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AGENCY**

**ENVIRONMENT PROTECTION SECTION  
CORNWALL AREA**

**FINAL DRAFT REPORT**

**EAST LOOE RIVER  
RIVER ECOSYSTEM NON  
COMPLIANCE INVESTIGATION**

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COR/99/032**

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## East Looe River RE Non-Compliance Investigation

### 1 INTRODUCTION

#### 1.1 Background

The East Looe River significantly failed the River Ecosystem (RE) River Quality Objectives (RQO) for BOD downstream of Moorswater Driers (81420280) and marginally failed downstream of Liskeard STW (81420269) and at Trussel Bridge (81420261). The latter two sites have an RQO of 2 (4.0 mg/l\* for BOD) while the former site has an RQO of 1 (2.5 mg/l for BOD). Archive data showed that increased concentrations of ammonia were found in samples with high BOD. See figure 1 for site locations.

\* mg/l – milligrams per litre.

#### 1.2 Objectives

To identify cause(s) of RE non-compliance at 81420280, 81420269 and 81420261 and make recommendations to ensure future compliance.

### 2 METHODS

- 2.1 Study archived water quality and rainfall data.
- 2.2 Compile a programme of 'Task Force' visits to all farms (30 sites in total) upstream of Trussel Bridge to identify and categorise potential sources of pollution (Central Environmental Protection (EP) Team). Site occupiers were then encouraged to carry out work if necessary to minimise pollution risk (see Reference 1).
- 2.3 Deploy 'YSI 6920' water quality monitors in the East Looe River at key sites to identify sources of ammonia. The monitors were set to log at fifteen-minute intervals for the following parameters; temperature, dissolved oxygen, pH, conductivity, ammonia and turbidity. Weekly visits were conducted to clean, download and calibrate the monitors.
- 2.4 Conduct a site visit with members of the Central EP Team and representatives from South West Water (SWW) to identify the Combined Storm Overflows (CSO's) in the Liskeard area and to install 'Stormlog' event loggers to gain spill frequency information. In total there are five CSO's in the catchment. Visits were made periodically to clean and download information from the loggers.
- 2.5 Install a Cassella rainfall logger at Liskeard STW to record rainfall data.
- 2.6 Maintain good communications between the Investigations Team and Central EP Team to share findings throughout the investigation.

### 3 RESULTS

The following table lists the location of the data collected.

Data	Table No.	Figure No.	Appendix No.
East Looe River Map (Upstream of Trussel Bridge) including sampling points, monitoring points and CSO's		1	
Looemills Bridge Monitor Data (Jan – Apr'99)		2 – 4	
Trussel Bridge Monitor Data (Jan – Apr'99)		5 – 7	
Venton Veor Bridge Monitor Data (Feb & Mar'99)		8	
Weekly Water Quality Sample Results	1 & 2		
Wet Weather Survey Results (18/02/99)		10 & 11	
Wet Weather Survey Results (02/03/99)		12 & 13	
Routine Monitoring Data (1995 – 1997)			1 – 6
Rainfall Data (1999)			7

### 4 DISCUSSION

#### 4.1 Archived Water Quality Data

##### 4.1.1 East Looe River Below Moorswater Driers (81420280)

There are two probable sources of elevated BOD to the East Looe River, which caused the significant RE non-compliance at the above site. In the three years 1995 – 97 four out of the 36 samples collected contained concentrations of BOD higher than the RE target limit of 2.5 mg/l. By comparing the data from below Moorswater with the data from the upstream site at Looemills Bridge (see appendices 1, 2 & 3) it is obvious that the first and fourth exceedances were due to upstream sources and coincided with wet weather events. However the second and third BOD exceedances appear to have been caused by a source between the two points, this may have been the consented discharge at Moorswater driers. Unfortunately this cannot be proved, as there are no data for BOD from the Moorswater driers. Operation of the Moorswater driers ceased in June 1997.

##### 4.1.2 East Looe River Downstream of Liskeard STW (81420269) and Trussel Bridge (81420261).

Both of the above sites marginally failed for BOD from 1995. Although not certain the main causes of the failures would appear to be due to three reasons.

- Sources of BOD upstream of Looemills Bridge coinciding with rainfall events.
- Moorswater Driers discharging upstream (up to June 1997).
- Moorswater CSO. For a period in September 1997, the CSO became blocked and discharged untreated sewage into the East Looe River (see reference 2 para.4.3.3). Samples taken from both sites contained BOD concentrations up to 6.9 mg/l and ammonia concentrations up to 0.967 mg/l. The RQO's for BOD and ammonia at these sites are 4.0 mg/l and 0.6 mg/l respectively.

## 4.2 Water Quality Monitor Data

Initially water quality monitors were deployed at two sites on the East Looe river, Looemills Bridge and Trussel Bridge (see figure 1). Within the first week increases in ammonia and turbidity at Trussel Bridge were also found at the upstream site at Looemills. These increases coincided with rainfall events. A third monitor was then deployed at Venton Veor Bridge (upstream of Looemills) in an attempt to identify potential sources of BOD, ammonia and turbidity (see figures 2 - 9).

Difficulties were experienced when using ammonia probes for this investigation. Probes would often fail to meet the set quality assurance standard. The probes were however effective in identifying data trends.

## 4.3 Wet Weather Surveys

Two wet weather surveys were conducted for this investigation. The first, on 18 February 1999 consisted of three sampling runs, with 19 sites per run. Sites were chosen following analysis of monitor data and findings from the EP Central Team farm visits. Further sample runs would have been conducted but the rainfall rate was far lower than was initially forecasted (actual rate = 20.2 mm in 22 hours). The survey did however highlight three main tributaries in the upper reaches of the catchment (above Venton Veor Bridge) with elevated BOD, ammonia and turbidity. The highest concentrations of BOD were found in the Venton Veor tributary (site 3) where 11.8 mg/l were found. The sampler at the time noted the 'strong smell of farm waste'. An inspection of the catchment by members of the EP Central Team found one particular farm with poor farm waste management including, 'Chicken manure heaped in fields causing land run off to the watercourse' (see reference 1). The other two tributaries (sites 1 & 7) also showed signs of poor farming practice ranging from limited waste storage facilities to steep bare soil fields, which allowed high concentrations of suspended solids into the watercourse.

The second wet weather survey was conducted on 2 March 1999 where 14mm of rain fell from 13:00 to 21:00. Four sampling runs were conducted over this period. The survey did not highlight any new sources of BOD and / or ammonia but did confirm the three 'problem' tributaries in the upper reaches of the catchment.

The CSO's in the catchment did not appear to significantly affect the BOD and ammonia concentrations in the catchment. However, none of the CSO's prior to the Liskeard STW contained any screens. Large quantities of sewage debris were found downstream of Sun Girt and New Road CSO's. This is of particular importance considering the East Looe River eventually impacts on the East Looe EC Bathing Water.

## 5 CONCLUSIONS

RE non-compliance since 1995 was almost certainly due to two main causes.

