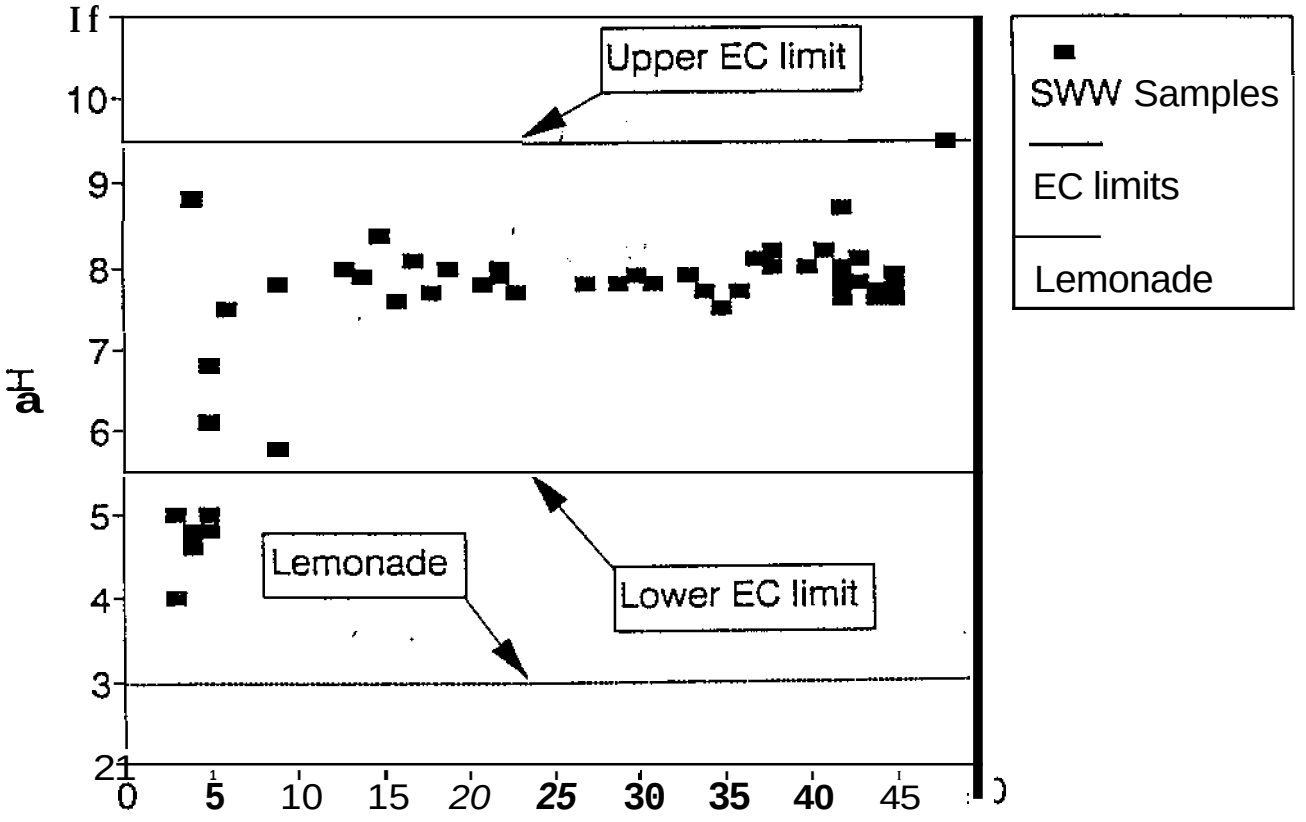
The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	9.0	48.0
07-Jul-88	2	0.6	3.2
08-Jul-88	3	*27.5*	146.7
08-Jul-88	3	32.5	173.3
09-Jul-88	4	7.7	41.1

All other data reported for sulphate concentration in the St. Endellion Area, including those samples taken from residence, are also for values below the EC MAC of *250* mg/l.

In estimating the total sutphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate; thus the maximum value for 8th July, used in my estimation for total sutphate ingested, is 192.3 mg/l. On the basis of the available data it is not possible to say that ingested concentrations of sulphate in excess of the acceptable limits.

pH values for the St. Endellion **Area.**



pH Values lot the St. Endellion Area.

Date	Day	pH
07-Jul-88	2	
07-Jul-88	2	
08-Jul-88	3	*5.0*
08-Jul-88	3	4.0
09-Jul-88	4	4.7
09-Jul-88	4	4.0
09-Jul-88	4	4.6
09-Jul-88	*4*	8.8
09-Jul-88	4	4.6
10-Jul-88	*5*	6.8
10-Jul-88	5	1.8
10-Jul-88	*5*	5.0
10-Jul-88	5	6.1
10-Jul-88	5	6.8
11-Jul-88	*8*	7.5
14-Jul-88	9	7.8
14-Jul-88	9	5.8
18-Jul-88	13	*8.0*
19-Jul-88	14	7.9
20-Jul-88	15	8.4
21-Jul-88	*16*	7.6
22-Jul-88	17	8.1
23-Jul-88	18	*7.7*
24-Jul-88	19	8.0
26-Jul-88	21	7.8
26-Jul-88	21	
27-Jul-88	22	*8.0*
27-Jul-88	22	7.9
28-Jul-88	23	7.7
01-Aug-88	27	7.8
03-Aug-88	29	*7.8*
03-Aug-88	*29*	*7.0*
04-Aug-88	30	7.9
05-Aug-88	31	7.8
07-Aug-88	33	7.9
08-Aug-88	34	*7.7*
09-Aug-88	35	7.5
10-Aug-88	36	*7.7*
11-Aug-88	37	8.1
11-Aug-88	37	at
12-Aug-88	38	8.2
12-Aug-88	38	*8.0*
14-Aug-88	40	8.0
15-Aug-88	41	8.2
16-Aug-88	42	7.6
16-Aug-88	42	*6.7*
16-Aug-88	42	8.0
16-Aug-88	42	7.7
16-Aug-88	42	7.8
16-Aug-88	42	7.8
17-Aug-88	43	7.8
17-Aug-88	43	7.8
17-Aug-88	43	a.1
18-Aug-88	44	*7.6*
18-Aug-88	44	7.8
18-Aug-88	44	7.7
19-Aug-88	45	7.6
19-Aug-88	45	7.8
19-Aug-88	45	7.8
19-Aug-88	45	*7.5*
19-Aug-88	45	7.7
19-Aug-88	45	7.6
22-Aug-88	48	
22-Aug-88	48	9.3
22-Aug-88	48	
22-Aug-88	48	9.3

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With the exception of 8 samples taken on the 8th. 9th and 10th June 1988 all samples are within this *range.*

The significance of pH lies more in its effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such as Coca Cola and lemonade. I show on the graph of the pH of samples in the St. Endellion Area the relative position of lemonade which typically has a pH in the region of 3.

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With the exception of 8 samples taken on the 8th, 9th and 10th June 1988 all samples are within this range.

The significance of pH lies more in its effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limb, for example soft drinks such as *Coca* Cola and lemonade. I show on the graph of the pH of samples in the St. Endellion Area the relative position of lemonade which typically has a pH in the region of 3.

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With the exception of 8 samples taken on the 8th, 9th and 10th June 1988 all samples are within this *range.*

The significance of pH lies more in its effect *on* pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health *of* consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example 'soft drinks such *as* Coca Cola and lemonade. I show on the graph of the pH of samples in the St. Endellion Area the relative position of lemonade which typically has a pH in the region of 3.

pH of water consumed by

pH is not a substance which can be consumed and *for* which *the* quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance *in* water.

The range for pH in drinking water specified in the EC Directive are

upper limit	*'9.5;*
lower limit	*5.5.*

With the exception of *8* samples taken on the 8th, 9th and 10th June 1988 all samples are within *this* range.

The significance of pH lies more in its effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such as *Coca* Cola and lemonade. 1 show on the graph of the pH of samples in the St. Endellion Area the relative position *of* lemonade which typically has a pH in the region of 3.

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With the exception of 8 samples taken on the 8th, 9th and 10th June 1988 all samples are within this range.

The significance of pH lies more in its effecton pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such as *Coca* Cola and lemonade. I show on the graph of the pH of samples in the St. Endellion Area the relative position of lemonade which typically has a pH in the region of 3.

Intake of copper, zinc and lead by

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000 µg/l ie 3	mg/l.
zinc :	5,000 µg/l ie 5	mg/l.
lead :	50 µg/l ie 0.05	mg/l.

All samptes for copper and zinc show levels for these two metals at levels very substantially below the EC MAC - sometimes as much 3 orders of magnitude below the MAC.

Lead also appears to be *consistently* below the MAC, and usually well below (and sometimes one order of magnitude below) the MAC. Results of lead analyses are normally reported as <0.05 or <0.005 - ie less than 50µg/l or *less* than 5 µg/l (and thus within the MAC). However, on three days, 16th, 18th and 19th August 1988, the results of the sample analyses on 13 samples are reported as <0.08 mg/l. I presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08mg/l and *0.005* mg/l. *It* Is therefore not possible to say with certainty that on those 13 occasions the lead concentration did not exceed *50* µg/l. However, since every other reported result, using the more sensitive methods, never exceed the MAC, and the acidity of these 13 samples was in the Same range as all other satisfactory samples, it is very unlikely that the concentrations of lead ever exceeded the EC MAC vatues.

The daily intake of copper and zinc was thus always well below the levels acceptable.

The dally intake of lead was also almost certainly well below the levels considered acceptable, the only uncertainty belng those 13 occasions when the concentration was recorded as <80 µg/l. If the level had been 80 µg/l on those three days then intake on *those* three days would have been less than 136 µg (<0.136 mg).

Intake of copper, zinc and lead by

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000 µg/l ie 3	mg/l.
zinc :	5,000 µg/l ie 5	mg/l.
lead :	50 µg/l ie 0.05	mg/l.

All samples for copper and zinc show levels for these two metals at levels very substantially below the EC MAC - sometimes as much 3 orders of magnitude below the MAC.

Lead also appears to be consistently below the MAC, and usually well below (and sometimes one order of magnitude below) the MAC. Results of lead analyses are normally reported as <0.05 or <0.005 - ie less than 50µg/l or less than 5 µg/l (and thus within the MAC). However, on three days, 16th, 18th and 19th August 1988, the results of the sample analyses on 13 samples are reported as <0.08 mg/l. I presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08 mg/l and 0.005 mg/l. It is therefore not possible to say with certainty that on those 13 occasions the lead concentration did not exceed 50 µg/l. However. since every other reported result, using the more sensitive methods, never exceed the MAC, and the acidity of these 13 samples was in the Same range as all other satisfactory samples, it is very unlikely that the concentrations of lead ever exceeded the EC MAC values.

The daily intake of copper and zinc was thus always well below the levels acceptable.

The daily intake of lead was also almost certainly well below the levels considered acceptable, the only uncertainty being those 13 occasions when the concentration was recorded as <80 µg/l. If the level had been 80 µg/l on those three days then intake on those three days would have been less than 160 µg (<0.16 mg).

Intake of copper, zinc and lead by

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000 µg/l ie 3	mg/l.
zinc :	5,000 µg/l ie 5	mg/l.
lead :	50 µg/l ie *0.05*	mg/l.

All samples for copper and zinc show levels for these two metals at levels very substantially below the EC MAC - sometimes as much 3 orders of magnitude below the MAC.

Lead also appears to be consistently below the MAC, and usually well below (and sometimes *one order of* magnitude betow) the MAC. Results of lead analyses are normally reported as <0.05 or <0.005 - ie less than 50µg/l or less than 5 µg/l (and thus within the MAC). However, on three days, 16th, 18th and 19th August 1988. the results of the sample analyses on 13 samples are reponed as <0.08 mg/l. 1 presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08 mg/l and *0.005* mg/l. It is therefore nos possible to say with certainty that on ?hose 13 occasions the lead concentration did not exceed *50* µg/l. However, since every other reported result, using the more sensitive methods, never exceed the MAC, and the acidity ofthese 13 samples was in the Same range as all other satisfactory samples, it is very unlikely that the concentrations of lead ever exceeded the EC MAC values.

The daily intake of copper and zinc was thus always well below the levels acceptable.

The daily intake of lead was also almost certainly well below the levels considered acceptable, the only uncertainty being those 13 occasions when the concentration was recorded as <80 µg/l. If the level had been 80 µg/l on those three days then intake on those three days would have been less than 160 µg (<0.16 mg).

Intake of copper, zinc and lead by .

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000µg/l ie 3	mg/l.
zinc :	5,000 µg/l ie 5	mg/l.
lead :	50 µg/l ie 0.05	mg/l.

All samples for copper and zinc show levels for these two metals at levels very substantially below the EC MAC - sometimes as much 3 orders of magnitude betow the MAC.

Lead also appears to be consistently below the MAC, and usually well below (and sometimes one order of magnitude below) the MAC. Results of lead analyses are normally reported as <0.05 or <0.005 - ie less than 50µg/l or less than 5 µg/l (and thus within the MAC). However, on three days, 16th, 18th and 19th August 1988, the results of the sample analyses on 13 samples are reported as <0.08 mg/l. I presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08 mg/l and 0.005 mg/l. It is therefore not possible to say with certainty that on those f3 occasions the lead concentration did not exceed 50 µg/l. However, since every other reported result, using the more sensitive methods, never exceed the MAC, and the acidity of these 13 samples was in the same range as all other satisfactory samples, it is very unlikely that the concentrations of lead ever exceeded the EC MAC vatues.

The daily intake of copper and zinc was thus always well below the levels acceptable.

The daily intake of lead was also almost certainly well below the levels considered acceptable, the only uncertainty being those 13 occasions when the concentration was recorded as <80 µg/l. If the level had been 80 µg/l on those three days then intake on those three days would have been less than 160 µg (<0.16 mg).

Intake of copper, zinc and lead by

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000µg/l ie 3	mg/l.
zinc :	5,000µg/l ie 5	mg/l.
lead :	50µg/l ie 0.05	mg/l.

All samples for copper and zinc show levels for these two metals at levels very substantially below the EC MAC - sometimes as much 3 orders of magnitude below the MAC.

Lead also appears to be consistently below the MAC, and usually well below (and sometimes one order of magnitude below) the MAC. Results of lead analyses are normally reported as <0.05 or <0.005 - ie less than 50µg/l or less than 5µg/l (and thus within the MAC). However, on three days, 16th, 18th and 19th August 1988, the results of the sample analyses on 13 samples are reported as <0.08 mg/l. I presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08 mg/l and 0.005 mg/l. It is therefore not possible to say with certainty that on those 13 occasions the lead concentration did not exceed 50µg/l. However, since every other reported result, using the more sensitive methods, never exceed the MAC, and the acidity of these 13 samples was in the Same range as all other satisfactory samples, it is very unlikely that the concentrations of tead ever exceeded the EC MAC values.

The daily intake of copper and zinc was thus always well below the levels acceptable.

The daily intake of lead was also almost certainty well below the levels considered acceptable. the only uncertainty being those 13 occasions when the concentration was recorded as <80 µg/l. If the level had been 80µg/l on those three days then intake on those three days would have been less than 227µg (<0.227 mg).

Analyses of SWW samples from the Delabole and Rockhead Area.