- 5.1 Point and diffuse agricultural inputs due to poor farming practices. These include unsatisfactory farm waste management and land management resulting in runoff to the catchment.
- 5.2 Moorswater CSO, which for a period in September 1997 became blocked and discharged untreated sewage into the East Looe River upstream of Lamellion Mill Bridge. Only one routine sample was collected in this period of time.

## **6 RECOMMENDATIONS**

- 6.1** Re-visit farms known to have waste and land management problems and ensure that remedial work has been carried out (concurrent with reference 1 recommendations).

**Action: Central EP Team.**

- 6.2** Compile and maintain a program of farm visits to encourage agricultural practices that improve the water quality in the catchment (concurrent with reference 1 recommendations).

**Action: Central (EP) Team**

- 6.3** Review the Liskeard CSO consents and seek improvements where necessary. eg. Provision of screening or screening facilities.

**Action: Regional Consents Team**

- 6.4** Liaison between the Agency and SWW to confirm the inspection programme for sewerage facilities in Liskeard.

**Action: Central (EP) Team**

### **References**

1. Ivall K. Spring 1999. 1997 River Quality Objective Non-Compliance. East Looe River.
2. Hocking R. November 1998. East Looe Bathing Water Directive Failures (1990 – 1997).

**Figure 1. East Looe River (upper catchment)**  
Wet weather sample points, water quality monitoring points and Combined Sewer Overflows.

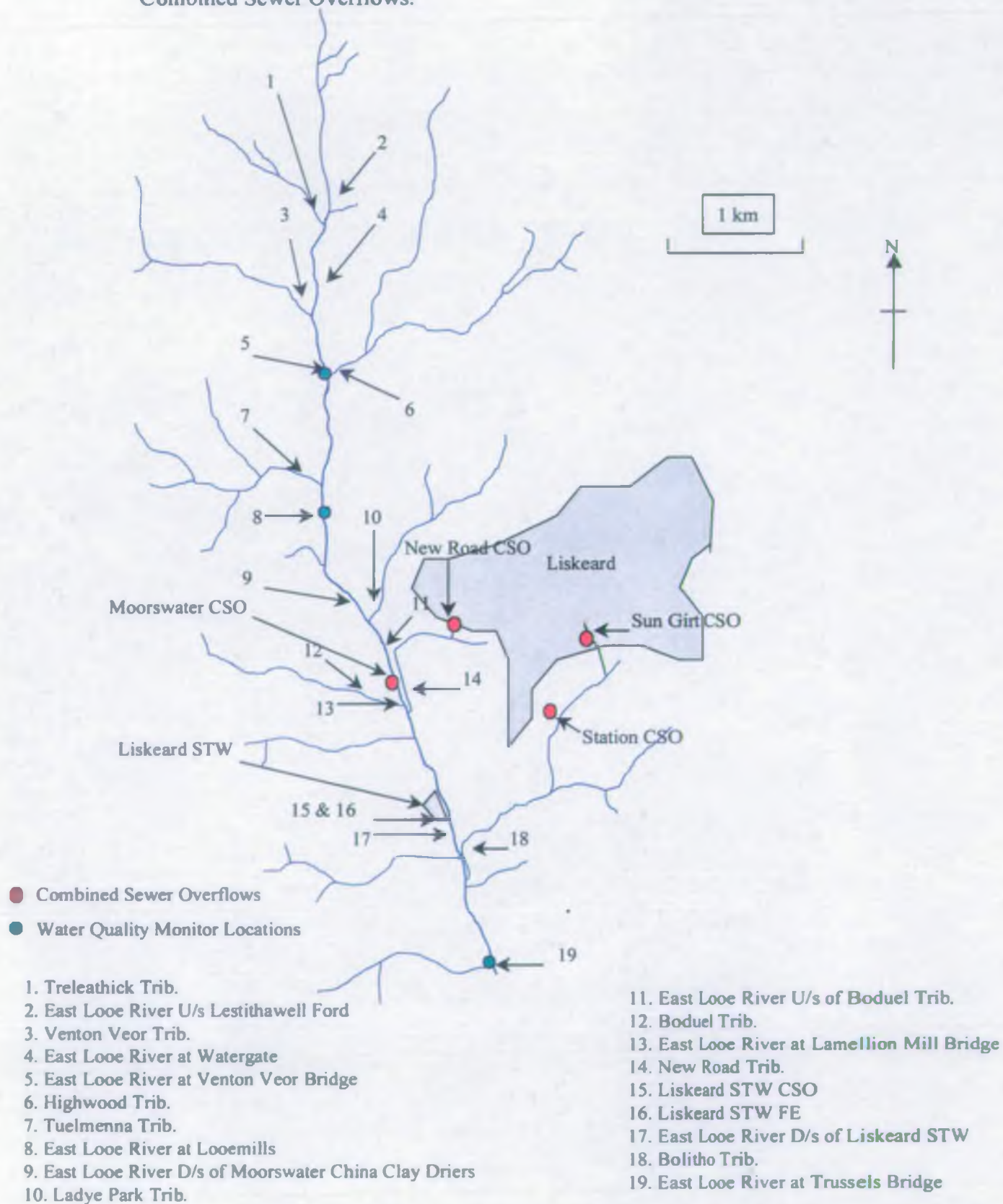




Figure 2

Looemills Monitor Data

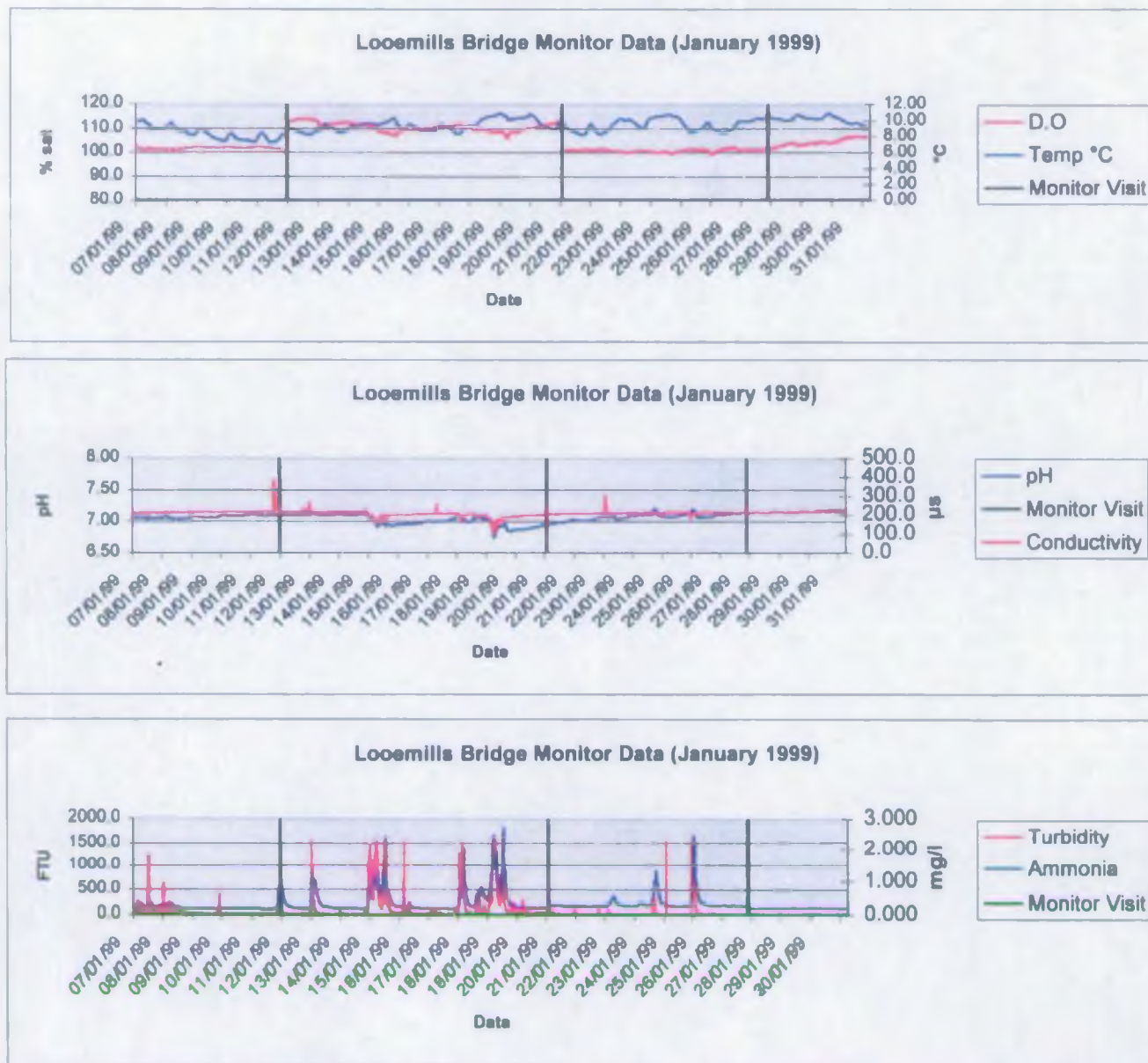




Figure 3

Loomills Bridge Monitor Data

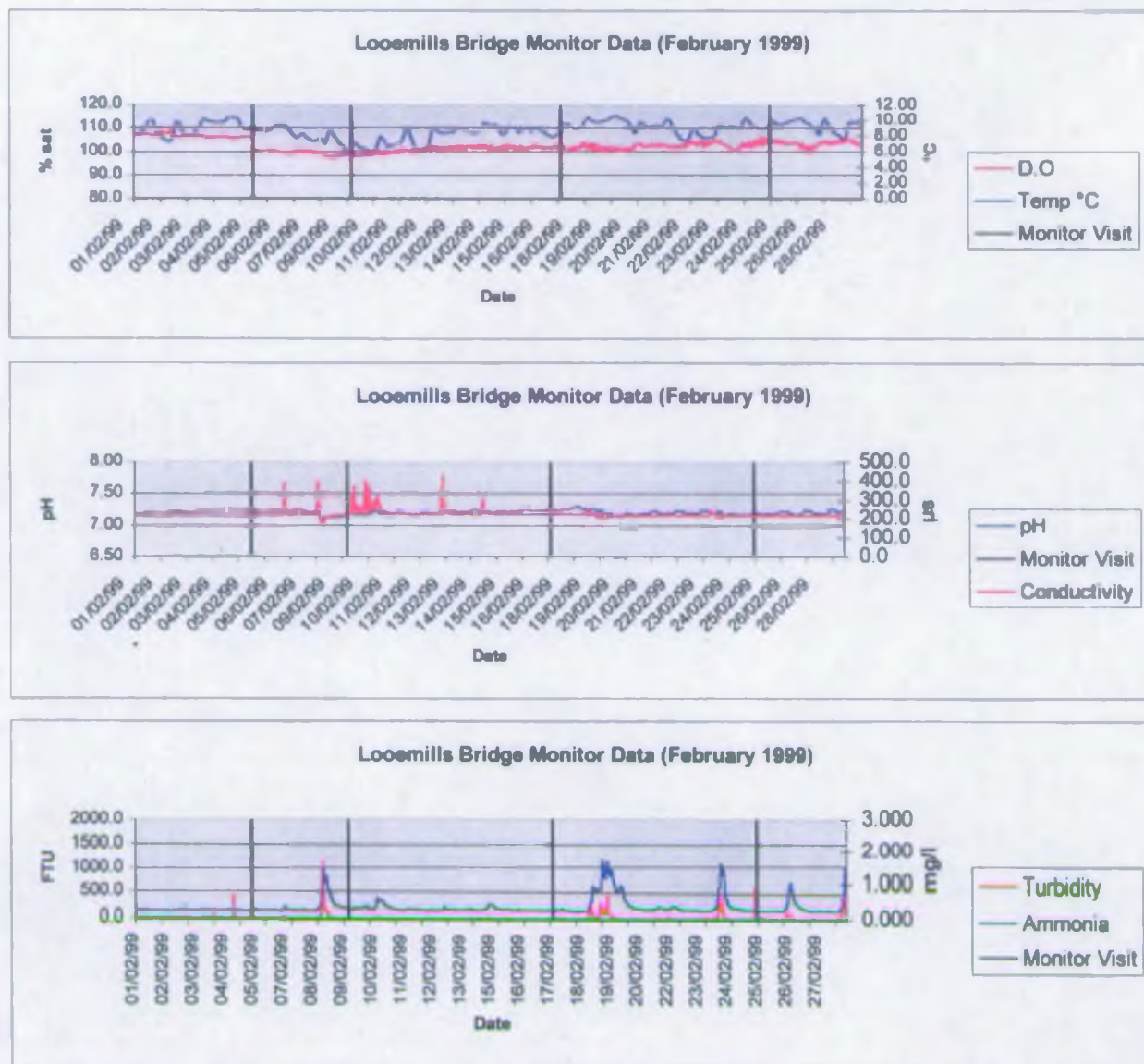


Figure 4

Looemills Bridge Monitor Data



Figure 5

Trussels Bridge Monitor Data

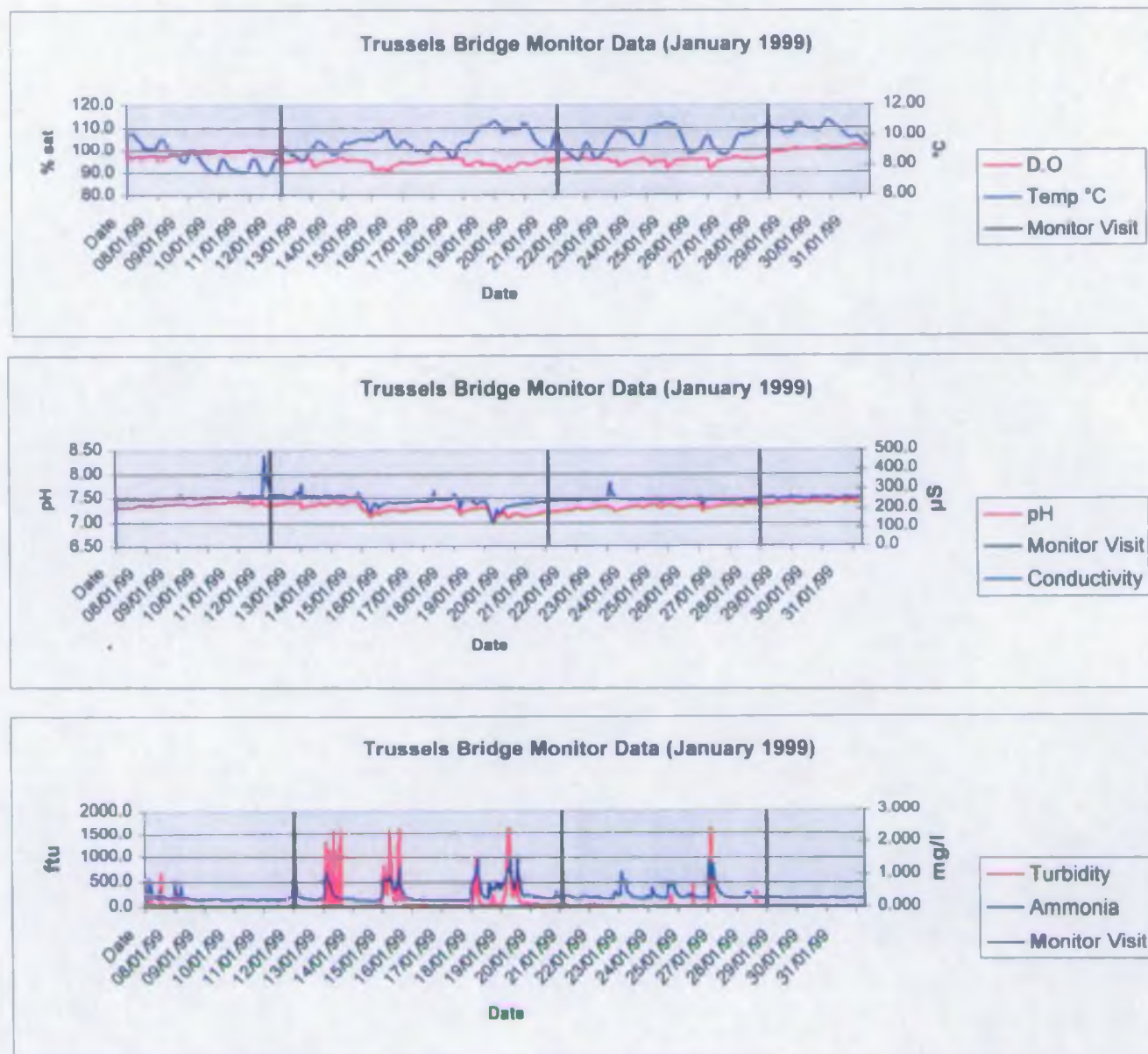


Figure 6

Trussels Bridge Monitor Data

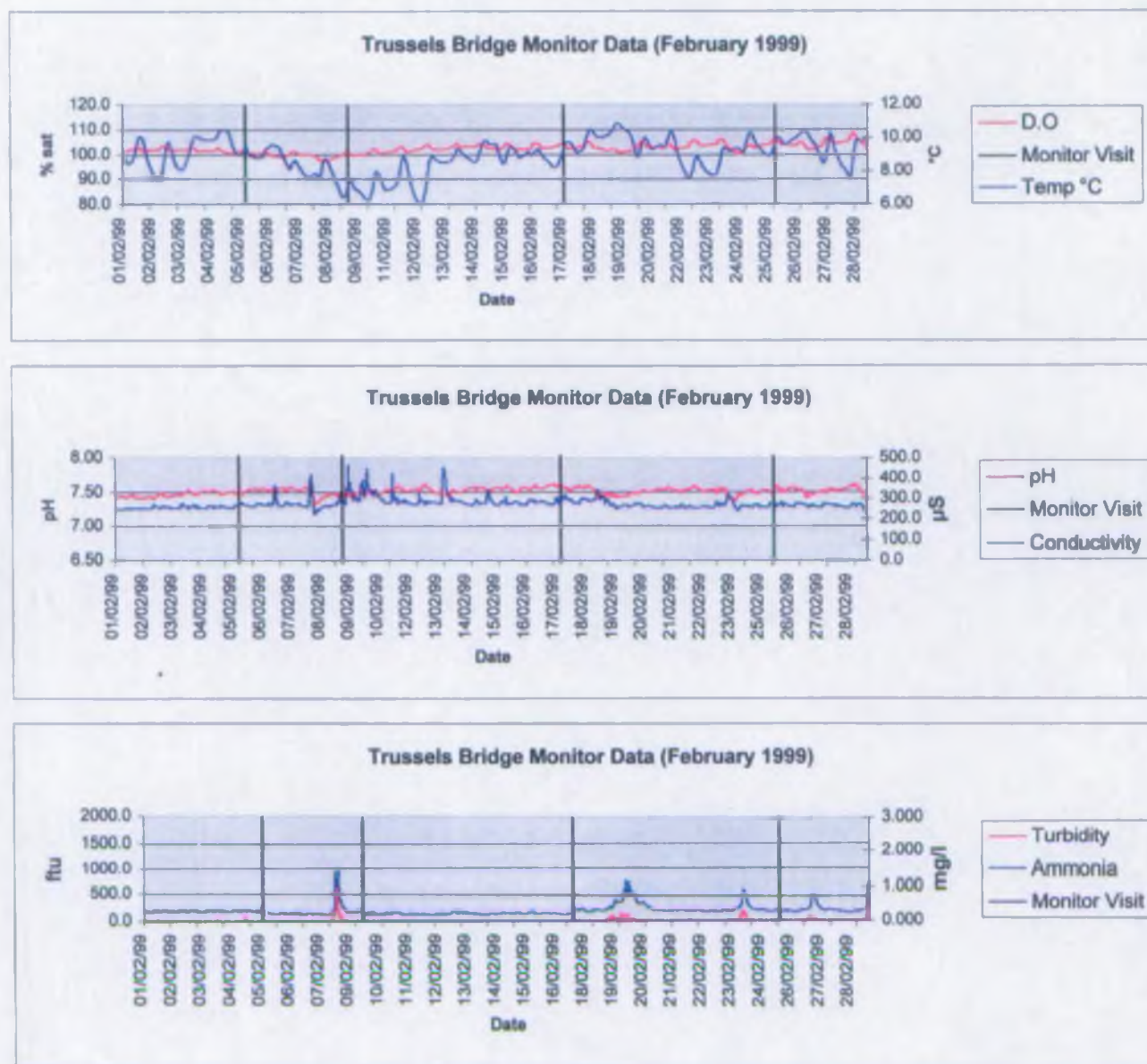


Figure 7