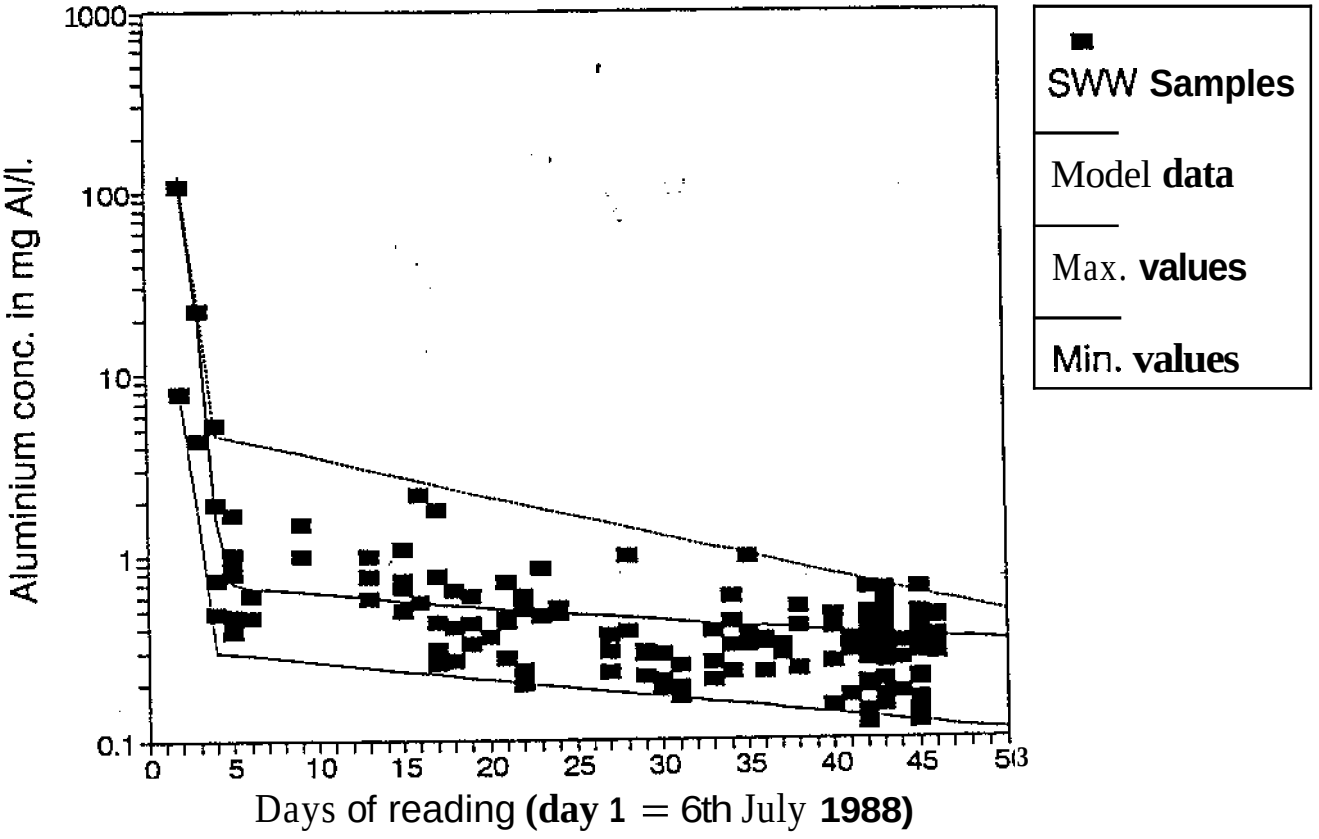
Page or S	Date	pH	Sulphate	Aluminium		Zinc	Lead
s.8498	07-Jul-88	4.1		109			
s.8499	07-Jul-88	4.7		7.80			
482	08-Jul-88	*8.0*		22.60	0.06	0.11	0.04
484	08-Jul-88	8.0		4.39	0.26	0.68	0.04
255	08-Jul-88	*7.8*		0.49	0.14	0.08	<0.01
488	09-Jul-88	8.8		0.75	0.1	0.06	<0.01
112	09-Jul-88	7.0		5.29	<0.1	0.12	<0.01
113	09-Jul-88	5.9	60.0	1.95	0.09	0.11	0.2
114	09-Jul-88	6.0		1.93	0.04	0.1	0.06
494	10-Jul-88	7.0	*27.0*	1.00	<0.01	0.04	<0.03
258	10-Jul-88	8.1	30.0	0.38	0.04	0.11	<0.03
492	10-Jul-88	67	28.0	0.47	0.05	a07	<0.03
493	10-Jul-88	7.2	27.0	1.02	<0.01	0.05	<0.03
12t	10-Jul-88	7.0	47.0	am	0.12	0.1	0.22
2w	10-Jul-88	10.0	28.0	0.60	0.02	0.05	<0.03
119	10-Jul-88	6.6	47.0	0.90	0.01	0.06	0.03
117	10-Jul-88	8.5	52.0	1.68	0.03	0.08	<0.03
115	10-Jul-88	9.0	*57.0*	0.82	<0.01	0.06	0.03
264	11-Jul-88	75	33.0	0.81	<0.05	<0.05	<0.05
265	11-Jul-88						0.1
260	11-Jul-88	7.5	36.0	0.46	<0.05	<0.05	<0.05
124	14-Jul-88	7.5	25.0	1.50	0.005	<0.005	<0.005
125	14-Jul-88	7.4	*25.0*	1.00	0.005	<0.005	<0.005
266	18-Jul-88	7.9	*25.0*	0S9	0.007	0.015	0.009
129	18-Jul-88	9.1	*25.2*	1.00	0.005	0.017	<0.005
500	18-Jul-88	8.2	25.3	0.77	0.005	0.01	<0.005
138	20-Jul-88	8.2		1.10	0.007	0.014	<0.005
136	20-Jul-88	8.1	29.9	0.73			
504	20-Jul-88	7.6	32.6	0.68			
267	20-Jul-88	8.1	28.8	0.50			
268	21-Jul-88	8.0	25.9	0.56	<0.05	<0.05	<0.05
269	21-Jul-88	*7.8*	26.3	a.56	<0.05	0.05	<0.05
511	21-Jul-88	8.5	18.4	2.20	<0.05	<0.05	<0.05
s.7722	22-Jul-88	8.4	15.8	0.77	0.05	<0.05	0.05
270	22-Jul-88	a4	15.0	0.44	<0.05	<0.05	<0.05
517	22-Jul-88	9.2	147	0.28	<0.05	<0.05	<0.05
140	22-Jul-88	8.5	16.9	1.80	<0.05	<0.05	<0.05
139	22-Jul-88	8.6	15.1	0.31	<0.05	<0.05	<0.05
141	23-Jul-88	8.4	17.5	0.85	<0.05	<0.05	<0.05
271	23-Jul-88	7.9	18.1	0.27	<0.05	0.098	<0.05
519	23-Jul-88	a.7	16.3	0.41	<0.05	<0.05	<0.05
2r2	24-Jul-88	7.8	18.9	*0.33*	<0.05	0.087	*<0.05*
142	24-Jul-88	8.3	17.8	0.51	<0.05	<0.05	<0.05
520	24-Jul-88	8.4	19.2	0.43	<0.05	<0.05	<0.05
143	25-Jul-88	7.2	18.3	0.36	<0.05	<0.05	<0.05
144	26-Jul-88	8.0	18.8	0.45	<0.05	<0.05	<0.05
273	26-Jul-88	*6.0*	19.5	0.44	<0.05	<0.05	<0.05
524	26-Jul-88	8.3	19.6	a n	<0.05	<0.05	<0.05
145	26-Jul-88			0.28	<0.05	<0.05	<0.05
s.8070	27-Jul-88	9.1	23	0.24	0.05	<0.05	<0.05
s.8021	27-Jul-88	8.8	23	*0.2*	0.05	*0.060*	<0.05
527	27-Jul-88	9.2	22.6	0.61	<0.05	<0.05	<0.05
146	27-Jul-88	8.0	19.9	0.51	<0.05	<0.05	<0.05
274	27-Jul-88	a3	22.6	0.60	<0.05	<0.05	<0.05
275	28-Jul-88	8.5	*23.8*	0.66	<0.05	<0.05	<0.05
155	28-Jul-88	8.9	21.7	0.47	<0.05	<0.05	<0.05
531	28-Jul-88	8.6	21.4	0.48	<0.05	<0.05	<0.05
536	29-Jul-88	*8.3*	21.8	0.49	<0.05	<0.05	<0.05
276	29-Jul-88	8.2	21.0	0.52	<0.05	0.051	<0.05
277	01-Aug-88	7.7	22.5	0.30	<0.05	<0.05	<0.05
537	01-Aug-88	7.8	20.0	0.23	<0.05	<0.05	<0.05
156	01-Aug-88	7.7	21.6	0.37	<0.05	<0.05	<0.05
158	02-Aug-88	7.8	21.4	1.00	<0.05	0.05	<0.05
157	02-Aug-88	9.2	20.7	0.39	<0.05	<0.05	<0.05
s8578/540	03-Aug-88	7.6	x1.4	0.22	<0.05	<0.05	<0.05
278	03-Aug-88	8.0	20.5	a.29	<0.05	<0.05	<0.05
159	03-Aug-88	7E	21.6	0.30	<0.05	0.088	<0.05
279	04-Aug-88	7.6	19.3	0.21	<0.05	<0.05	<0.05
280	04-Aug-88	7.1	19.8	0.29	<0.05	<0.05	<0.05
548	04-Aug-88	7.f	18.3	0.20	<0.005	<0.005	<0.005
549	04-Aug-88	8.(		0.10	<0.05	<0.05	<0.05
167	05-Aug-88	7.1	18.6	0.17	<0.05	<0.05	<0.05
551	05-Aug-88	7.1	19.1	0.25	<0.05	<0.05	<0.05
281	05-Aug-88	7.1	16.7	0.19	<0.05	<0.05	<0.05
168	07-Aug-88	8.1	19.3	0.26	<0.05	<0.05	*c 0.05*
554	07-Aug-88	8.'	18.3	0.39	<0.05	<0.05	<0.05
282	07-Aug-88	8.5	17.9	0.21	<0.05	<0.05	<0.05
283	08-Aug-88	8.(	18.8	0.60	<0.05	*<0.05*	<0.05

Page of Sample	Date	pH	Sulphate	Aluminium	Copper	Zinc	Lead
	06-Aug-88	8.1	19.0	0.23	<0.05	<0.05	<0.05
284	08-Aug-88	a0	16.3	0.44	<0.05	<0.05	<0.05
556	08-Aug-88	8.8	18.7	0.32	<0.05	<0.05	<0.05
285	09-Aug-88	*7.9*	17.8	0.37	<0.05	<0.05	<0.05
170	09-Aug-88	7.7	18.5	0.32	<0.05	<0.05	<0.05
559	09-Aug-88	8.4	17.5	0.32	<0.05	<0.05	<0.05
489	09-Aug-88	0.2		0.99	<0.01	0.06	<0.01
171	10-Aug-88	8.7	18.6	0.23	<0.05	<0.05	<0.05
561	10-Aug-88	0.8	18.4	0.35	<0.05	<0.05	<0.05
286	10-Aug-88	8.5	18.1	0.33	<0.05	<0.05	<0.05
172	11-Aug-88	7.8	19.6	0.32	<0.05	<0.05	<0.05
563	11-Aug-88	8.9	18.9	0.29	<0.05	<0.05	<0.05
568	12-Aug-88	*a 2*	19.4	0.52	<0.05	0.13	<0.05
287	12-Aug-88	8.8	18.7	0.41	<0.05	<0.05	<0.05
173	12-Aug-88	8.0	18.5	0.24	<0.05	<0.05	<0.05
288	14-Aug-88	*Q.2*	18.3	0.47	<0.05	<0.05	<0.05
174	14-Aug-88	e.5	19.1	0.40	<0.05	<0.05	<0.05
289	14-Aug-88	9.1	18.3	0.26	<0.05	<0.05	<0.05
570	14-Aug-88	9.2	10.0	0.15	<0.05	<0.05	<0.05
575	15-Aug-88	8.2	18.6	0.17	<0.05	<0.05	<0.05
290	15-Aug-88	9.3	18.4	0.30	<0.05	<0.05	<0.05
177	15-Aug-88	e.5	18.3	0.34	<0.05	<0.05	<0.05
297	16-Aug-88	5.5	18.5	0.12	<0.05	<0.05	<0.05
298	16-Aug-88	e.1	19.5	0.29	<0.05	<0.05	<0.05
s.9921M	16-Aug-88	*7.9*	20.7	0.28	<0.05	>0.05	<0.05
299	16-Aug-88	8.0	19.7	0.27	<0.05	<0.05	<0.05
186	16-Aug-88	9.0	16.0	0.19	<0.05	0.057	<0.05
300	16-Aug-88	7.9	21.1	0.66	<0.05	<0.05	<0.05
313	16-Aug-88	8.8	17.6	0.34	<0.005	0.0(	<0.005
585	16-Aug-88	9.0	17.0	0.20	<0.05	<0.05	<0.05
312	16-Aug-88	8.9	18.0	0.37	<0.05	<0.05	<0.05
317	16-Aug-88	7.8	17.3	0.14	0.01	0.005	<0.005
296	16-Aug-88	7.9	18.7	0.49	<0.05	<0.05	<0.05
292	16-Aug-88	8.0	19.2	0.41	<0.05	<0.05	<0.05
315	16-Aug-88	8.1	17.2	0.42	0.008	0.007	<0.005
291	16-Aug-88	8.0	18.9	0.46	<0.05	<0.05	<0.05
589	17-Aug-88	P2	16.6	0.15	<0.05	<0.05	<0.05
329	17-Aug-88	8.7	16.4	0.26	<0.05	<0.05	<0.05
326	17-Aug-88	8.0	16.4	0.35	<0.05	<0.05	<0.05
324	17-Aug-88	8.1	16.7	0.65	0.005	0.01	<0.005
195	17-Aug-88	9.5		0.30	<0.005	<0.005	<0.005
197	17-Aug-88	B.6	15.7	0.17			
196	17-Aug-88	9.4	16.8	0.26	<0.05	<0.0	<0.05
338	17-Aug-88	7.8		0.46	<0.05	<0.0	<0.05
191	17-Aug-88	8.3	17.2	0.36	<0.05	<0.0	<0.05
199	17-Aug-88	8.3	17.1	0.21	<0.05	<0.0	<0.05
339	17-Aug-88	7.6		0.54	<0.05	0.05	<0.05
332	17-Aug-88	3 7		0.35	<0.05	0.07	<0.05
340	17-Aug-88	7.9		0.39	<0.05	<0.0	<0.05
341H	17-Aug-88	0.1		0.16	<0.05	<0.0	<0.05
343	18-Aug-88	7.5	12.4	0.177	<0.05	<0.0	<0.08
346	18-Aug-88	7.7	IS.3	0.337	<0.05	<0.0	<0.08
344	18-Aug-88	7.1	16.1	0.331	<0.05	<0.0	<0.08
345	18-Aug-88	7.1	16.2	0.270	<0.05	<0.0	<0.08
356	19-Aug-88	7.5	13.4	0.413	<0.05	<0.0	<0.08
353	19-Aug-88	8.2	16.6	0.144	<0.05	0.0	<0.08
354	19-Aug-88	7.f	13.4	0.121	<0.05	<0.0	<0.08
357	19-Aug-88	7.i	12.0	0.412	<0.05	0.06	<0.08
358	19-Aug-88	7.6	12.0	0.456	<0.05	<0.0	<0.08
359	19-Aug-88	7.:	11.8	0.486	<0.05	<0.0	<0.08
355	19-Aug-88	7.t	14.5	0.466	<0.05	<0.0	<0.08
201	19-Aug-88			0.296			
352	19-Aug-88	9.:	15.1	0.161	<0.05	0.(	<0.08
351	19-Aug-88	7.:	16.5	0.210	<0.05	<0.(	<0.08
362	19-Aug-88	7.	19.4	0.398	<0.05	<0.(	<0.08
363	19-Aug-88	71	13.7	0.350	<0.05	<0.(	<0.08
200	19-Aug-88	7.'	14.8	0.301	<0.05	<0.(	<0.08
369	19-Aug-88			0.184	<0.05	0.0	0.209
366	19-Aug-88			0.866	<0.05	<0.(	<0.08
360	19-Aug-88	7.1	14.1	0.364	<0.05	<0.(	<0.08
361	19-Aug-88	7.	14.1	0.330	<0.05	<0.(	<0.08
364	19-Aug-88			0.162	<0.05	<0.(	<0.08
105	19-Aug-88	7	12.5	0.215	<0.05	<0.(	<0.08
208	20-Aug-88	8.	18.0	0.29			
205	20-Aug-88	e.	18.0	0.33	<0.01	<0.	<0.03
204	20-Aug-88	a.	19.0	0.36	<0.01	<0.	<0.03
383	20-Aug-88	8.	18.0	0.450	<0.01	<0.	<0.03
381	20-Aug-88	a.	19.0	0.470	<0.01	<0.	<0.03

M = sample from [illegible] NCB.

H = sample from [illegible] residence

Aluminium concentrations for the Delabole/Rockhead **Area.**



Data for aluminium concentrations in SWW samples from the Celabole/Rockhead Area.

Page or Sample	Date	Day	Aluminium	Page or Sample	Date	Day	Aluminium
s.6498	07-Jul-88	2	109	284	08-Aug-88	34	0.44
s.6499	07-Jul-88	2	7.90	556	08-Aug-88	34	0.37
482	08-Jul-88	3	22.60	285	09-Aug-88	35	0.32
484	08-Jul-88	3	4.39	170	09-Aug-88	35	0.32
255	09-Jul-88	4	0.49	559	09-Aug-88	35	0.99
488	09-Jul-88	4	0.75	469	09-Aug-88	35	0.23
112	09-Jul-88	4	5.29	171	10-Aug-88	36	0.35
113	09-Jul-88	4	1.95	561	10-Aug-88	36	0.33
114	09-Jul-88	4	1.93	286	10-Aug-88	36	0.32
494	10-Jul-88	5	1.00	172	11-Aug-88	37	0.29
256	10-Jul-88	5	0.38	563	11-Aug-88	37	0.52
492	10-Jul-88	5	0.47	566	12-Aug-88	38	0.41
493	10-Jul-88	5	1.02	287	12-Aug-88	38	0.24
121	10-Jul-88	5	0.90	173	12-Aug-88	38	0.47
256	10-Jul-88	5	0.80	288	14-Aug-88	40	R4a
118	10-Jul-88	5	am	174	14-Aug-88	40	0.28
117	10-Jul-88	5	1.68	289	14-Aug-88	40	0.15
115	10-Jul-88	5	0.82	570	14-Aug-88	40	9.17
264	11-Jul-88	e	0.81	575	15-Aug-88	41	0.30
260	11-Jul-88	8	0.48	290	15-Aug-88	41	0.34
124	14-Jul-88	9	1.50	177	15-Aug-88	41	0.12
125	14-Jul-88	9	1.00	297	16-Aug-88	42	0.29
266	18-Jul-88	13	0.59	298	16-Aug-88	42	0.28
129	18-Jul-88	13	1.00	s.9921	16-Aug-88	42	R27
500	18-Jul-88	13	0.77	299	16-Aug-88	42	0.19
135	20-Jul-88	15	1.10	186	16-Aug-88	42	0.66
136	20-Jul-88	1s	0.73	300	16-Aug-88	42	0.34
504	20-Jul-88	15	0.68	313	16-Aug-88	42	0.20
267	20-Jul-88	15	0.50	585	16-Aug-88	42	0.37
268	21-Jul-88	16	0.56	312	16-Aug-88	42	0.14
269	21-Jul-88	16	ass	317	16-Aug-88	42	0.49
511	21-Jul-88	16	2.20	296	16-Aug-88	42	R41
s.7722	22-Jul-88	17	0.77	292	16-Aug-88	42	0.42
270	22-Jul-88	17	0.44	315	16-Aug-88	42	0.46
517	22-Jul-88	17	0.26	291	16-Aug-88	42	0.15
140	22-Jul-88	17	1.80	588	17-Aug-88	43	0.26
139	22-Jul-88	17	0.31	329	17-Aug-88	43	0.55
141	23-Jul-88	18	0.65	328	17-Aug-88	43	0.65
271	23-Jul-88	18	0.27	324	17-Aug-88	43	0.30
519	23-Jul-88	18	0.41	195	17-Aug-88	43	0.17
272	24-Jul-88	19	*0.33*	197	17-Aug-88	43	*0.28*
142	24-Jul-88	19	0.61	196	17-Aug-88	43	0.46
520	24-Jul-88	IS	0.43	338	17-Aug-88	43	0.36
143	25-Jul-88	20	0.36	191	17-Aug-88	43	0.21
144	26-Jul-88	21	0.45	199	17-Aug-88	43	*0.54*
273	26-Jul-88	21	0.44	339	17-Aug-88	43	0.35
524	26-Jul-88	21	0.72	332	17-Aug-88	43	0.39
145	26-Jul-88	21	0.28	340	17-Aug-88	43	0.18
s.8070	27-Jul-88	22	0.24	341	17-Aug-88	43	0.177
s.8021	27-Jul-88	22	0.2	343	18-Aug-88	44	0.337
527	27-Jul-88	22	0.81	346	18-Aug-88	44	0.331
146	27-Jul-88	22	0.51	344	18-Aug-88	44	0.270
274	27-Jul-88	22	0.60	345	18-Aug-88	44	0.413
275	28-Jul-88	23	0.88	358	19-Aug-88	45	0.144
155	28-Jul-88	23	n47	353	19-Aug-88	45	0.121
531	28-Jul-88	23	0.48	354	19-Aug-88	45	0.412
536	29-Jul-88	24	0.49	357	19-Aug-88	45	0.456
276	29-Jul-88	24	0.52	356	19-Aug-88	45	0.486
277	01-Aug-88	27	0.30	359	19-Aug-88	45	0.486
537	01-Aug-88	27	0.23	355	19-Aug-88	45	0.296
156	01-Aug-88	27	0.37	201	19-Aug-88	45	0.161
158	02-Aug-88	28	1.00	352	19-Aug-88	45	0.210
157	02-Aug-88	28	0.39	351	19-Aug-88	45	0.398
s8579/540	03-Aug-88	29	:	362	19-Aug-88	45	0.350
278	03-Aug-88	29	0.29	363	19-Aug-88	45	0.301
159	03-Aug-88	29	0.30	200	19-Aug-88	45	0.164
279	04-Aug-88	30	0.21	369	19-Aug-88	45	0.666
280	04-Aug-88	30	0.29	366	19-Aug-88	45	0.364
548	04-Aug-88	30	0.20	360	19-Aug-88	45	0.330
549	04-Aug-88	30	0.19	361	19-Aug-88	45	0.162
167	05-Aug-88	31	0.17	364	19-Aug-88	45	0.215
551	05-Aug-88	31	0.25	105	19-Aug-88	45	*0.8*
281	05-Aug-88	31	0.19	208	20-Aug-88	46	0.3
166	07-Aug-88	33	0.28	205	20-Aug-88	46	0.3
554	07-Aug-88	33	0.39	204	20-Aug-88	46	0.45
282	07-Aug-88	33	0.21	383	20-Aug-88	46	0.47
283	08-Aug-88	34	0.60	381	20-Aug-88	46	
169	08-Aug-88	34	0.23				

Estimated Aluminium Concentrations for the Delabole/Rockhead Area.

Date	Day	Concentrations		
		Modet	max.	min.
07-Jul-88	2	110.68	125.00	7.90
08-Jul-88	3	18.89	25.00	1.50
09-Jul-88	4	1.61	4.68	0.30
10-Jul-88	5	0.71	4.45	0.29
11-Jul-88	6	0.68	4.24	0.29
14-Jul-88	9	0.64	3.66	0.27
18-Jul-88	13	0.59	3.00	0.25
19-Jul-88	14	0.58	2.86	0.24
20-Jul-88	15	0.57	2.72	0.24
21-Jul-88	16	0.56	2.59	0.23
22-Jul-88	17	0.55	2.47	0.23
23-Jul-88	18	0.54	2.35	0.22
24-Jul-88	19	0.53	2.24	0.22
25-Jul-88	20	0.52	2.13	0.21
26-Jul-88	21	0.51	2.03	0.21
27-Jul-88	22	0.51	1.93	0.20
28-Jul-88	23	0.50	1.84	0.20
29-Jul-88	24	0.49	1.75	0.19
30-Jul-88	25	0.48	1.66	0.19
31-Jul-88	26	0.47	1.58	0.19
01-Aug-88	27	0.47	1.51	0.18
02-Aug-08	28	0.46	1.44	0.18
03-Aug-88	29	0.45	1.37	0.17
04-Aug-88	30	0.44	1.30	0.17
05-Aug-88	31	0.44	1.24	0.17
06-Aug-88	32	0.43	1.18	0.16
07-Aug-88	33	0.42	1.12	0.16
08-Aug-88	34	0.42	1.07	0.16
09-Aug-88	35	0.41	1.02	0.15
10-Aug-88	36	0.41	0.97	0.15
11-Aug-88	37	0.40	0.92	0.15
I2-Aug-88	38	0.40	0.88	0.14
13-Aug-88	39	0.39	0.84	0.14
14-Aug-88	40	0.38	0.80	0.14
15-Aug-88	41	0.38	0.76	0.13
16-Aug-88	42	0.37	0.72	0.13
17-Aug-88	43	0.37	0.69	0.13
18-Aug-88	44	0.36	0.65	0.12
19-Aug-88	45	0.36	0.62	0.12
20-Aug-88	46	0.36	0.59	0.12
21-Aug-88	47	0.35	0.56	0.12
22-Aug-88	48	0.35	0.54	0.11
23-Aug-88	49	0.34	0.51	0.11
24-Aug-88	50	0.34	0.49	0.11

Comments on the aluminium intake of

The table on the following page gives an estimate of the aluminium intake for the period up to 24th August, after which date there are insufficient data to be able to make any satisfactory prediction.

I have not seen any data for the premises where . resided at the time of the incident and the only data are the estimates for the Delabole/Rockhead Area from which I have derived the data in the table on the following page.

Estimated aluminium intake for
Quantity of water drunk in litres/day: 1.14

Date	Day	Aluminium intake in mg/ Model	max.	min.
07-Jul-88	2	126.18	142.50	9.01
08-Jul-88	3	21.54	28.50	1.71
09-Jul-88	4	1.84	5.33	0.34
10-Jul-88	5	0.80	5.08	0.34
11-Jul-88	6	0.77	4.83	0.33
14-Jul-88	9	0.73	4.17	0.31
18-Jul-88	13	0.68	3.43	0.28
19-Jul-88	14	0.66	3.26	0.28
20-Jul-88	15	0.65	3.10	0.27
21-Jul-88	16	0.64	2.95	0.26
22-Jul-88	17	0.63	2.81	0.26
23-Jul-88	18	0.62	2.68	0.25
24-Jul-88	19	0.61	2.55	0.25
25-Jul-88	20	0.60	2.43	0.24
26-Jul-88	21	0.59	2.31	0.24
27-Jul-88	22	0.58	2.20	0.23
28-Jul-88	23	0.53	2.09	0.23
29-Jul-88	24	0.56	1.99	0.22
30-Jul-88	25	0.55	1.90	0.22
31-Jul-88	26	0.54	1.81	0.21
01-Aug-88	27	0.53	1.72	0.21
02-Aug-88	28	0.52	1.64	0.20
03-Aug-88	29	0.51	1.56	0.20
04-Aug-88	30	0.51	1.48	0.19
05-Aug-88	31	0.50	1.41	0.19
06-Aug-88	32	0.49	1.34	0.19
07-Aug-88	33	0.48	1.28	0.18
08-Aug-88	34	0.48	1.22	0.18
09-Aug-88	35	0.47	1.16	0.17
10-Aug-88	36	0.46	1.10	0.17
11-Aug-88	37	0.46	1.05	0.17
12-Aug-88	38	0.45	1.00	0.16
13-Aug-88	39	0.44	0.95	0.16
14-Aug-88	40	0.44	0.91	0.16
15-Aug-88	41	0.43	0.86	0.15
16-Aug-88	42	0.43	0.82	0.15
17-Aug-88	43	0.42	0.78	0.15
18-Aug-88	44	0.42	0.74	0.14
19-Aug-88	45	0.41	0.71	0.14
20-Aug-88	46	0.41	0.67	0.14
21-Aug-88	47	0.40	0.64	0.13
22-Aug-88	48	0.40	0.61	0.13
23-A ug-88	49	0.39	0.58	0.13
24-hug-80	50	0.39	0.55	0.12

Comments on the aluminium intake of

The table on the following page *gives* an estimate of the aluminium intake for the period up to 24th August, after which date there are Insufficient data to be able to make any satisfactory prediction.

The only data for samples taken from the premises where resided at the time of the incident are those for 17th August 1988 which show an aluminium concentration of 0.16 mg/l (which is less than *the* EC MAC of *0.2* mg/l) and which gives an aluminium intake of 0.32 mg for that day; see the table on the following page for more details.

Estimated aluminium intake for
Quantity **of water drunk** in **litreslday:** 2

Date	Day	Aluminium intake in mg/ Model	max.	min.
07-Jul-88	2	221.36	250.00	15.80
08-Jul-88	3	37.79	50.00	3.00
09-Jul-88	4	3.22	9.36	0.60
10-Jul-88	5	1-41	8.91	0.59
11-Jul-88	6	1.36	8.48	0.58
14-Jul-88	9	1.28	7.32	0.54
18-Jul-88	13	1.19	6.01	0.49
I9-Jul-88	14	1.16	5.72	0.48
20-Jul-88	15	1.14	5.45	0.47
21-Jul-88	16	1.12	5.18	0.46
22-Jul-88	17	1.10	4.93	0.45
23-Jul-88	18	1.08	4.70	0.44
24-Jul-88	19	1.06	4.47	0.43
25-Jul-88	20	1.05	4.26	0.42
26-Jul-88	21	1.03	4.05	0.41
27-Jul-88	22	1.01	3.86	0.41
28-Jul-88	23	0.99	3.67	0.40
29-Jul-88	24	0.98	3.50	0.39
30-Jul-88	25	0.96	3.33	0.38
31-Jul-88	26	0.95	3.17	0.37
01-Aug-88	27	0.93	3.02	0.36
02-Aug-88	28	0.92	2.87	0.36
03-Aug-88	29	0.90	2.73	0.35
04-Aug-88	30	0.89	2.60	0.34
05-Aug-88	31	0.87	2.48	0.33
06-Aug-88	32	0.86	2.36	0.33
07-Aug-88	33	0.85	2.24	0.32
08-Aug-88	34	0.84	2.14	0.31
09-Aug-88	35	0.82	2.03	0.30
10-Aug-88	36	0.81	1.94	0.30
11-Aug-88	37	0.80	1.84	0.29
12-Aug-88	38	0.79	1.76	0.28
13-Aug-88	39	0.78	1.67	0.28
14-Aug-88	40	0.77	1.59	0.27
15-Aug-88	41	0.76	1.51	0.27
16-Aug-88	42	0.75	1.44	0.26
17-Aug-88	43	0.74	1.37	0.26
18-Aug-88	44	0.73	1.31	0.25
19-Aug-88	45	0.72	1.24	0.24
20-Aug-88	46	0.71	1.18	0.24
21-Aug-88	47	0.70	1.13	0.23
22-Aug-88	48	0.69	1.07	0.23
23-Aug-88	49	0.69	1.02	0.22
24-Aug-88	50	0.68	0.97	0.22

ıctual intake 0:32 mg

Comments on the aluminium intake of

The table on the following page *gives* an estimate of the aluminium intake for the period up *to* 24th August, after which date there are insufficient data to be able to make any satisfactory prediction.

The only data for samples taken from the premises where resided at the time of the incident are those for 16th August 1988 which show an aluminium concentration of 0.28 mg/l which gives an aluminium intake of 0.56 mg for that day; see the table on the following page for more details.

Estimated aluminium intake for
Quantity of water drunk in litres/day: 2

Date	Day	Aluminium intake in mg/ Model	max.	ma.
07-Jul-88	2	221.36	250.00	15.80
08-Jul-88	3	37.79	50.00	3.00
09-Jul-88	4	3.22	9.36	0.60
10-Jul-88	5	1.41	8.91	0.59
11-Jul-88	6	1.36	8.48	0.58
14-Jul-88	9	1.28	7.32	0.54
18-Jul-88	13	1.19	6.01	0.49
19-Jul-88	14	1.16	5.72	0.48
20-Jul-88	15	1.14	5.45	0.47
21-Jul-88	16	1.12	5.18	0.46
22-Jul-88	17	1.10	4.93	0.45
23-Jul-88	18	1.08	4.70	0.44
24-Jul-88	19	1.06	4.47	0.43
25-Jul-88	20	1.05	4.26	0.42
26-Jul-88	21	1.03	4.05	0.41
27-Jul-88	22	1.01	3.86	0.41
28-Jul-88	23	0.99	3.67	0.40
29-Jul-88	24	0.98	3.50	0.39
30-Jul-88	25	0.96	3.33	0.38
31-Jul-88	26	0.95	3.17	0.37
01-Aug-88	27	0.93	3.02	0.36
02-Aug-88	28	0.92	2.87	0.36
03-Aug-88	29	0.90	2.73	0.35
04-Aug-88	30	0.89	2.60	0.34
05-Aug-88	31	0.87	2.48	0.33
06-Aug-88	32	0.86	2.36	0.33
07-Aug-88	33	0.85	2.24	0.32
08-Aug-88	34	0.84	2.14	0.31
09-Aug-88	35	0.82	2.03	0.30
10-Aug-88	36	0.81	1.94	0.30
11-Aug-88	37	0.80	1.84	0.29
12-Aug-88	38	0.79	1.76	0.28
13-Aug-88	39	0.78	1.67	0.28
14-Aug-88	40	0.77	1.59	0.27
15-Aug-88	41	0.76	1.51	0.27
16-Aug-88	42	0.75	1.44	0.26
17-Aug-88	43	0.74	1.37	0.26
18-Aug-88	44	0.73	1.31	0.25
19-Aug-88	45	0.72	1.24	0.24
20-Aug-88	46	0.71	1.18	0.24
21-Aug-88	47	0.70	1.13	0.23
22-Aug-88	48	0.69	1.07	0.23
23-Aug-88	49	0.69	1.02	0.22
24-Aug-88	50	0.68	0.97	0.22

ctual intake 0.56 mg

Comments on the aluminium **intake** of .