Trussels Bridge Monitor Data

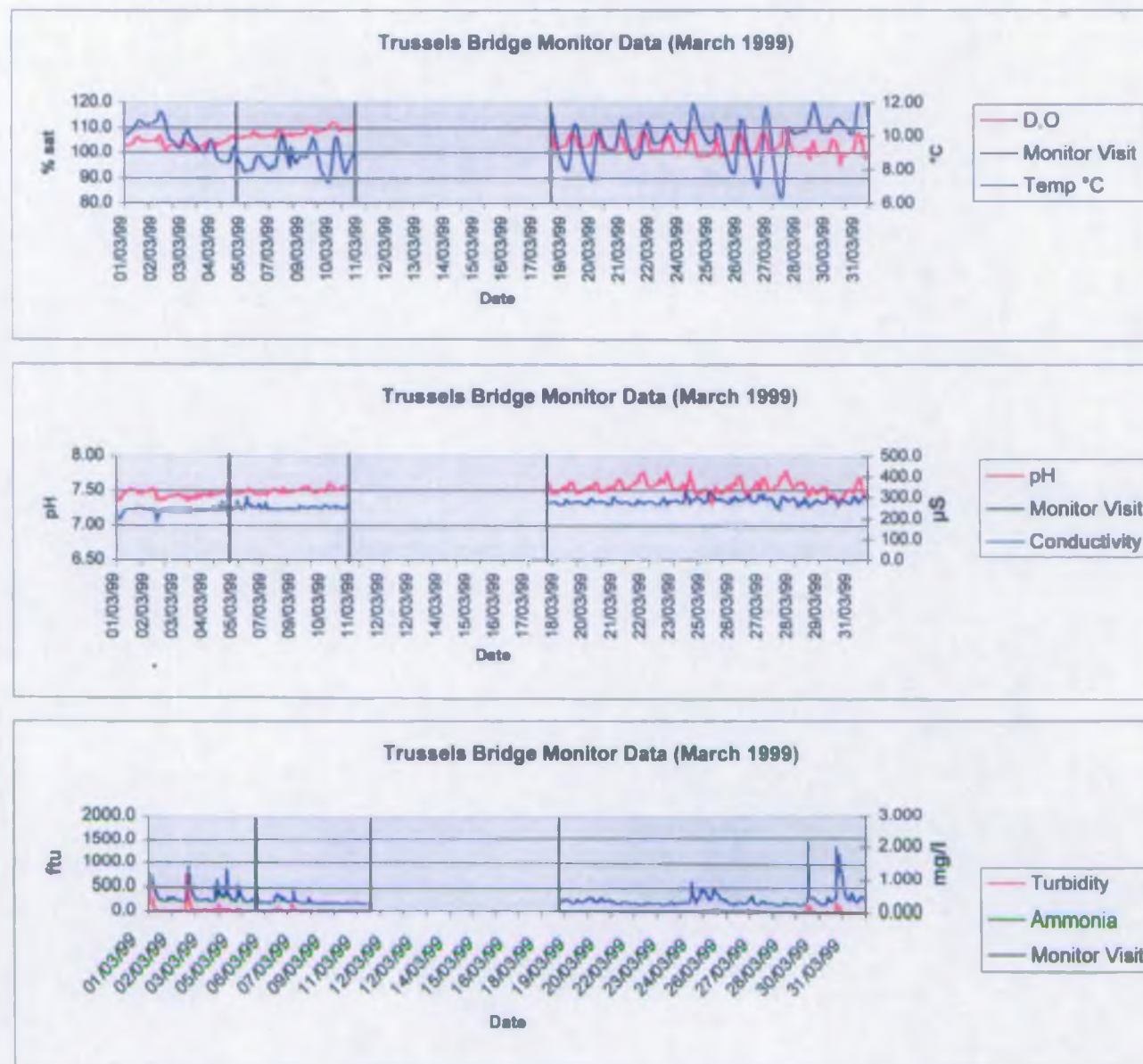


Figure 8

Venton Veor Bridge Monitor Data

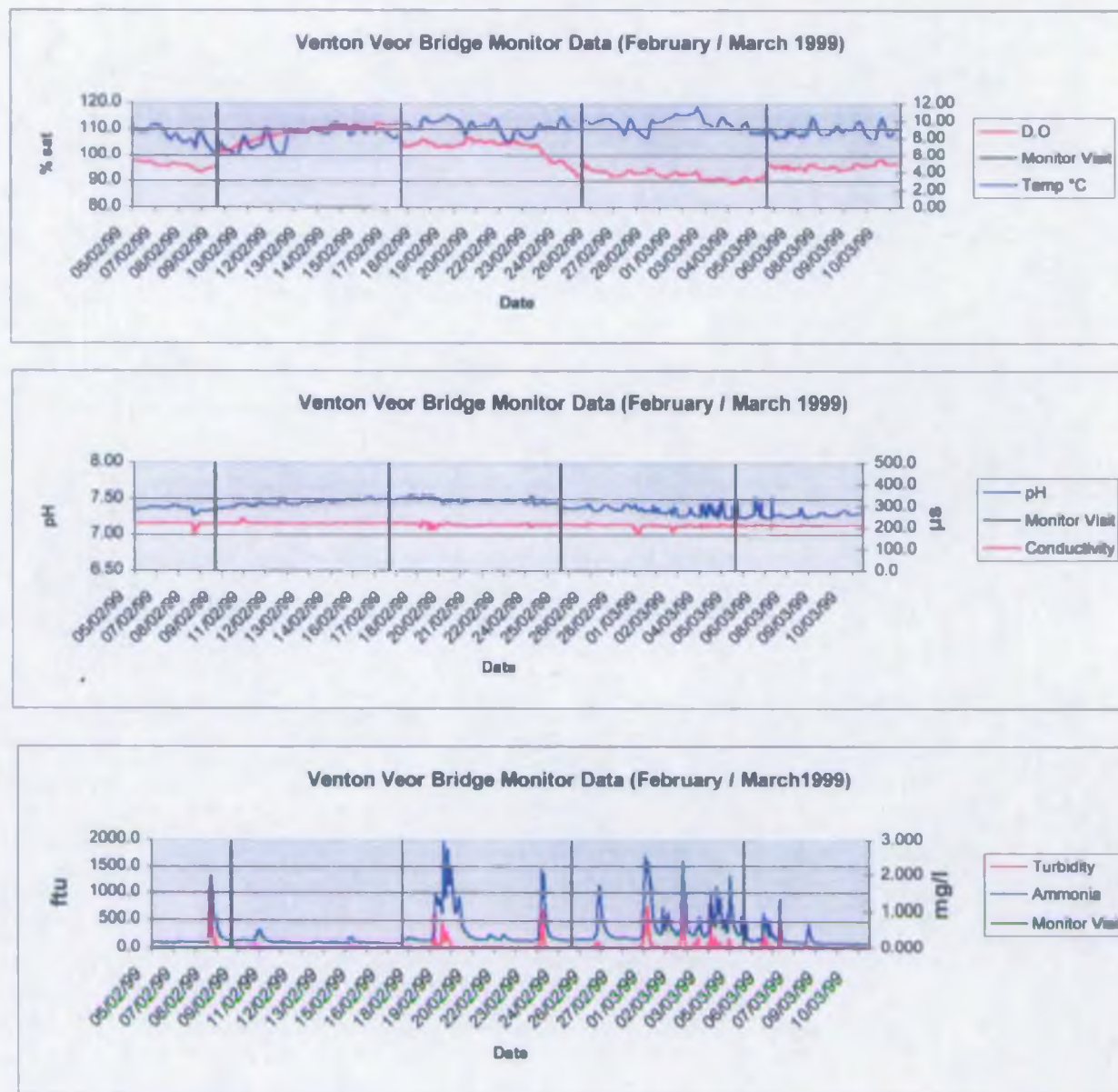
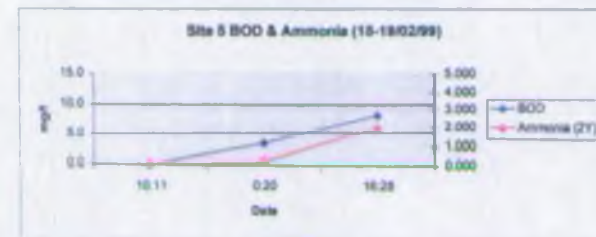
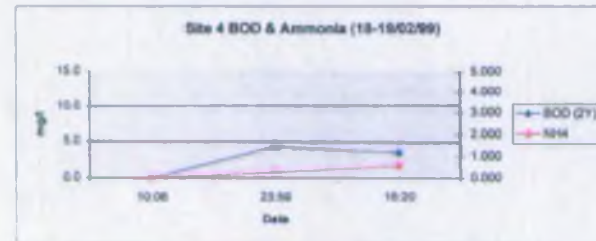
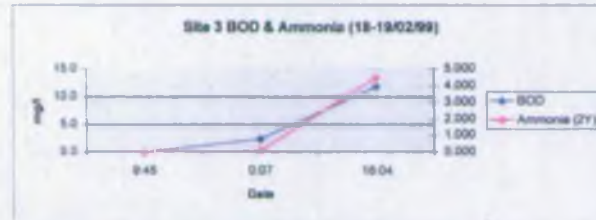
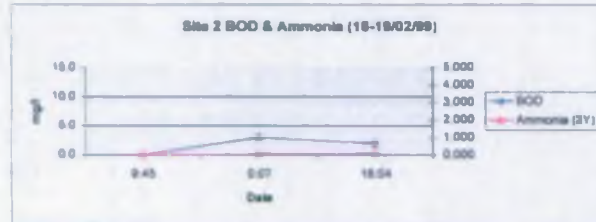
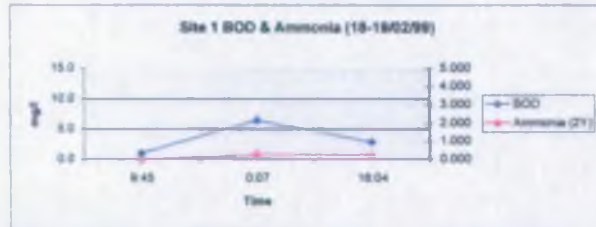
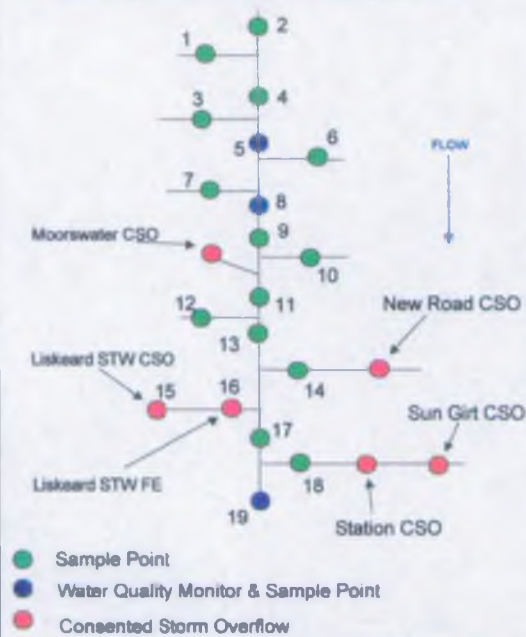