The table on the following page *gives* an estimate of the aluminium intake for the period up to **24th August, after which date there are insufficient data to be able** to **make any satisfactory prediction.**

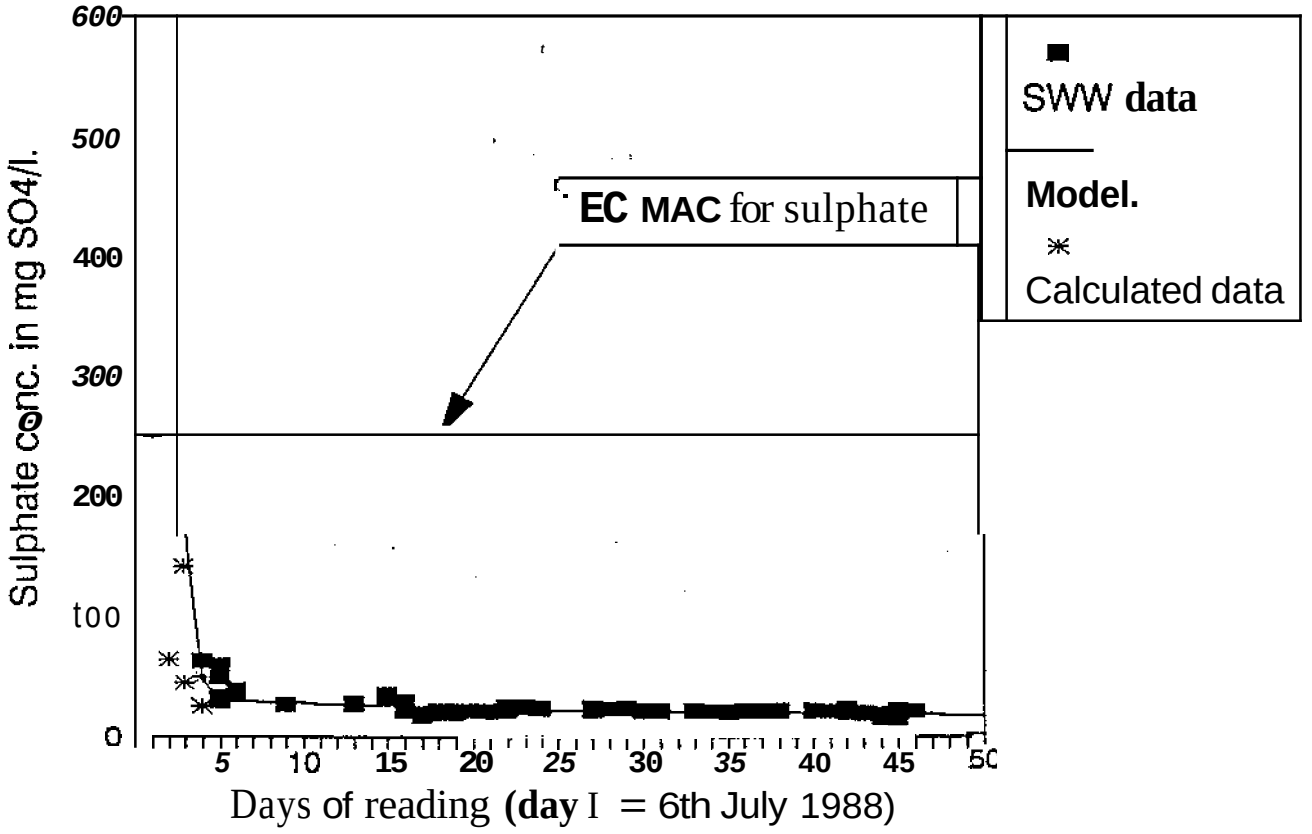
The only data *for* samples taken from **the premises where** . **resided at the time of the incident are those for** 16th **August 1988 which show an aluminium** concentration ***of* 0.28** mg/l **which gives an aluminium intake of** 0.48 mg ***for* that day; see the table** on **the following page for more details.**

Estimated aluminium intake for
Quantity of water drunk in litres/day: 1.7

Date	Day	Aluminium intake in mg/l Model	max.	min.
07-Jul-88	2	188.16	212.50	13.43
08-Jul-88	3	32.12	42.50	2.55
09-Jul-88	4	2.74	7.95	0.51
10-Jul-88	5	1.20	7.57	0.50
11-Jul-88	6	1.15	7.21	0.49
14-Jul-88	9	1.09	6.22	0.46
18-Jul-88	13	1.01	5.11	0.42
19-Jul-88	14	0.99	4.86	0.41
20-Jul-88	15	0.97	4.63	0.40
21-Jul-88	16	0.95	4.41	0.39
22-Jul-88	17	0.94	4.19	0.38
23-Jul-88	18	0.92	3.99	0.38
24-Jul-88	19	0.90	3.80	0.37
25-Jul-88	20	0.89	3.62	0.36
26-Jul-88	21	0.87	3.44	0.35
27-Jul-88	22	0.86	3.28	0.34
28-Jul-88	23	0.84	3.12	0.34
29-Jul-88	24	0.83	2.97	0.33
30-Jul-88	25	0.82	2.a3	0.32
31-Jul-88	26	0.80	2.69	0.32
01-Aug-88	27	0.79	2.56	0.31
02-Aug-88	28	0.78	2.44	0.30
03-Aug-88	29	0.77	2.32	0.30
04-Aug-88	30	0.76	2.21	0.29
05-Aug-88	31	0.74	2.11	0.28
06-Aug-88	32	0.73	2.00	0.28
07-Aug-88	33	0.72	1.91	0.27
08-Aug-88	34	0.71	1.82	0.26
09-Aug-88	35	0.70	1.73	0.26
10-Aug-88	36	0.69	1.65	0.25
11-Aug-88	37	0.68	1.57	0.25
12-Aug-88	38	0.67	1.49	0.24
13-Aug-88	39	0.66	1.42	0.24
14-Aug-88	40	0.65	1.35	0.23
15-Aug-88	41	0.65	1.29	0.23
16-Aug-88	42	0.64	1.23	0.22
17-Aug-88	43	0.63	1.17	0.22
18-Aug-88	44	0.62	1.11	0.21
19-Aug-88	45	0.61	1.06	0.21
20-Aug-88	46	0.61	1.01	0.20
21-Aug-88	47	0.60	0.96	0.211
22-Aug-88	48	0.59	0.91	0.19
23-Aug-88	49	0.58	0.87	0.19
24-Aug-88	50	0.58	0.83	0.19

ıctual intake 0.48 mg

Sulphate concentrations for the Delabole/Rockhead Area,



Data on sulphate for the Delabole and Rockhead Area.

Date	Day	Sulphate Concentrations SWW Data	Model Data	Estimated
	0			
	1			
07-Jul-88	2			600
07-Jul-88	2		600	81
08-Jul-88	3		181	139
08-Jul-88	3		181	42
09-Jul-88	4		45	22
09-Jul-88	4		45	23
09-Jul-88	4		45	47
09-Jul-88	4	60.0	45	
10-Jul-88	5	27.0	28	
10-Jul-88	5	30.0	26	
10-Jul-88	5	28.0	20	
10-Jul-88	5	27.0	28	
10-Jul-88	5	47.0	28	
10-Jul-88	5	28.0	28	
10-Jul-88	5	47.0	28	
10-Jul-88	5	52.0	28	
10-Jul-88	5	57.0	28	
11-Jul-88	6	33.0	27	
11-Jul-88	6	36.0	27	
14-Jul-88	9	25.0	26	
14-Jul-88	9	25.0	26	
18-Jul-88	13	25.0	24	
18-Jul-88	13	25.2	24	
18-Jul-88	13	25.3	24	
20-Jul-88	15	29.9	23	
20-Jul-88	13	32.6	24	
20-Jul-88	15	28.6	23	
21-Jul-88	16	25.9	23	
21-Jul-88	16	26.3	23	
21-Jul-88	16	19.4	23	
22-Jul-88	17	15.8	22	
22-Jul-88	17	15.0	22	
22-Jul-88	17	t4.7	22	
22-Jul-88	t7	16.9	22	
22-Jul-88	17	15.1	22	
23-Jul-88	10	17.5	22	
23-Jul-88	18	19.1	22	
23-Jul-88	18	18.3	22	
24-Jul-88	19	18.9	22	
24-Jul-88	19	17.8	22	
24-Jul-88	19	19.2	22	
25-Jul-88	20	19.3	21	
26-Jul-88	21	18.8	21	
26-Jul-88	21	19.5	21	
26-Jul-88	21	10.6	21	
27-Jul-88	22	23	21	
27-Jul-88	22	23	21	
27-Jul-88	22	22.6	21	
27-Jul-88	22	19.9	21	
27-Jul-88	22	22.6	21	
28-Jul-88	23	23.8	20	
28-Jul-88	23	21.7	20	
28-Jul-88	23	22.4	20	
29-Jul-88	24	21.8	20	
29-Jul-88	24	21.0	20	
01-Aug-88	27	22.5	19	
01-Aug-88	27	20.0	19	
01-Aug-88	27	21.6	19	
02-Aug-88	28	21.1	19	
02-Aug-88	28	20.7	19	
03-Aug-88	29	20.4	19	
03-Aug-88	29	20.5	19	
03-Aug-88	29	21.6	19	
04-Aug-88	30	19.3	18	
04-Aug-88	30	19.8	18	
04-Aug-88	30	18.3	18	
05-Aug-88	31	18.6	18	
05-Aug-88	31	19.1	18	
05-Aug-88	31	18.7	18	
07-Aug-88	53	19.3	18	

Date	Day	Sulphate Concentrations SWW Data	odel Data	Estimated
07-Aug-88	33	18.3	18	
07-Aug-88	33	17.9	18	
08-Aug-88	34	18.8	18	
08-Aug-88	34	19.0	18	
08-Aug-88	34	18.3	18	
08-Aug-88	34	18.7	18	
09-Aug-88	35	17.8	17	
09-Aug-88	35	18.5	17	
09-Aug-88	35	17.5	17	
10-Aug-88	36	18.6	17	
10-Aug-88	36	19.4	17	
10-Aug-88	36	19.1	I?	
11-Aug-88	37	19.6	17	
11-Aug-88	37	18.9	17	
12-Aug-88	38	19.4	17	
12-Aug-88	38	18.7	17	
12-Aug-88	38	18.5	17	
14-Aug-88	40	18.3	17	
14-Aug-88	40	19.1	17	
14-Aug-88	40	18.3	17	
14-Aug-88	40	18.0	17	
15-Aug-88	41	18.6	16	
15-Aug-88	41	18.4	16	
15-Aug-88	41	18.3	16	
16-Aug-88	42	19.5	16	
16-Aug-88	42	19.5	16	
16-Aug-88	42	20.7	16	
16-Aug-88	42	19.7	16	
16-Aug-88	42	18.0	18	
16-Aug-88	42	21.1	16	
16-Aug-88	42	17.8	16	
16-Aug-88	42	17.0	18	
16-Aug-88	42	18.0	16	
16-Aug-88	42	17.3	16	
16-Aug-88	42	19.7	16	
16-Aug-88	42	19.2	16	
16-Aug-88	42	17.2	16	
16-Aug-88	42	18.9	16	
17-Aug-88	43	16.6	I6	
17-Aug-88	43	16.4	16	
17-Aug-88	43	16.4	16	
17-Aug-88	43	16.7	16	
17-Aug-88	43	16.7	16	
17-Aug-88	43	t6.8	16	
17-Aug-88	43	17.2	16	
17-Aug-88	43	17.1	16	
18-Aug-88	44	12.4	16	
18-Aug-88	44	16.3	16	
18-Aug-88	44	16.1	16	
18-Aug-88	44	16.2	16	
19-Aug-88	45	13.4	I6	
19-Aug-88	45	18.6	16	
19-Aug-88	45	13.4	16	
19-Aug-88	45	120	16	
19-Aug-88	5	12.0	16	
19-Aug-88	45	11.8	16	
19-Aug-88	45	t4.5	16	
19-Aug-88	45	15.1	16	
19-Aug-88	45	18.5	16	
19-Aug-88	45	19.4	16	
19-Aug-88	45	13.7	16	
19-Aug-88	45	14.8	16	
19-Aug-88	45	14.1	16	
19-Aug-88	45	14.1	16	
19-Aug-88	45	12.5	16	
20-Aug-88	46	18.(	16	
20-Aug-88	46	18.(	16	
20-Aug-88	46	19.(	16	
20-Aug-88	46	18.(	16	
20-Aug-88	46	19.(	16	
	47		15	
	48		15	

The quantity of sulphate ingested by

The results of the analyses on all the samples collected by South West Water Authority from the Delabole/Rockhead Area (Area B in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations for the period from 6th July to 8th July 1988 inclusive, but there are data for the aluminium concentrations on 7th and 8th July 1988.1 have therefore calculated *the* equivalent theoretical sulphate concentration for the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - far example, the water naturally contains roughly 16-20 *rng* sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still in solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the first two days when the theoretical and statistical model for sulphate concentration is less reliable because of the shortage of data.

The data are:

			ic Sulphate Concentration
07-Jul-88			
07-Jul-88			
08-Jul-88	3	22.6	120
08-Jut-88	3	4.39	23.4
09-Jul-88	4	0.49	2.6
09-Jul-88	4	*0.75*	4.0
09-Jul-88	4	5.29	28.2

Ail other data reported for sulphate concentration *in* the Delabole/Rockhead Area, including those samples taken from the and residences. are also *for* values below the EC MAC of *250* mg/l. In the case of the residence, a sample taken on 17th August 1988 from the cold water tap was not analysed for sulphate - presumably because there was no reason to suppose that the sulphate was high - and another sample taken on 9th March 1989 had a sulphate concentration ,of 20.5 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate: thus the maximum value *for* 7th July, used in my estimation for total sulphate ingested, is 600 mg/l. This is the only occasion on which, according to *the* SWWA data I have seen, the sulphate value exceeded the EC MAC. In making my estimates based on the mathematical model I have used the higher vatues for sulphate from the table above so, on the basis of the evidence I have seen, my estimates *of* sulphate ingestion err on the high side.

On the basis of the available data the only day on which might have ingested concentrations of sulphate in excess of the MAC was on 7th July when the quantity consumed, based on the estimate as described above, would have been 0.684 grams.

The quantity of sulphate ingested by

The results of the analyses on all the samples collected by South West Water Authority from the Delabole/Rockhead Area (Area B in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations for the period from 6th July to 8th July 1988 inclusive, but there are data for the aluminium concentrations on 7th and 8th July 1988. I have therefore calculated the *equivalent* theoretical sulphate concentration for the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as ?hehydroxide *leaving* the associated sulphate still in solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the first two days when the theoretical and statistical model *for* sulphate concentration is less reliable because of the shortage of data.

The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	109	*581*
07-Jul-88	2	7.9	42
08-Jul-88	3	22.6	120
08-Jul-88	3	4.39	23.4
09-Jul-88	4	0.49	*2.6*
09-Jul-88	4	*0.75*	4.0
09-Jul-88	4	*5.29*	*28.2*

All other data reported for sulphate concentration In the Delabole/Rockhead Area, including those samples taken from the and residences, are also for values below the EC MAC of 250 mg/l. In the case of the . . residence, a sample taken on *17th* August 1988 from the cold water tap was not analysed fur sulphate - presumably because there was no reason *to* suppose that the sulphate was high - and another sample taken on 9th March 1989 had a sulphate concentration of 20.5 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown In the table above since, as noted above, the water naturally Contains roughly 16-20 mg/l sulphate; thus the maximum value for 7th July, used in my estimation for total sulphate ingested, is 600 mg/l. This is the only occasion on which, according to the SWWA data I have seen, the sulphate value exceeded the EC MAC. In making my estimates based on the mathematical model I have used the higher values for sulphate from the table above so, an the basis of the evidence I have seen, my estimates of sulphate ingestion err on the high side.

On the basis of the available data the only day *on* which might have ingested concentrations of sulphate in excess of the MAC was on 7th July when the quantity consumed, based on the estimate as described above, would have been 1.2 grams.

The quantity of sulphate ingested by

The results of the analyses on all the samples collected by South *West* Water Authority from the Delabole/Rockhead Area (Area B in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of *250* mg/l.

I could find no data for sulphate concentrations for the period from 6th July to 8th July 1988 inclusive, *but* there are data for *the* aluminium concentrations on 7th and *8th* July 1988. I have therefore calculated the equivalent theoretical sulphate concentration for the aluminium concentrations for the 7th and 8th July. These values *can* only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still in solution. However, these are ?he only data available and it enables an approximate evaluation of sulphate Intake to be made for the first two days when the theoretical and statistical model for sulphate concentration is less reliable because of the shortage of data.

The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	109	581
07-Jul-88	2	7.9	42
08-Jul-88	3	*22.6*	120
08-Jul-88	3	4.39	23.4
09-Jul-88	4	0.49	2.6
09-Jul-88	4	*0.75*	4.0
09-Jul-88	4	5.29	*28.2*

All other data reported for sulphate concentration in the Delabole/Rockhead Area, including those samples taken from the and residences, are also for values below the EC MAC of 250 mg/l. In the case of the residence, a sample taken on 17th *August* 1988 from the cold water tap was not analysed for sulphate - presumably because there was no reason to suppose that the sulphate was high - and another sample taken on 9th March 1989 had a sulphate concentration of 20.5 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate; thus the maximum value for 7th July, used in my estimation for total sulphate ingested, is 600 mg/l. This is the only occasion on which, according to the SWWA data I have seen, the sulphate value exceeded the EC MAC. In making my estimates based on the mathematical model I have used the higher values for sulphate from the table above so, on the basis of the evidence I have seen, my estimates of sulphate ingestion err on the high side.

On the basis of the available data the only day on which might have *ingested* concentrations of sulphate in excess of the MAC was on 7th July when the quantity consumed, based on the estimate as described above, would have been 1.2gwms.

The quantity of sulphate ingested by

The results of the analyses on all the samples collected by South West Water Authority from the Delabole/Rockhead Area (Area B in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations for the period from 6th July to 8th July 1988 inclusive, but there are data for the aluminium concentrations on 7th and 8th July 1988.1 have therefore calculated the equivalent theoretical sutphate concentration for the aluminium concentrations for the 7th and 8th July. These values can only be approximate since the sulphate concentrations are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still in solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the first two days when the theoretical and statistical model for sutphate concentration is less reliable because of the shortage of data.