Figure 9. Wet Weather Survey Data, 18 & 19/02/99



Schematic Map of Wet Weather Survey Sampling Points



- |   |  |
|---|--|
| 1 Trelethick Trib                               | 11 East Looe River Site of Boduel Trib     |
| 2 Lesthewell Trib                               | 12 Boduel Trib. Prior to East Looe River   |
| 3 Venton Veor Trib                              | 13 East Looe River at Lameton Mill Bridge  |
| 4 East Looe River at Watergate                  | 14 New Road Trib. Prior to East Looe River |
| 5 East Looe River at Venton Veor Bridge         | 15 Liskard STW CSO discharge               |
| 6 Hightwood Trib                                | 16 Liskard STW FE                          |
| 7 Tuelmenna Trib                                | 17 East Looe River Dis of Liskard STW      |
| 8 East Looe River at Looemilla Bridge           | 18 Bodho Trib                              |
| 9 East Looe River Dis Moorwater China Clay Drie | 19 East Looe River at Truxesla Bridge      |
| 10 Lady's Park Trib                             |  |

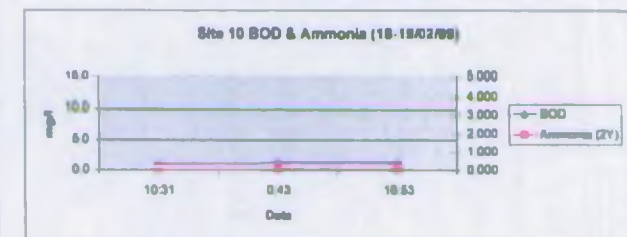
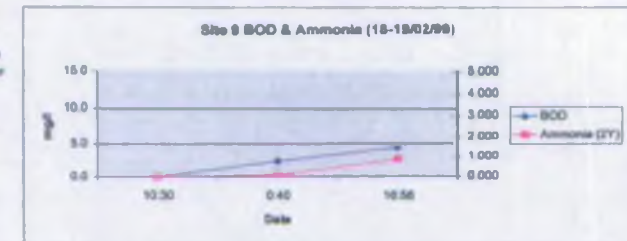
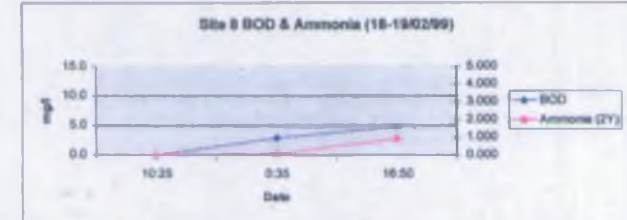
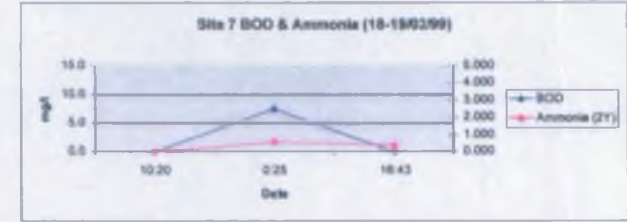
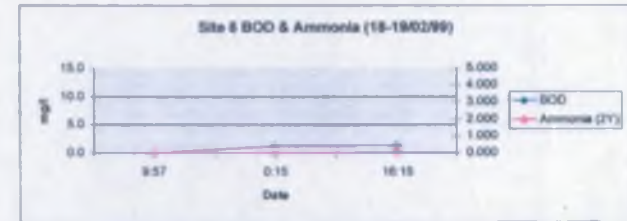
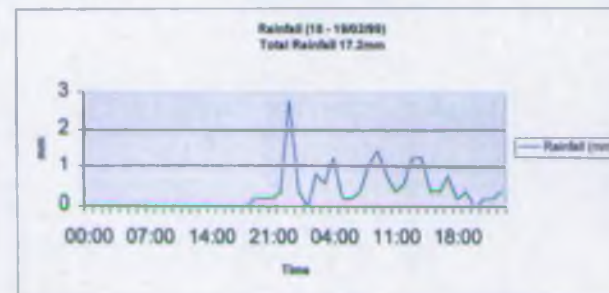