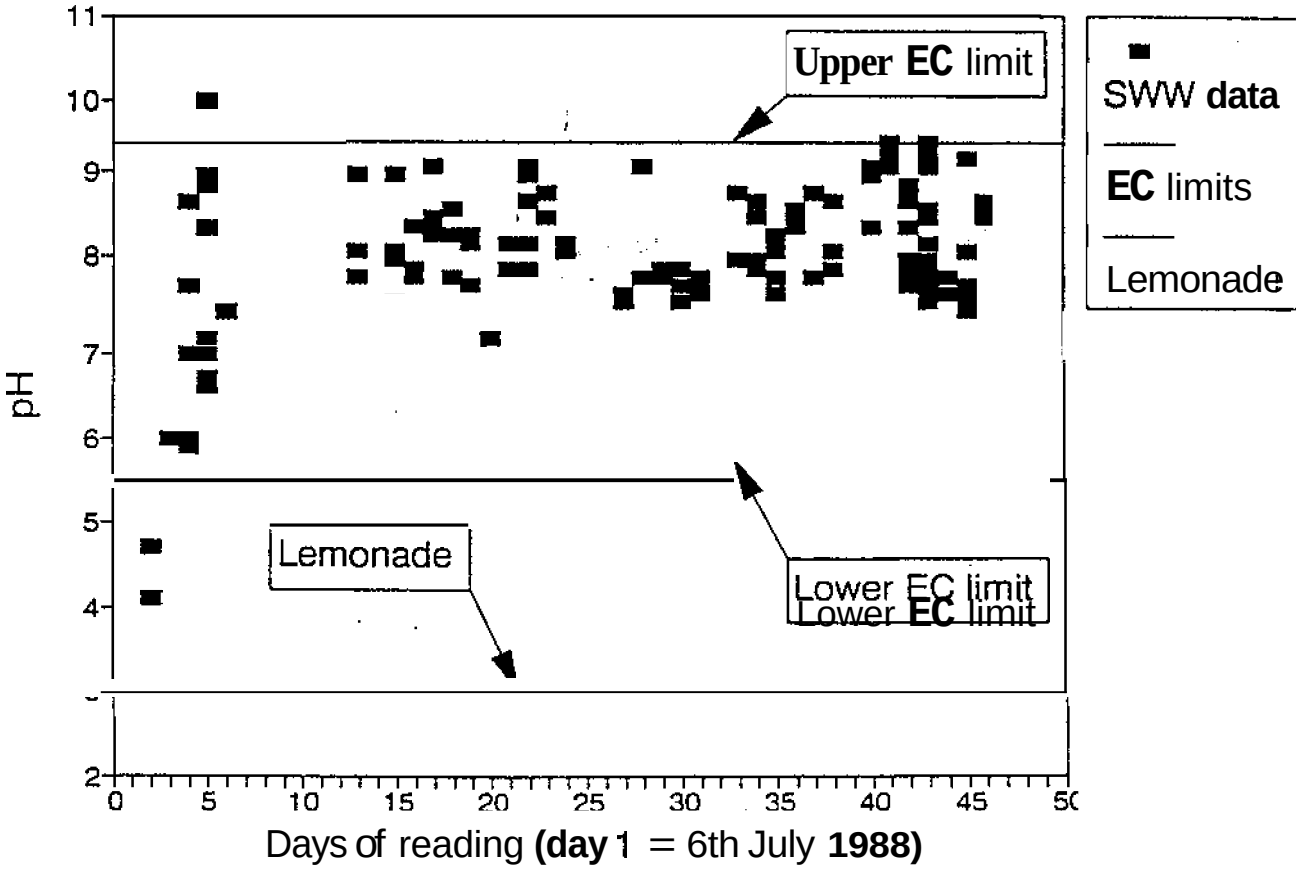
The data are:

Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	109	581
07-Jul-88	2	7.9	42
08-Jul-88	3	22.6	120
08-Jul-88	3	4.39	23.4
09-Jul-88	4	0.49	2.6
09-Jul-88	4	0.75	4.0
09-Jul-88	4	5.29	28.2

All other data reported for sulphate concentration in the Delabole/Rockhead Area, inctuding those samples taken from the and residences, are also for values below the EC MAC of 250 mg/l. In the case of the residence, a sample taken on 17th August 1988 from the cold water tap was not analysed for sulphate - presumably because there was no reason to suppose that the sulphate was high - and another sample taken on 9th March 1989 had a sulphate concentration of 20.5 mg/l.

In estimating the total sulphate concentration I have added 19 mg/l to the stoichiometric values shown in the table above since, as noted above, the water naturally contains roughly 16-20 mg/l sulphate: thus the maximum value for 7th July, used in my estimation for total sulphate ingested, is 600 mg/l. This is the only occasion on which, according to the SWWA data I have seen, the sulphate value exceeded the EC MAC. In making my estimates based on the mathematical model I have used the higher values for sulphate from the table above so, on the basis of the evidence I have seen, my estimates of sulphate ingestion err on the high side.

On the basis of the availabte data the only day on which might have *ingested* concentrations of sulphate in excess of the MAC was on 7th July when the quantity consumed, based on the estimate as described above, would have been 1.02 grams.


11
10
9
8
7
6
5
4
2
0
5
10
15
20
25
30
35
40
45
pH
Upper EC limit
Lemonade
Lower EC limit
Lower EC limit
SWW data
EC limits
Lemonade
Days of reading (day 1 = 6th July 1988)

Data on pH in samples from the Delabole/Rockhead Area.

Date	Day	pH	Date	Day	pH
07-Jul-88	2	4.1	08-Aug-88	34	8.6
07-Jul-88	2	4.7	08-Aug-88	34	8.1
08-Jul-88	3	KO	08-Aug-88	34	8.0
08-Jul-88	3	6.0	08-Aug-88	34	8.8
09-Jul-88	4	7.8	09-Aug-88	35	7.9
09-Jul-88	4	8.8	09-Aug-88	35	7.7
09-Jul-88	4	7.0	09-Aug-88	35	8 4
09-Jul-88	4	5.9	09-Aug-88	35	8.2
09-Jul-88	4	6.0	10-Aug-88	36	8.7
10-Jul-88	5	7.0	10-Aug-88	36	8.6
10-Jul-88	5	9.1	10-Aug-88	36	8.5
10-Jul-88	5	6.7	11-Aug-88	37	7.9
10-Jul-88	5	7 2	11-Aug-88	37	8.9
10-Jul-88	5	7.0	12-Aug-88	38	8.2
10-Jul-88	5	10.0	12-Aug-88	38	8.8
10-Jul-88	5	6.6	12-Aug-88	38	8.0
10-Jul-88	5	8.5	14-Aug-88	40	9.2
10-Jul-88	5	9.0	14-Aug-88	40	8.5
11-Jul-88	6	7.5	14-Aug-88	40	9.1
11-Jul-88	6	7.5	14-Aug-88	40	9.2
14-Jul-88	9	7.5	15-Aug-88	41	9.2
14-Jul-88	9	7.4	15-Aug-88	41	9.3
18-Jul-88	13	7.9	15-Aug-88	41	9.5
18-Jul-88	13	9.1	16-Aug-88	42	8.5
18-Jul-88	13	8.2	16-Aug-88	42	8.1
20-Jul-88	15	6.2	16-Aug-88	42	7.9
20-Jul-88	15	9.1	16-Aug-88	42	8.0
20-Jul-88	15	7.6	16-Aug-88	42	8.0
20-Jul-88	15	8.1	16-Aug-88	42	7.9
21-Jul-88	16	0.0	16-Aug-88	42	8.8
21-Jul-88	16	7.9	16-Aug-88	42	9.0
21-Jul-88	16	8.5	16-Aug-88	42	8.9
22-Jul-88	17	8.4	16-Aug-88	42	7.8
22-Jul-88	17	6.4	16-Aug-88	42	7.9
22-Jul-88	17	9.2	16-Aug-88	42	8.0
22-Jul-88	17	as	16-Aug-88	42	8.1
22-Jul-88	17	8.6	16-Aug-88	42	8.0
23-Jul-88	10	a4	17-Aug-88	43	9.2
23-Jul-88	18	7.9	17-Aug-88	43	8.7
23-Jul-88	18	8.7	17-Aug-88	43	8.0
24-Jul-88	19	7.8	17-Aug-88	43	8.1
24-Jul-88	19	8.3	17-Aug-88	43	9.5
24-Jul-88	19	a4	17-Aug-88	43	8.6
25-Jul-88	20	7.2	17-Aug-88	43	9.4
26-Jul-88	21	8.0	17-Aug-88	43	7.8
26-Jul-88	21	8.0	17-Aug-88	43	8.3
26-Jul-88	21	6.3	17-Aug-88	43	9.3
27-Jul-88	22	9.1	17-Aug-88	43	7.6
27-Jul-88	22	8.8	17-Aug-88	43	7.7
27-Jul-88	22	9.2	17-Aug-88	43	7.9
27-Jul-88	22	aa	17-Aug-88	43	8.1
27-Jul-88	22	a3	18-Aug-88	44	7.9
28-Jul-88	23	8.6	18-Aug-88	44	7.7
28-Jul-88	23	8.9	18-Aug-88	44	7.7
28-Jul-88	23	8.6	18-Aug-88	44	7.7
29-Jul-88	24	8.3	19-Aug-88	45	7.5
29-Jul-88	24	8.2	19-Aug-88	45	8.2
01-Aug-88	27	7.1	19-Aug-88	45	7.8
01-Aug-88	27	7.6	19-Aug-88	45	7.7
01-Aug-88	27	7.7	19-Aug-88	45	7.6
02-Aug-88	28	7.9	19-Aug-88	45	7.7
02-Aug-88	28	9.2	19-Aug-88	45	7.6
03-Aug-88	29	7.9	19-Aug-88	45	9.3
03-Aug-88	29	8.0	19-Aug-88	45	7.7
03-Aug-88	29	7.9	19-Aug-88	45	7.7
04-Aug-88	30	7.6	19-Aug-88	45	7.3
04-Aug-88	30	7.8	19-Aug-88	45	7.7
04-Aug-88	30	7.6	19-Aug-88	45	7.6
04-Aug-88	30	8.0	19-Aug-88	45	7.8
05-Aug-88	31	7.7	19-Aug-88	45	7.1
05-Aug-88	31	7.9	20-Aug-88	46	8.8
05-Aug-88	31	7.8	20-Aug-88	46	8.8
07-Aug-88	33	8.1	20-Aug-88	46	8.7
07-Aug-88	33	8.1	20-Aug-88	46	8.7
07-Aug-88	33	8.9	20-Aug-88	46	8.6

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity *ingested* can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance In water.

The range for pH *in* drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With *the* exception of 3 samples, two with pH values of *4.1,* 4.7 taken on the 7th and and one with a value of 10 taken on 10th June 1988 all samples are within this range.

The significance of pH lies more in its effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such as Coca Cola and lemonade. I show an *the* graph of the pH of samples in the Delabole/Rockhead Area (Area B) the relative position of lemonade which typically has a pH in the region of 3.

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With the exception of 3 samples, two with pH values of 4.1, 4.7 taken on the 7th and and one with a value of 10 taken on 10th June 1988 all samples are within this range.

The significance of pH lies more in its effecton pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside *the* EC Drinking Water pH limits, for example soft drinks such as Coca Cola and lemonade. I show on the graph of the pH of samples in the Delabole/Rockhead Area (Area 8) the relative position of lemonade which typically has a pH in the region of 3.

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance *in* water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5:
lower limit	5.5.

With the exception of *3* samples, two with pH values of 4.1, 4.7 taken on *the* 7th and and one with a value of 10 taken on 10th June 1988 all samples are within this range.

The significance of pH lies more in *its* effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such as Coca Cola and lemonade. I show on the graph of the pH of samples in the Delabole/Rockhead Area (Area B) the relative position of lemonade which typically has *a* pH in the region of *3.*

pH of water consumed by

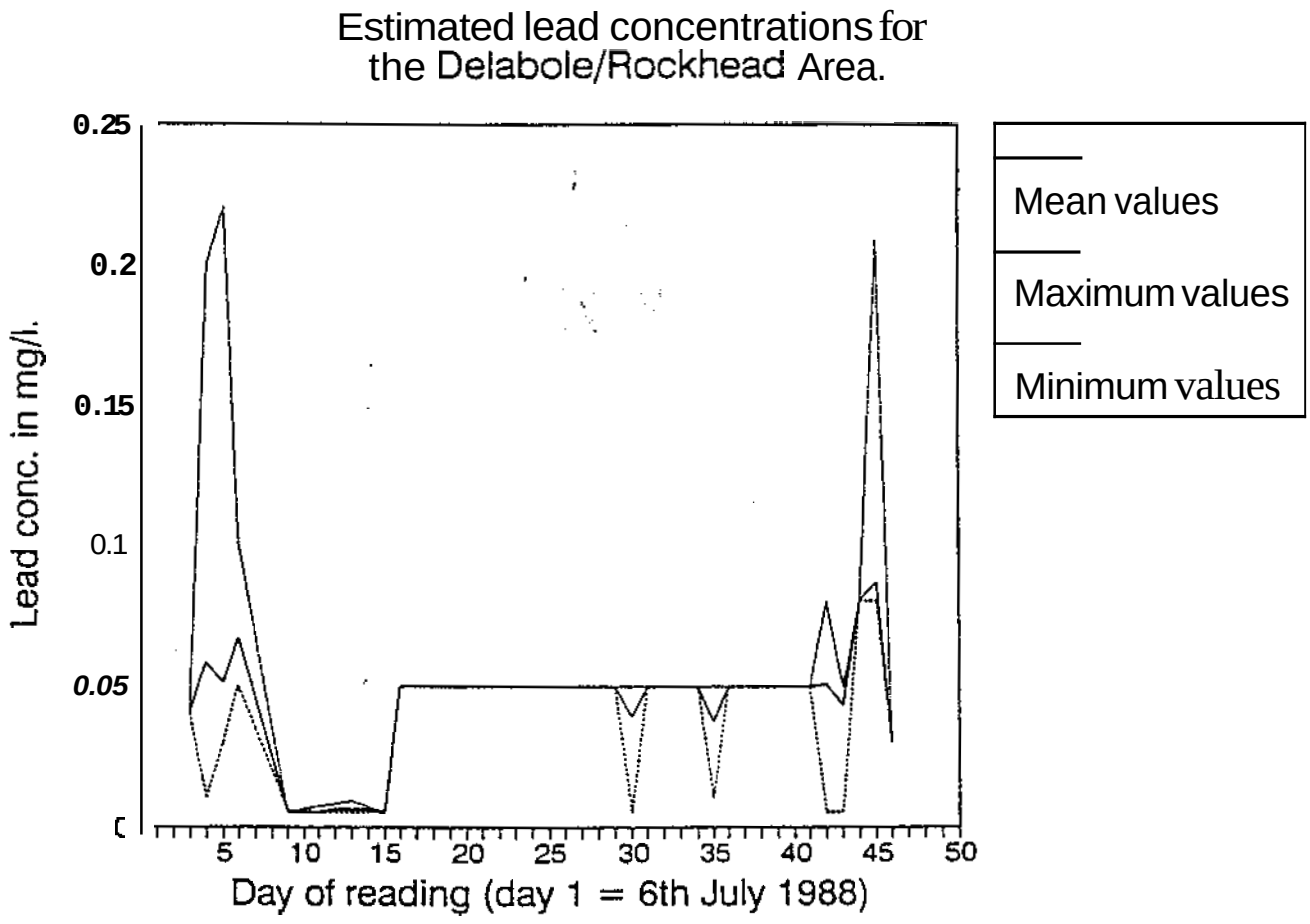
pH is not a substance which can be consumed and *for* which the quantity ingested can be calculated as it *can* for aluminium or sulphate; pH is a measure of the acidity and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	9.5;
lower limit	5.5.

With the exception of 3 samples, two with pH values of 4.1, 4.7 taken on the 7th and and one with a value of 10 taken on 10th June 1988 all samples are within this range.

The significance of pH Lies more in Its effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such as *Coca* Cola and lemonade. I show on the graph of the pH of samples in the Delabole/Rockhead Area (Area 6) the relative position of lemonade which typically has a pH in the region of 3.



The above graph should be treated with caution. Where data from **analyses showed** a **lead Concentration of "less than" a particular value (concentrations are variously shown** in **the SWW analytical records as** <80 μg/l, <50 μg/l, <30 μg/l or <10 μg/l) **I have shown them** on the **above graph at the "less than" value itself, for example,** <50μg/l **is shown on the graph as** 50μg/l.

Estimation of lead values in the drinking water fur the Delabole/Rockhead Area.

(see graph on the previous page and the table on the following page).

Most of the data for the lead analyses are for a value below the limit of detection of the analytical method used, and as a consequence the data are not 'hard' data. from which neither a dispersion model nor a statistical model can be developed. Out of some 148 measurements only about nine are actual values. In preparing the data for lead I have therefore assumed values to be the 'less than' value, so, for example, if a value of <.05 mg/l is shown in the SWW records I have used a value of *0.05* mg/l in preparing the graph, table and consumption level by

The data are insufficient to calibrate any rational model or to prepare a reasonable statistical relationship so, in order to estimate values for those six or so days on which there was no lead sample, I have assumed a simple linear relationship between consecutive values and interpolated. These are the values shown in the table headed *"Estimated values for lead concentrations in mg/l for the Delabole/Rockhead Area"* which have been used to prepare the graph on the previous page.

Estimated values for lead concentrations in mg/l for the Delabole/Rockhead Area.

Page or Sample	Day	Date	Estimated Lead Co	cs.	
			Mean.	Max.	Min.
484	3	08-Jul-88	0.04	0.04	0.04
114	4	09-Jul-88	0.058	0.2	0.01
115	5	10-Jul-88	0.051	0.22	0.03
260	6	11-Jul-88	0.067	0.1	0.05
	7	12-Jul-88	0.046	0,068	0.035
	a	13-Jul-88	0.025	0.036	0.02
125	9	14-Jul-88	0.005	0.005	0.005
	10	15-Jul-88	0.005	0.006	0.005
	If	16-Jul-88	0.005	0.007	0.005
	12	17-Jul-88	0.006	0.008	0,005
500	13	18-Jul-88	0.006	0.009	0.005
	14	19-Jul-88	0.006	0.007	0.005
267	15	20-Jul-88	0.005	0.005	0.005
511	16	21-Jul-88	0.05	0.05	0.05
139	17	22-Jul-88	0.05	0.05	0.05
519	18	23-Jul-88	0.05	0.05	0.05
520	19	24-Jul-88	0.05	0.05	0.05
143	20	25-Jul-88	0.05	0.05	0.05
145	21	26-Jul-88	0.05	0.05	0.05
274	22	27-Jul-88	0.05	0.05	0.05
531	23	28-Jul-88	0.05	0.05	0.05
276	24	29-Jul-88	0.05	0.05	0.05
	25	30-Jul-88	0.05	0.05	0.05
	26	31-Jul-88	0.05	0.05	0.05
156	27	01-Aug-88	0.05	0.05	0.05
157	28	02-Aug-88	0.05	0.05	0.05
159	29	03-Aug-88	0.05	0.05	0.05
549	30	04-Aug-88	0.039	0.05	0.005
281	31	05-Aug-88	0.05	0.05	0.05
	32	06-Aug-88	0.05	0.05	0.05
282	33	07-Aug-88	0.05	0.05	0.05
556	34	08-Aug-88	0.05	0.05	0.05
489	35	09-Aug-88	0.037	0.05	0.01
286	36	10-Aug-88	0.05	0.05	0.05
563	37	11-Aug-88	0.05	0.05	0.05
173	38	12-Aug-88	0.05	0.05	0.05
	39	13-Aug-88	0.05	0.05	0.05
570	40	14-Aug-88	0.05	0.05	0.05
177	41	15-Aug-88	0.05	0.05	0.05
291	42	16-Aug-88	0.051	0.08	0.005
341	43	17-Aug-88	0.043	0.05	0.005
345	44	18-Aug-88	0.08	0.08	0.08
105	45	19-Aug-88	0.087	0.209	0.08
381	46	20-Aug-88	0.03	0.03	0.03

Intake of copper, zinc and lead by In Area B.

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000µg/l ie 3	mg/l.
zinc :	5,000µg/l ie 5	mg/l.
lead :	50 µg/l ie 0.05	mg/l.

Intake of Copper and Zinc.

All samples for copper and zinc show levels for these two metals at levels very substantially below the EC *MAC* - sometimes as much 3 orders of magnitude below the MAC.

Intake of Lead.

I have examined analyses of 148 samples taken between 7th July and 20th August 1988 In which 5 samples taken on four different days exceeded the MAC, all but one of which exceedances were between 9th and 11th July. Of the remaining 143 samples *28,* taken on three different days (viz. 16th, 18th and 19th August 1988) are recorded as being less than 80µg/l (ie <0.08 mg/l). I presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08mg/l and *0.005* mg/l (since the results are variously recorded as being <0.08, <0.05, <0.03, <0.01 and <0.005 mg/l). It is therefore not possible to say with certainty that on those 28 occasions the lead concentration did not exceed 50 µg/l. Since the remaining 115 samples (about *78%)* are below - and often very much below - the MAC it is likely that some or all of the samples shown as being <0.08 mg/l were, actually, less than the MAC.

The concentrations of copper and zinc were thus always well below the acceptable levels.

The concentration of lead was also mostly welt below the EC level, the exceptions being the five samples shown in the table on the following page and some uncertainty on those 28 occasions when the concentration was recorded as <80 µg/l.

I have estimated possible lead intake, using the data available and Interpolating where no data exist, and show the results in the table on the following page. In making the estimates I have used a lead concentration of 80 µg/l on the three days when the *result of* analysis *is* recorded as <0.08 mg/l. In the case of the other five analyses which exceed the MAC there are insufficient data for any sensible modelling so I have simply given an estimate based on the mean, maximum and minimum values for the relevant days.

Data on lead analyses in samples from the Delabole/Rockhead Area

1. SWW samples from the Delabole/Rockhead Area in which the lead exceeded the EC MAC of *50* micrograms/litre.

No.	Page or Sample	Date	Lead
1	113	09-Jul-88	0.2
2	114	09-Jul-88	0.06
3	121	10-Jul-88	0.22
4	265	11-Jul-88	0.1
5	369	19-Aug-88	0.209

2. SWW samples *from* the Delabole/Rockhead Area *in* which the lead concentration could have been above the EC MAC.

No.	Page or Sample	Date	Lead	Sample
1	297	16-Aug-88	<0.08	
2	298	16-Aug-88	<0.08	
3	s.9921	16-Aug-88	<0.08	
4	299	16-Aug-88	<0.08	
5	300	16-Aug-88	<0.08	
6	296	16-Aug-88	<0.08	
7	292	16-Aug-88	<0.08	
8	343	18-Aug-88	<0.08	
9	346	18-Aug-88	<0.08	
10	344	18-Aug-88	<0.08	
11	345	18-Aug-88	<0.08	
12	356	19-Aug-88	<0.08	
13	353	19-Aug-88	<0.08	
14	354	19-Aug-88	<0.08	
15	357	19-Aug-88	<0.08	
16	358	19-Aug-88	<0.08	
17	359	19-Aug-88	<0.08	
18	355	19-Aug-88	<0.08	
19	352	19-Aug-88	<0.08	
20	351	19-Aug-88	<0.08	
21	362	19-Aug-88	<0.08	
22	363	19-Aug-88	<0.08	
23	200	19-Aug-88	4.08	
24	366	19-Aug-88	<0.08	
25	360	19-Aug-88	<0.08	
26	361	19-Aug-88	<0.08	
27	364	19-Aug-88	<0.08	
28	105	19-Aug-88	<0.08	

Estimation of the lead intake by
Quantity of water drunk in litres/day:- 1.14

Page or Sample	Day	Date	Lead Intake in mg/day. Mean	Max.	Min.
484	3	08-Jul-88	0.046	0.046	0.046
114	4	09-Jul-88	0.066	0.228	0.011
115	5	10-Jul-88	0.058	0.251	0.034
260	6	11-Jul-88	0.076	0.114	0.057
	7	12-Jul-88	0.052	0.078	0.040
	8	13-Jul-88	0.029	0.041	0.023
125	9	14-Jul-88	0.006	0.006	0.006
	10	15-Jul-88	0.006	0.007	0.006
	11	16-Jul-88	0.006	0.008	0.006
	12	17-Jul-88	0.007	0.009	0,006
500	13	18-Jul-88	0.007	0.010	0.006
	14	19-Jul-88	0.007	0.008	0.006
267	15	20-Jul-88	0.006	0.006	0.006
511	16	21-Jul-88	0.057	0.057	0.057
139	17	22-Jul-88	0.057	0.057	0.057
519	18	23-Jul-88	0.057	0.057	0.057
520	19	24-Jul-88	0.057	0.057	0.057
143	20	25-Jul-88	0.057	0.057	0.057
145	21	26-Jul-88	0.057	0.057	0.057
274	22	27-Jul-88	0.057	0.057	0.057
531	23	28-Jul-88	0.057	0.057	0.057
276	24	29-Jul-88	0.057	0.057	0.057
	25	30-Jul-88	0.057	0.057	0.057
	26	31-Jul-88	0.057	0.057	0.057
156	27	01-Aug-88	0.057	0.057	0.057
157	28	02-Aug-88	0.057	0.057	0.057
159	29	03-Aug-88	0.057	0.057	0.057
549	30	04-Aug-88	0.044	0.057	0.006
281	31	05-Aug-88	0.057	0.057	0.057
	32	06-Aug-88	0.057	0.057	0.057
282	33	07-Aug-88	0.057	0.057	0.057
556	34	08-Aug-88	0.057	0.057	0.057
489	35	09-Aug-88	0.042	0.057	0.011
286	36	10-Aug-88	0.057	0.057	0.057
563	37	11-Aug-88	0.057	0.057	0.057
173	38	12-Aug-88	0.057	0.057	0.057
	39	13-Aug-88	0.057	0.057	0.057
570	40	14-Aug-88	0.057	0.057	0.057
177	41	15-Aug-88	0.057	0.057	0.057
291	42	16-Aug-88	0.058	0.091	0.006
341	43	17-Aug-88	0.049	0.057	0.006
345	44	18-Aug-88	0.091	0.091	0.091
105	45	19-Aug-88	0,099	0.238	0.091
381	46	20-Aug-88	0.034	0.034	0.034

Estimation of the lead intake by
Quantity of water drunk in litres/day:- 2

Page or Sample	Day	Date	Lead Intake in mg/day. Mean	Max.	Min.
484	3	08-Jul-88	0.080	0.080	0.080
114	4	09-Jul-88	0.116	0.400	0.020
115	5	10-Jul-88	0.102	0.440	0.060
260	6	11-Jul-88	0.134	0.200	0.100
	7	12-Jul-88	0.092	0.136	0.070
	8	13-Jul-88	0.050	0.072	0.040
125	9	14-Jul-88	0.010	0.010	0.010
	10	15-Jul-88	0.010	0.012	0.010
	11	16-Jul-88	0.010	0.014	0.010
	12	17-Jul-88	0.012	0.016	0.010
500	13	18-Jul-88	0.012	0.018	0.010
	14	19-Jul-88	0.012	0.014	0.010
267	15	20-Jul-88	0.010	0.010	0.010
511	16	21-Jul-88	0.100	0.100	0.100
139	17	22-Jul-88	0.100	0.100	0.100
519	18	23-Jul-88	0.100	0.100	0.100
520	19	24-Jul-88	0.100	0.100	0.100
143	20	25-Jul-88	0.100	0.100	0.100
145	21	26-Jul-88	0.100	0.100	0.100
274	22	27-Jul-88	0.100	0.100	0.100
531	23	28-Jul-88	0.100	0.100	0.100
276	24	29-Jul-88	0.100	0.100	0.100
	25	30-Jul-88	0.100	0.100	0.100
	26	31-Jul-88	0.100	0.100	0.100
156	27	01-Aug-88	0.100	0.100	0.100
157	28	02-Aug-88	0.100	0.100	0.100
159	29	03-Aug-88	0.100	0.100	0.100
549	30	04-Aug-88	0.078	0.100	0.010
281	31	05-Aug-88	0.100	0.100	0.100
	32	06-Aug-88	0.100	0.100	0.100
282	33	07-hug-88	0.100	0.100	0.100
556	34	08-Aug-88	0.100	0.100	0.100
489	35	09-Aug-88	0.074	0.100	0.020
286	36	10-Aug-88	0.100	0.100	0.100
563	37	11-Aug-88	0.100	0.100	0.100
173	38	12-Aug-88	0.100	0.100	0.100
	39	13-Aug-88	0.100	0.100	0.100
570	40	14-Aug-88	0.100	0.100	0.100
177	41	15-Aug-88	0.100	0.100	0.100
291	42	16-Aug-88	0.102	0.160	0.010
341	43	17-Aug-88	0.086	0.100	0.010
345	44	18-Aug-88	0.160	0.160	0.160
105	45	19-Aug-88	0.174	0.418	0.160
381	46	20-Aug-88	0.060	0.060	0.060

Estimation of the lead intake by
Quantity of water drunk in litres/day:- *2*

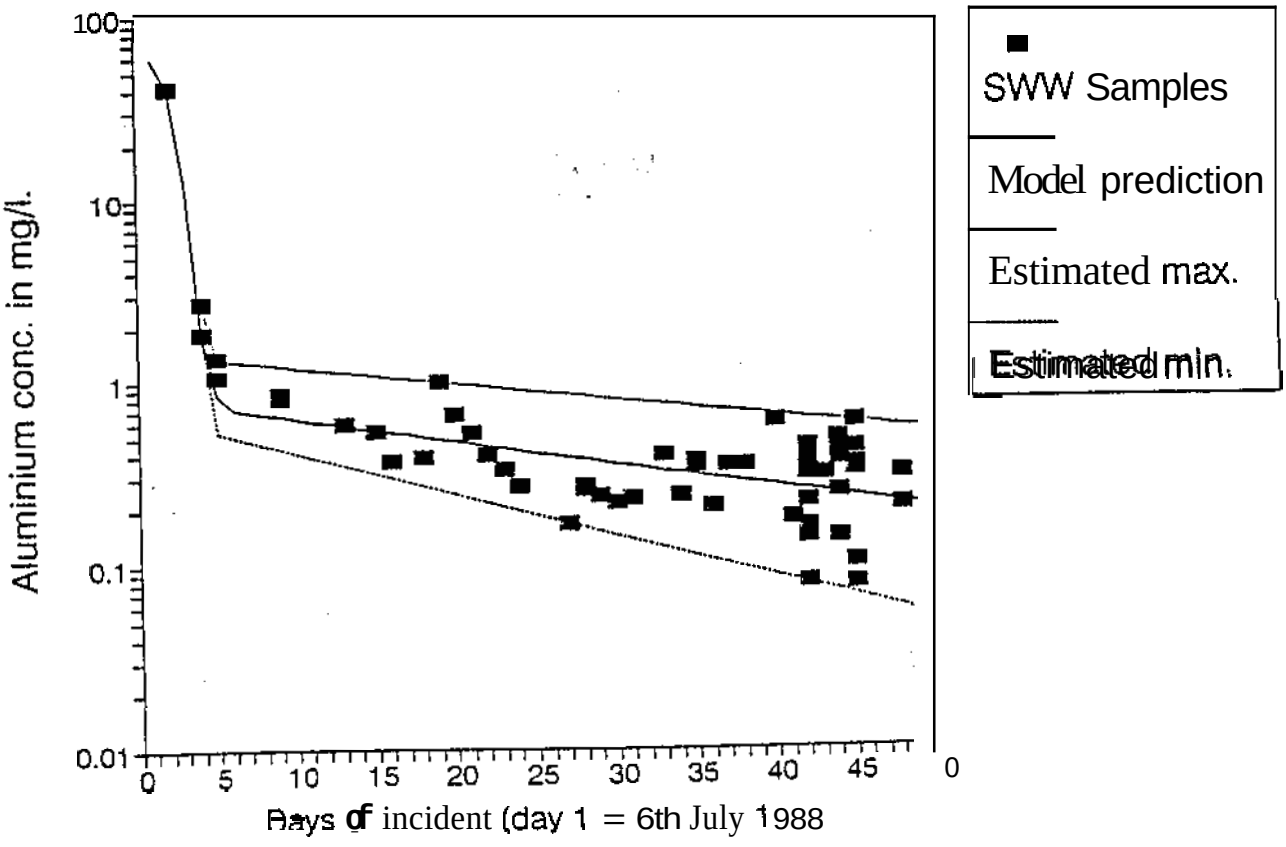
Page or Sample	Day	Date	Lead intake in mg/day. Mean	Max.	Min.
484	3	08-Jul-88	0.080	0.080	0.080
114	4	09-Jul-88	0.116	0.400	0.020
115	5	10-Jul-88	0102	0.440	0.060
260	6	11-Jul-88	0.134	0.200	0.100
	7	12-Jul-88	0.092	0.136	0.070
	8	13-Jul-88	0.050	0.072	0.040
125	9	14-Jul-88	0.010	0.010	0.010
	10	15-Jul-88	0.010	0.012	0.010
	11	16-Jul-88	0.010	0.014	0.010
	12	17-Jul-88	0.012	0.016	0.010
500	13	18-Jul-88	0.012	0.018	0.010
	14	19-Jul-88	0.012	0.014	0.010
267	15	20-Jul-88	0.010	0.010	0.010
511	16	21-Jul-88	0.100	0.100	0.100
139	17	22-Jul-88	0.100	0.100	0.100
519	18	23-Jul-88	0.100	0.100	0.100
520	19	24-Jul-88	0.100	0.100	0.100
143	20	25-Jul-88	0.100	0.100	0.100
145	21	26-Jul-88	0.100	0.100	0.100
274	22	27-Jul-88	0.100	0.100	0.100
531	23	28-Jul-88	0.100	0.100	0.100
276	24	29-Jul-88	0.100	0.100	0.100
	25	30-Jul-88	0.100	0.100	0.100
	26	31-Jul-88	0.100	0.100	0.100
156	27	01-Aug-88	0.100	0.100	0.100
157	28	02-Aug-88	0.100	0.100	0.100
159	29	03-Aug-88	0.100	0.100	0.100
549	30	04-Aug-88	0.078	0.100	0.010
281	31	05-Aug-88	0.100	0.100	0.100
	32	06-Aug-88	0.100	0.100	0.100
282	33	07-Aug-88	0.100	0.100	0.100
556	34	08-Aug-88	0.100	0.100	0.100
489	35	09-Aug-88	0.074	0.100	0.020
286	36	10-Aug-88	0.100	0.100	0.100
563	37	11-Aug-88	0.100	0.100	0.100
173	38	12-Aug-88	0.100	0.100	0.100
	39	13-Aug-88	0.100	0.100	0.100
570	40	14-Aug-88	0.100	0.100	0.100
177	41	15-Aug-88	0.100	0.100	0.100
291	42	16-Aug-88	0.102	0.160	0.010
341	43	17-Aug-88	0.086	0.100	0.010
345	44	18-Aug-88	0.160	0.160	0.160
105	45	19-Aug-88	0.174	0.418	0.160
381	46	20-Aug-88	0.060	0.060	0.060

Estimation of the lead intake by
Quantity of water drunk in litres/day:- I.7

Page or Sample	Day	Date	Lead Intake in mg/day. Mean	Max.	Min.
484	3	08-Jul-88	0.068	0.068	0.068
114	4	09-Jul-88	0.099	0.340	0.017
115	5	10-Jul-88	0.087	0.374	0.051
260	6	11-Jul-88	0.114	0.170	0.085
	7	12-Jul-88	0.078	0.116	0.060
	8	13-Jul-88	0.043	0.061	0.034
125	9	14-Jul-88	0.009	0.009	0.009
	10	15-Jul-88	0.009	0.010	0.009
	11	16-Jul-88	0.009	0.012	0.009
	12	17-Jul-88	0.010	0.014	0.009
500	13	18-Jul-88	0.010	0.015	0.009
	14	19-Jul-88	0.010	0.012	0.009
267	15	20-Jul-88	0.009	0.009	0.009
511	16	21-Jul-88	0.085	0.085	0.085
139	17	22-Jul-88	0.085	0.085	0.085
519	18	23-Jul-88	0.085	0.085	0.085
520	19	24-Jul-88	0.085	0.085	0.085
143	20	25-Jul-88	0.085	0.085	0.085
145	21	26-Jul-88	0.085	0.085	0.085
274	22	27-Jul-88	0.085	0.085	0.085
531	23	28-Jul-88	0.085	0.085	0.085
276	24	29-Jul-88	0.085	0.085	0.085
	25	30-Jul-88	0.085	0.085	0.085
	26	31-Jul-88	0.085	0.085	0.085
156	27	01-Aug-88	0.085	0.085	0.085
157	28	02-Aug-88	0.085	0.085	0.085
159	29	03-Aug-88	0.085	0.085	0.085
549	30	04-Aug-88	0.066	0.085	0.009
281	31	05-Aug-88	0.085	0.085	0.085
	32	06-Aug-88	0.085	0.085	0.085
282	33	07-Aug-88	0.085	0.085	0.085
556	34	08-Aug-88	0.085	0.085	0.085
489	35	09-Aug-88	0.063	0.085	0.017
286	36	10-Aug-88	0.085	0.085	0.085
563	37	11-Aug-88	0.085	0.085	0.086
173	38	12-Aug-88	0.085	0.085	0.085
	39	13-Aug-88	0.085	0.085	0.085
570	40	14-Aug-88	0.085	0.085	0.085
177	41	15-Aug-88	0.085	0.085	0.085
291	42	16-Aug-88	0.087	0.136	0.009
341	43	17-Aug-88	0.073	0.085	0.009
345	44	18-Aug-88	0.136	0.136	0.136
105	45	19-Aug-88	0.148	0.352	0.136
381	46	20-Aug-88	0.051	0.051	0.051

Page	Date	Day	pH	Sulphate	Aluminium	Copper	Zinc	Lead
	07-Jul-88	2	4.3		41.00			
5	09-Jul-88	4	8.4		1.07	0.01	0.08	0.01
6	09-Jul-88	4	4.6		2.71	0.09	0.11	0.01
7	10-Jul-88	5	4.6	62.0	1.07	0.03	0.07	0.03
8	10-Jul-88	5	8.4	27.0	1.37	<0.01	0.05	<0.03
12	14-Jul-88	9	8.0	32.3	0.81	0.08	0.092	<0.01
13	14-Jul-88	9	8.5	26.0	0.86	<0.05	<0.05	<0.05
14	14-Jul-88	9	7.1	26.0	1.60	0.09	<0.05	<0.05
15	18-Jul-88	13	8.0	26.3	0.59	<0.05	0.11	<0.05
16	20-Jul-88	15	8.2	23.1	0.54			
17	21-Jul-88	16	7.4	18.7	0.37	<0.05	<0.05	<0.05
18	23-Jul-88	18	8.6	17.7	0.39	<0.05	<0.05	<0.05
19	24-Jul-88	19	8.8	19.1	1.00	<0.05	<0.05	<0.05
21	25-Jul-88	20	8.2	10.0	0.66	<0.05	<0.05	<0.05
22	26-Jul-88	21	8.8	21.0	0.53	<0.05	<0.05	<0.05
23	28-Jul-88	22	7.1	21.2	0.40	<0.05	<0.05	<0.05
24	28-Jul-88	23	9.1	21.2	0.33	<0.05	0.05	<0.05
26	29-Jul-88	24	6.8	24.4	0.27	<0.05	<0.05	<0.05
27	01-Aug-88	27	7.7	18.5	0.17	<0.05	<0.05	<0.05
28	02-Aug-88	28	8.6	20.4	0.27	<0.05	<0.05	<0.05
29	02-Aug-88	28	8.5	20.5	0.26	<0.05	<0.05	<0.05
30	03-Aug-88	29	7.5	18.6	0.24	<0.05	<0.05	<0.05
32	04-Aug-88	30	7.9	19.5	0.22	<0.05	<0.05	<0.05
33	05-Aug-88	31	9.1	20.2	0.23	0.06	<0.05	<0.05
34	07-Aug-88	33	9.1	17.6	0.40	<0.05	<0.05	<0.05
35	08-Aug-88	34	8.4	18.2	0.24	<0.05	<0.05	<0.05
36	09-Aug-88	35	8.8	18.4	0.35	<0.05	<0.05	<0.05
37	09-Aug-88	35	7.9	17.8	0.37	<0.05	<0.05	<0.05
39	10-Aug-88	36	8.6	17.3	0.21	<0.05	<0.05	<0.05
40	11-Aug-88	37	8.6	20.1	0.35	<0.05	<0.05	<0.05
47	12-Aug-88	38	8.9	19.9	0.35	<0.05	<0.05	<0.05
43	14-Aug-88	40	9.1	18.2	0.61	<0.05	<0.05	<0.05
44	15-Aug-88	41	9.5	18.6	0.18	<0.05	<0.05	<0.05
46	16-Aug-88	42	8.9	20.0	0.37	<0.05	<0.05	<0.08
47	16-Aug-88	42	7.7	19.4	0.44	<0.05	<0.05	<0.08
48	16-Aug-88	42	8.5	19.4	0.22	<0.05	<0.05	<0.08
49	16-Aug-88	42	8.8	19.7	0.15	<0.05	<0.05	<0.08
50	16-Aug-88	42	8.7	19.4	0.14	<0.05	<0.05	<0.08
51	16-Aug-88	42	8.8	19.0	0.08	<0.05	<0.05	<0.08
58	16-Aug-88	42	8.9	17.2	0.31	<0.05	<0.05	<0.08
61	16-Aug-88	42	8.9	16.5	0.16	<0.05	<0.05	<0.08
65	17-Aug-88	43	8.8	17.0	0.31	<0.05	0.11	<0.05
72	17-Aug-88	43	8.5		0.31	<0.05	<0.05	<0.05
74	18-Aug-88	44	8.2		0.41	<0.05	<0.05	<0.05
76	18-Aug-88	44	8.9	20.3	0.141	<0.05	<0.05	<0.08
78	18-Aug-88	44	7.7	16.0	0.391	<0.05	<0.05	<0.08
83	18-Aug-88	44	6.8	14.9	0.485	<0.05	<0.05	<0.08
84	18-Aug-88	43	7.8	16.2	0.377	<0.05	<0.05	<0.08
85	18-Aug-88	44	7.7	16.0	0.247	<0.05	<0.05	<0.08
104	19-Aug-88	45	8.8	18.9	0.103	<0.05	<0.05	<0.08
110	19-Aug-88	45	7.9	19.E	0.349	<0.05	<0.05	<0.08
105	19-Aug-88	45	8.1	19.2	0.329	<0.05	<0.05	<0.08
106	19-Aug-88	45	8.4	19.5	0.432	<0.05	<0.05	<0.08
107	19-Aug-88	45	8.6	19.2	0.078	<0.05	<0.05	<0.08
129	19-Aug-88	45	8C	16.1	0.600	<0.05	<0.05	<0.08
145	22-Aug-88	48			0.310	0.07	0.07	<0.01
146	22-Aug-88	48	9.2	17.4	0.210	<0.01	0.13	<0.01

Aluminium concentrations for the Camelford **Area.**



Data for aluminium concentrations in mg/l
for SWW samples from the Camelford Area.

Date	Day	Aluminium
-Jul-88	2	41.000
-Jul-88	4	11.870
-Jul-88	4	2.710
-Jul-88	5	1.070
-Jul-88	5	1.370
-Jul-88	9	0.810
-Jul-88	9	0.860
-Jul-88	13	0.590
-Jul-88	15	0.540
-Jul-88	16	0.370
-Jul-88	18	0.390
-Jul-88	19	1.000
-Jul-88	20	0.660
-Jul-88	21	0.530
-Jul-88	23	0.400
-Jul-88	23	0.330
-Jul-88	24	0.270
-Aug-88	27	0.170
-Aug-88	28	0.270
-Aug-88	28	0.260
-Aug-88	29	0.240
-Aug-88	30	0.220
-Aug-88	31	0.230
-Aug-88	33	0.400
-Aug-88	34	0.240
-Aug-88	35	0.350
-Aug-88	35	0.370
-Aug-88	36	0.211
-Aug-88	37	0.350
2-Aug-88	38	0.350
4-Aug-88	40	0.610
5-Aug-88	41	0.181
6-Aug-88	42	0.370
6-Aug-88	42	0.440
6-Aug-88	42	0.22
6-Aug-88	42	0.15
6-Aug-88	42	0.14
6-Aug-88	42	0.08
6-Aug-88	42	0.31
6-Aug-88	42	0.16
7-Aug-88	43	0.31
7-Aug-88	43	0.31
8-Aug-88	44	0.41
8-Aug-88	44	0.141
8-Aug-88	44	0.391
8-Aug-88	44	0.485
8-Aug-88	44	0.377
8-Aug-88	44	0.247
9-Aug-88	45	0.103
9-Aug-88	45	0.349
9-Aug-88	45	0.329
9-Aug-88	45	0.433
9-Aug-88	45	0.070
9-Aug-88	45	0.600
22-Aug-88	48	0.310
22-Aug-88	48	0.210

Estimated aluminium concentrations **in** mg/l for **the Camelford Area.**

Date	Day	Estimated Aluminium Conc. Model	Max	Min
07-Jul-88	2	40.9	41	4t
08-Jul-88	3	12.68	15	1.87
09-Jul-88	4	1.80	2.71	1.87
10-Jul-88	5	0.84	1.32	0.533
11-Jul-88	6	0.71	1.30	0.506
12-Jul-88	7	0.68	1.27	0.480
13-Jul-88	a	0.66	1.25	0.456
14-Jul-88	9	1.46	1.22	0.433
15-Jul-88	10	0.63	1.20	0.411
16-Jul-88	11	0.61	1.17	0.390
17-Jul-88	12	0.59	1.15	0.371
18-Jul-88	13	0.58	1.13	0.352
19-Jul-88	14	0.56	1.11	0.334
20-Jul-88	15	0.55	1.08	0.317
21-Jul-88	16	0.53	1.06	0.301
22-Jul-88	17	0.52	1.04	0.286
23-Jul-88	18	0.50	1.02	0.271
24-Jul-88	19	0.49	1.00	0.258
25-Jul-88	20	0.47	0.98	0.245
26-Jul-88	21	0.46	0.96	0.232
27-Jul-88	22	0.45	0.94	0.221
28-Jul-88	23	0.44	0.92	0.209
29-Jul-88	25	0.41	0.89	0.189
30-Jul-88	26	0.40	0.87	0.179
31-Jul-88	27	0.39	0.85	0.170
01-Aug-88	28	0.38	0.84	0.162
02-Aug-88	28	0.38	0.84	0.162
03-Aug-88	29	0.37	0.82	0.153
04-Aug-88	30	0.36	0.80	0.146
05-Aug-88	31	0.35	0.79	0.138
06-Aug -88	32	0.34	0.77	0.131
07-Aug-88	33	0.33	0.76	0.125
08-Aug-88	34	0.32	0.74	0.118
09-Aug-88	35	0.31	0.73	0.112
10-Aug-88	36	0.30	0.71	0.107
11-Aug-88	37	0.29	0.70	0.101
12-Aug-88	38	0.29	0.68	0.096
13-Aug-88	39	0.28	0.67	0.091
14-Aug-88	40	0.27	0.66	0.087
15-Aug-88	41	0.26	0.64	0.082
16-Aug-88	42	0.25	0.63	0.078
17-Aug-88	43	0.25	0.62	0.074
18-Aug-88	44	0.24	0.61	0.070
19-Aug-88	45	0.23	0.59	0.067
20-Aug-88	46	0.23	0.58	0.063
21-Aug-88	47	0.22	0.57	0.060
22-Aug-88	48	0.22	0.56	0.057

Comments on *the* aluminium **intake** *of*

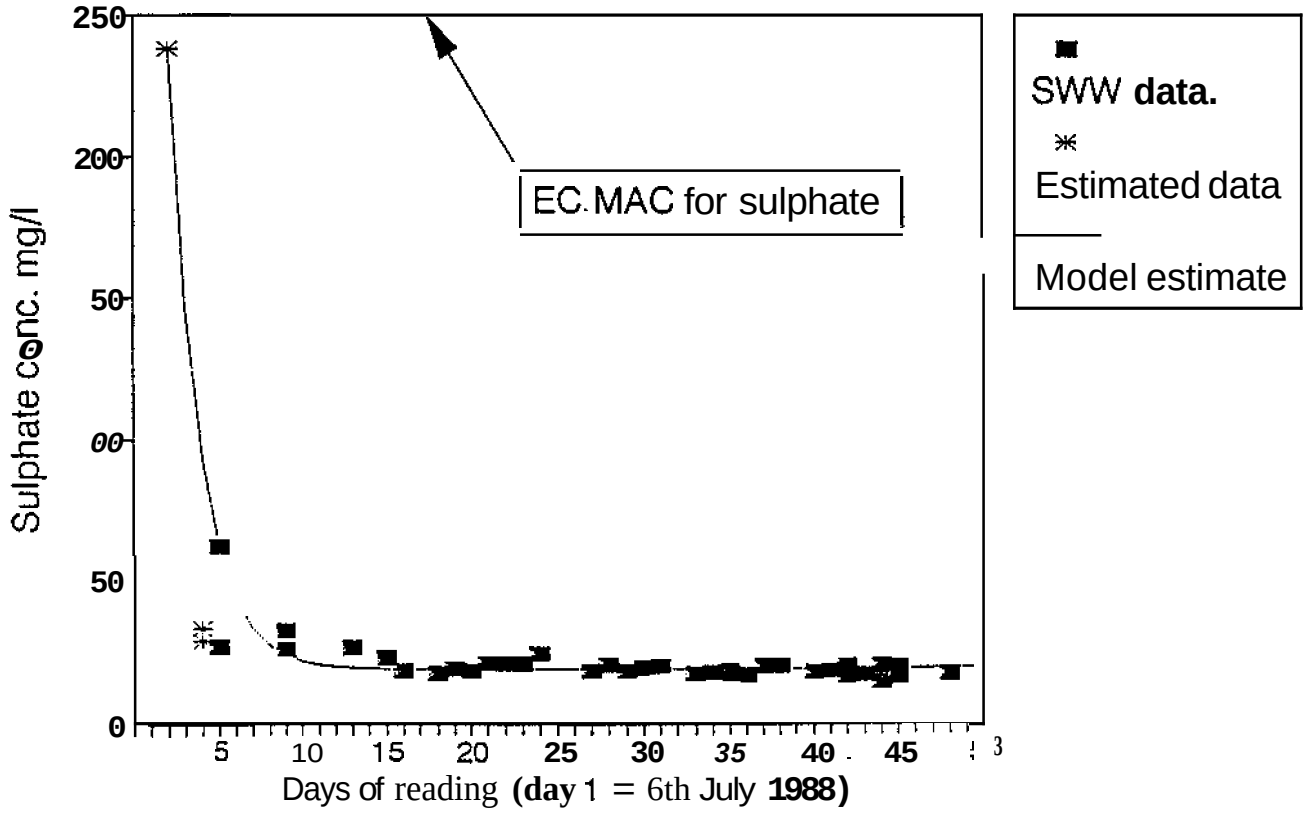
The table on **the** following **page** *gives* an **estimate** *of* **the** aluminium **intake** for the **period** up to 22nd **August, after** which **date there are insufficient data** to **be** able **to make any satisfactory prediction.**

I have not **seen any data** for **the premises where** **resided** at **the time** of **the** incident **and the** only **data are the estimates** for **the** Camelford **Area** from **which I have derived the data** in **the table** on **the following page.**

Estimated aluminium intake in mg/day by
Consumption of drinking water in l/day 2

Date	Day	Estimated Aluminium Intake		
		Model	Max	Min
07-Jul-88	2	81.7	82.0	82.0
08-Jul-88	3	25.4	29.6	3.74
09Jul-88	4	3.6	5.4	3.74
10-Jul-88	5	1.7	2.6	1.07
11-Jul-88	6	1.4	2.6	1.01
12-Jul-88	7	1.4	2.5	0.96
13-Jul-88	8	1.3	2.5	0.91
14-Jul-88	9	2.9	2 4	0.87
15-Jul-88	10	1.3	2.4	0.82
16-Jul-88	11	1.2	2.3	0.78
17-Jul-88	12	1.2	2.3	0.74
18-Jul-88	13	1.2	2.3	0.70
19-Jul-88	14	1.1	2.2	0.67
20-Jul-88	15	1.1	2.2	0.63
21-Jul-88	16	1.1	2.1	0.60
22-Jul-88	17	1.0	2.1	0.57
23-Jul-88	18	1.0	2.0	0.54
24-Jul-88	19	1.0	2.0	0.52
25-Jul-88	20	0.9	2.0	0.49
26Jul-88	21	0.9	1.9	0.46
27-Jul-88	22	0.9	1.9	0.44
28-Jul-88	23	0.9	1.8	0.42
29-Jul-88	25	0.8	1.8	0.38
30-Jul-88	26	0.8	1.7	0.36
31Jut-88	27	0.8	1.7	0.34
01-Aug-88	28	0.8	1.7	0.32
02-Aug-88	28	0.8	1.7	0.32
03-Aug-88	29	0.7	1.6	0.31
04-Aug-88	30	0.7	1.6	0.29
05-hug-88	31	0.7	1.6	0.28
06-Aug-88	32	0.7	1.5	0.26
07-Aug-88	33	0.7	1.5	0.25
08-Aug-88	34	0.6	1.5	0.24
09-Aug-88	35	0.6	1.5	0.22
10-Aug-88	36	0.6	1.4	0.21
11-Aug-88	37	0.6	1.4	0.20
12-Aug-88	38	0.6	1.4	0.19
13-Aug-88	39	0.6	1.3	0.18
14-Aug-88	40	0.5	1.3	0.17
15-hug-88	41	0.5	1.2	0.16
16-Aug-88	42	0.5	1.3	0.16
17-Aug-88	43	0.5	1.2	0.15
18-Aug-88	44	0.5	1.2	0.14
19-Aug-88	45	0.5	1.2	0.13
20-Aug-88	46	0.5	1.2	0.13
21-Aug-88	47	0.4	1.1	0.12
22-Aug-88	48	0.4	1.1	0.11

Sulphate Concentrations for the Camelford **Area.**



Sulphate conc. in mg/l in samples from the Camelford Area.

Date	Day	
07-Jul-88	2	
09-Jul-88	4	[29]
09-Jul-88	4	[33]
10-Jul-88	5	62.0
10-Jul-88	5	27.0
14-Jul-88	9	32.3
14-Jul-88	9	26.0
14-Jul-88	9	26.0
18-Jul-88	13	26.3
20-Jul-88	15	23.1
21-Jul-88	16	18.7
23-Jul-88	18	17.7
24-Jul-88	19	19.1
25-Jul-88	20	18.8
26-Jul-88	21	21.0
28-Jul-88	22	21.2
28-Jul-88	23	21.2
29-Jul-88	24	24.4
01-Aug-88	27	10.5
02-Aug-88	28	20.4
02-Aug-88	28	20.5
03-Aug-88	29	18.6
04-Aug-88	30	19.5
05-Aug-88	31	20.2
07-Aug-88	33	17.6
08-Aug-88	34	18.2
09-Aug-88	35	18.4
09-Aug-88	35	17.0
10-Aug-88	36	17.3
11-Aug-88	37	20.1
12-Aug-88	38	19.9
14-Aug-88	40	18.2
15-Aug-88	41	18.6
16-Aug-88	42	20.0
16-Aug-88	42	19.4
16-Aug-88	42	19.1
16-Aug-88	42	19.7
16-Aug-88	42	19.4
16-Aug-88	42	19.0
16-Aug-88	42	17.2
16-Aug-88	42	16.5
17-Aug-88	43	17.0
18-Aug-88	44	20.3
18-Aug-88	44	16.0
	44	14
	44	16
	44	16.0
	45	18.9
	45	19.8
19-Aug-88	45	19.2
19-Aug-88	45	19.5
19-Aug-88	45	19.2
19-Aug-88	45	16.1
22-Aug-88	48	17.4

NOTE: **Values in square brackets are estimated from the aluminium concentrations.**

The quantity of sulphate ingested by

The results of the analyses on all the samples collected by South West Water Authority from the Delabole/Rockhead Area (Area B in this report) show sulphate concentrations below the EC Maximum Allowable Concentration of 250 mg/l.

I could find no data for sulphate concentrations on 7th, 8th and 9th July 1988, but there are data for the aluminium concentration on 7th and 9th July. I have therefore calculated the equivalent theoretical sulphate concentration for the aluminium concentrations for these two days using the aluminium concentrations as the basis for the calculation. These values can only be approximate since the sulphate concentrations in the water supply are not necessarily the stoichiometric equivalent of the aluminium - for example, the water naturally contains roughly 16-20 mg sulphate/litre which is not associated with any aluminium, and some of the aluminium may have precipitated as the hydroxide leaving the associated sulphate still in solution. However, these are the only data available and it enables an approximate evaluation of sulphate intake to be made for the two days when the statistical model for sulphate concentration is less reliable because of the shortage of data.

The data are:

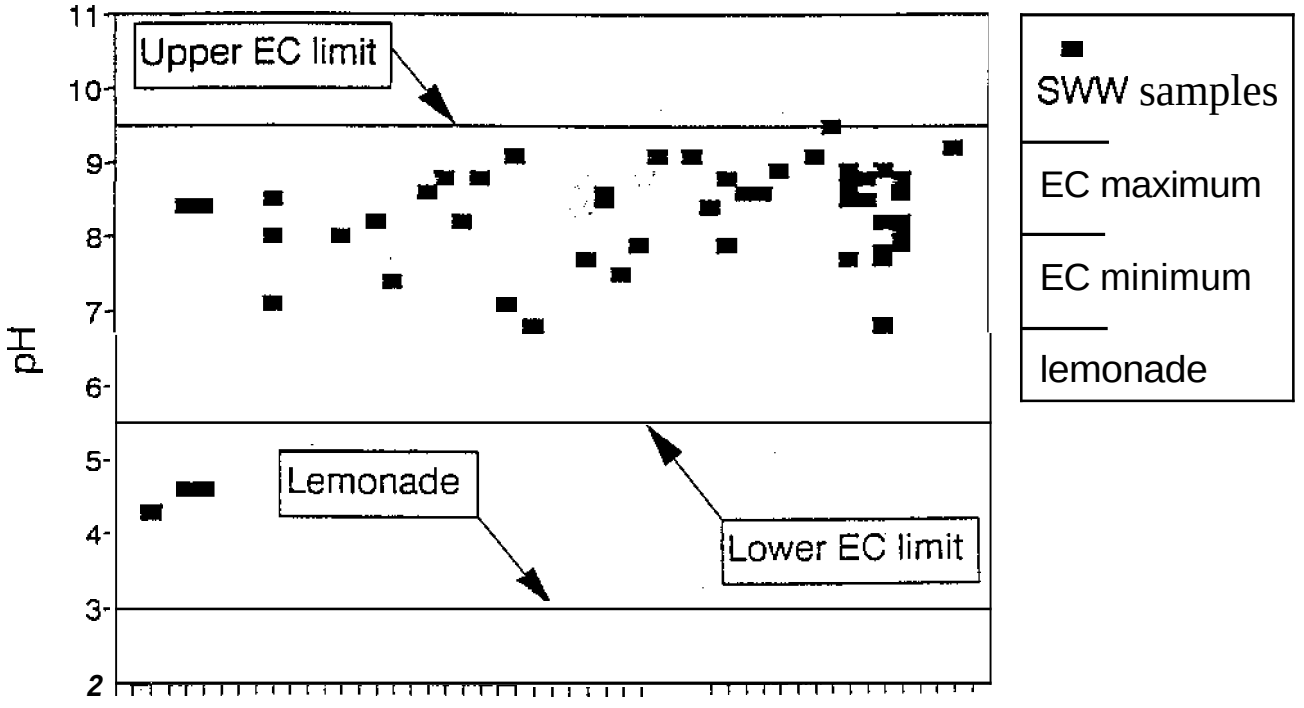
Date	Day	Aluminium in mg/l	Calculated Stoichiometric Sulphate Concentration
07-Jul-88	2	41.0	218.7
09-Jul-88	4	1.87	10.0
09-Jul-88	4	2.71	14.5

I used the maximum values to calculate the parameters for the mathematical model which then predicted concentratians of sulphate for the period 8th-10th July. I also assumed a naturally occurring residual sulphate concentration in the water of 19 mg/l. The results shown in the table below.

		Sulphate Concentration	
Date	Day	Measured by SWW	Predicted by model
07-Jul-88	2		238
08-Jul-88	3		146
09-Jul-88	4		92.8
10-Jul-88	5	62.0 & 27.0	61.8

On the basis of my calculations using available data from the SWW analyses there is no evidence for sulphate exceeding the MAC of 250 mg/l. The maximum consumption would have been on 7th July when the sulphate concentration could have been 238 mg/l. If this were the case would have consumed 476 mg of sulphate on that day.

pH of water samples from the Camelford **Area.**



pH of water samples for the Camelford Area.

Date	Day	pH
07-Jul-88	2	4.3
09-Jul-88	4	8.4
09-Jul-88	4	4.6
10-Jul-88	5	4.6
10-Jul-88	5	8.4
14-Jul-88	9	8.0
14-Jul-88	9	8.5
14-Jul-88	9	7.1
18-Jul-88	13	8.0
20-Jul-88	15	8.2
21-Jul-88	16	7.4
23-Jul-88	18	8.6
24-Jul-88	19	8.8
25-Jul-88	20	8.2
26-Jul-88	21	a8
28-Jul-88	22	7.1
28-Jul-88	23	9.1
29-Jul-88	24	6.8
31-Aug-88	27	7.7
02-Aug-88	28	8.6
02-Aug-88	28	8.5
03-Aug-88	29	7.5
04-Aug-88	30	7.9
05-Aug-88	31	9.1
07-Aug-88	33	4.1
08-Aug-88	34	8.4
09-Aug-88	35	8.8
09-Aug-88	35	7.9
10-Aug-88	36	0.6
11-Aug-88	37	8.6
12-Aug-88	38	8.9
14-hug-88	40	9.1
15-Aug-88	41	9.5
16-Aug-88	42	8.9
16-Aug-88	42	7.7
16-Aug-88	42	8.5
16-Aug-88	42	8.8
16-Aug-88	42	8.7
16-Aug-88	42	8.8
16-Aug-88	42	8.9
16-hug-88	42	8.9
17-Aug-88	43	8.8
17-Aug-88	43	8.5
18-Aug-88	44	8.2
18-Aug-88	44	8.
18-Aug-88	44	7.
18-Aug-88	44	6.
18-Aug-88	44	7.
18-Aug-88	44	7.
19-Aug-88	45	8.
19-Aug-88	45	7.
19-hug-a8	45	8.
19-Aug-88	45	8.
19-Aug-88	45	8
19-Aug-88	45	8
22-Aug-88	48	9

pH of water consumed by

pH is not a substance which can be consumed and for which the quantity ingested can be calculated as it can for aluminium or sulphate; pH is a measure of the *acidity* and alkalinity balance in water.

The range for pH in drinking water specified in the EC Directive are

upper limit	*9.5;*
lower limit	5.5.

With the exception of 3 samples taken on the 7th, 9th and 10th July 1988 *respectively* all samples are within this range.

The significance of pH lies more in its effect on pipes and other fittings in the water supplier's and the consumer's water distribution system than on the health of consumers. Many normal beverages are outside the EC Drinking Water pH limits, for example soft drinks such *as Coca* Cola and lemonade. I show, *as* an example, on the graph of the pH of water samples in the Camelford Area the relative position of lemonade which typically has *a* pH in the region *of* 3.

Results of analyses of water samples in the Carnelford Area *tor* copper, *zinc* and lead; concentrations in mg/l.

Date	Day	Copper	Zinc	Lead
09-Jul-88	4	0.01	0.08	0.01
09-Jul-88	4	0.09	0.11	0.01
10-Jul-88	5	0.03	0.07	0.03
10-Jul-88	5	<0.01	0.05	<0.03
14-Jul-88	9	0.08	0.092	<0.01
14-Jul-88	9	<0.05	<0.05	<0.05
14-Jul-88	9	0.09	<0.05	<0.05
18-Jul-88	13	<0.05	0.11	<0.05
21-Jul-88	16	4.05	<0.05	<0.05
23-Jul-88	18	<0.05	<0.05	<0.05
24-Jul-88	19	<0.05	<0.05	<0.05
25-Jul-88	20	<0.05	<0.05	<0.05
26-Jul-88	21	<0.05	<0.05	<0.05
28-Jul-88	22	<0.05	<0.05	<0.05
28-Jul-88	23	<0.05	0.05	<0.05
29-Jul-88	24	<0.05	<0.05	<0.05
01-Aug-88	27	<0.05	<0.05	<0.05
02-Aug-88	28	<0.05	<0.05	<0.05
02-Aug-88	28	<0.05	<0.05	<0.05
03-Aug-88	29	<0.05	<0.05	<0.05
04-Aug-88	30	e0.05	<0.05	<0.05
05-Aug-88	31	0.06	<0.05	<0.05
07-Aug-88	33	<0.05	<0.05	<0.05
08-Aug-88	34	<0.05	<0.05	<0.05
09-Aug-88	35	<0.05	<0.05	<0.05
09-Aug-88	35	<0.05	<0.05	<0.05
10-Aug-88	36	<0.05	<0.05	<0.05
11-Aug-88	37	<0.05	<0.05	<0.05
12-Aug-88	38	<0.05	<0.05	<0.05
14-Aug-88	40	<0.05	<0.05	<0.05
15-Aug-88	41	<0.05	<0.05	<0.05
16-Aug-88	42	<0.05	<0.05	<0.08
16-Aug-88	42	<0.05	<0.05	<0.08
16-Aug-88	42	<0.05	<0.05	<0.08
16-Aug-88	42	<0.05	<0.05	<0.08
16-Aug-88	42	<0.05	<0.05	<0.08
16-Aug-88	42	<0.05	<0.05	<0.08
16-Aug-88	42	<0.05	<0.05	<0.05
16-Aug-88	42	<0.05	<0.05	<0.05
17-Aug-88	43	<0.05	0.11	<0.05
17-Aug-88	43	<0.05	<0.05	<0.05
18-Aug-88	44	<0.05	<0.05	<0.05
18-Aug-88	44	<0.05	<0.05	<0.08
18-Aug-88	44	<0.05	<0.05	<0.08
18-Aug-88	44	<0.05	<0.05	<0.08
18-Aug-88	44	<0.05	<0.05	<0.08
18-Aug-88	44	<0.05	<0.05	<0.08
19-Aug-88	45	<0.05	<0.05	<0.08
19-Aug-88	45	<0.05	<0.05	<0.08
19-Aug-88	45	<0.05	<0.05	<0.08
19-Aug-88	45	<0.05	<0.05	<0.08
19-Aug-88	45	<0.05	<0.05	<0.08
22-Aug-88	48	0.07	0.07	<0.0
22-Aug-88	48	<0.01	0.1:	<0.0

Intake of copper, zinc and lead by

The EC Maximum Allowable Concentrations (MAC) for copper, zinc and lead are

copper:	3,000 µg/l ie 3	mg/l.
zinc :	5,000 µg/l ie 5	mg/l.
lead :	50 µg/l ie 0.05	mg/l.

All samples for copper and zinc show levels for these two metals at levels very substantially below the EC MAC - sometimes as much 3 orders of magnitude below the MAC.

Lead also appears to be consistently below the MAC, and usually well below (and sometimes one order of magnitude below) the MAC. Results of lead analyses are normally reported as <0.05 or <0.005 - ie less than 50 µg/l or less than 5 µg/l (and thus within the MAC). However, on three days, 16th, 18th and 19th August 1988, the results of the sample analyses on 16 samples are reported as <0.08 mg/l. I presume that different methods of analysis have been used and that the limit of sensitivity of these analyses vary between 0.08 mg/l and 0.005 mg/l. It is therefore not possible to say with certainty that on those 16 occasions the lead concentration did not exceed 50 µg/l. However, since every other reported result, using the more sensitive methods, never exceed the MAC, and the acidity of these 16 samples was in the same range as all other satisfactory samples, it is very unlikely that the concentrations of lead ever exceeded the EC MAC values.

The daily intake of copper and zinc was thus always well below the levels acceptable.

The daily intake of lead was also almost certainly well below the levels considered acceptable, the only uncertainty being those 13 occasions when the concentration was recorded as <80 µg/l. If the level had been 80 µg/l on those three days then intake on those three days would have been less than 160 µg (<0.16 mg).