Figure 10. Wet Weather Survey Data 18 & 19/02/99

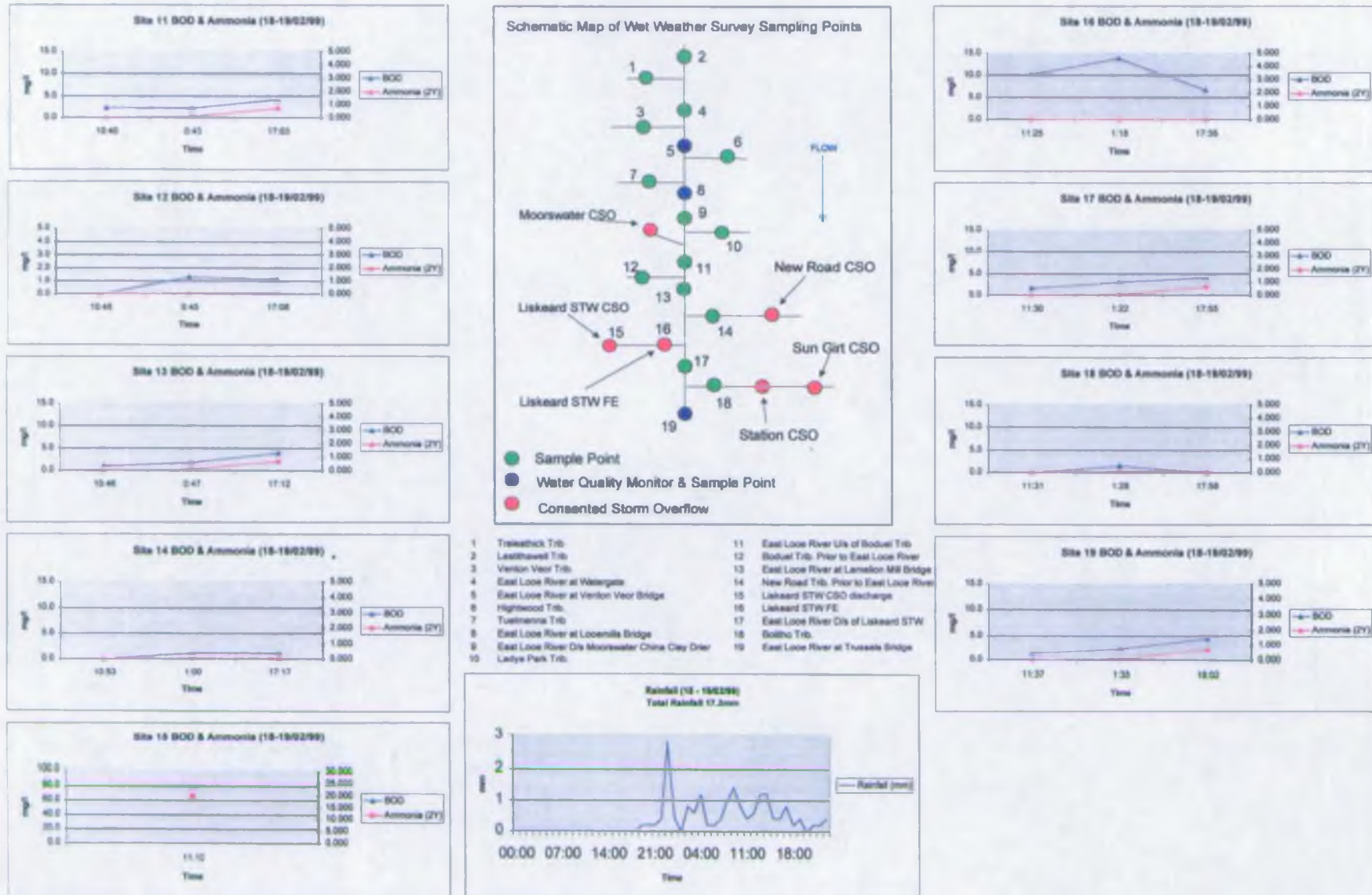


Figure 11. Wet Weather Survey Data, 02/03/99

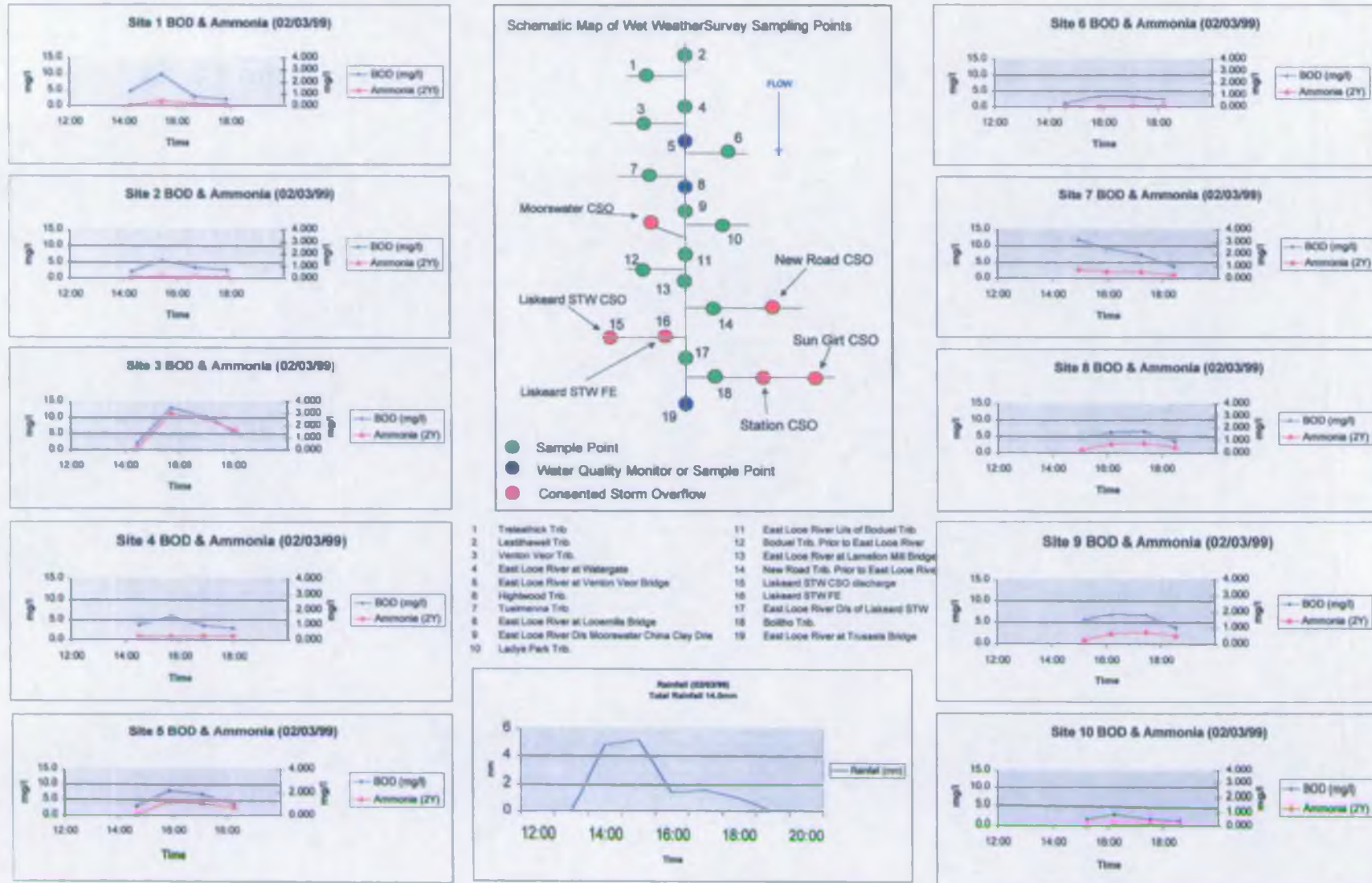
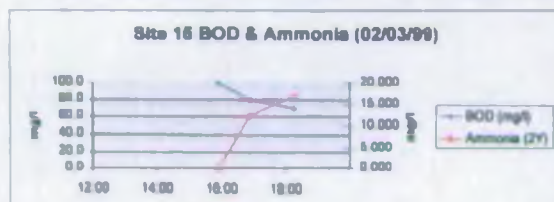
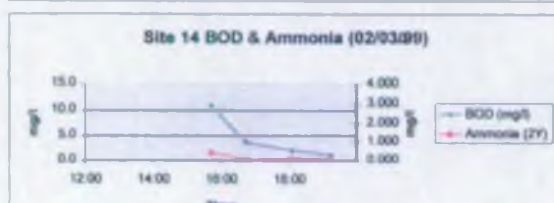
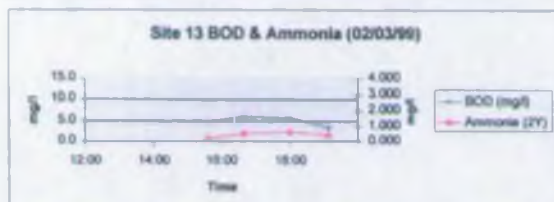
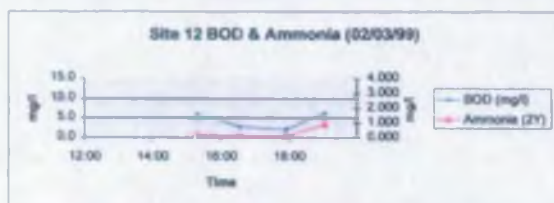
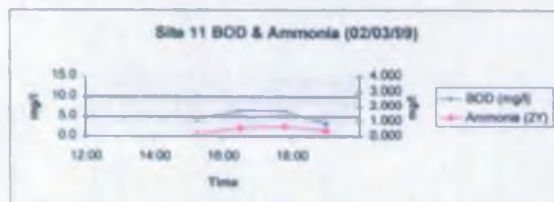
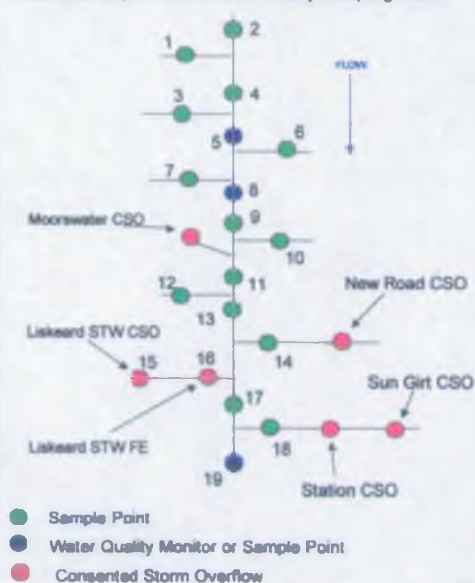


Figure 12. Wet Weather Survey Data, 02/03/99



Schematic Map of Wet Weather Survey Sampling Points



- |  |  |
|--|--|
| 1 Trussick Trib                              | 11 East Loe River W of Bodwell Trib        |
| 2 Leathwell Trib                             | 12 Bodwell Trib. Prior to East Loe River   |
| 3 Vention Vear Trib                          | 13 East Loe River at Leathwell Mill Bridge |
| 4 East Loe River at Watergate                | 14 New Road Trib. Prior to East Loe River  |
| 5 East Loe River at Vention Vear Bridge      | 15 Leakeard STW CSO discharge              |
| 6 Highwood Trib                              | 16 Leakeard STW FE                         |
| 7 Tushmore Trib                              | 17 East Loe River Dr of Leakeard STW       |
| 8 East Loe River at Longville Bridge         | 18 Bodlho Trib                             |
| 9 East Loe River Dr Moonwater China Clay Dns | 19 East Loe River at Trussick Bridge       |
| 10 Lady's Park Trib                          |  |

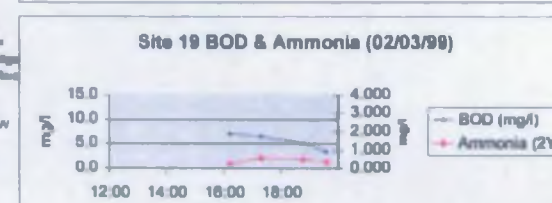
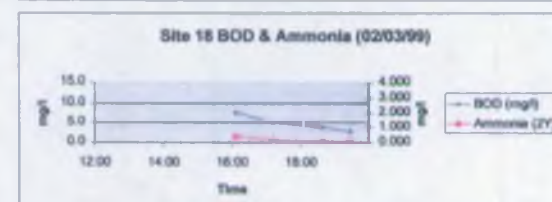
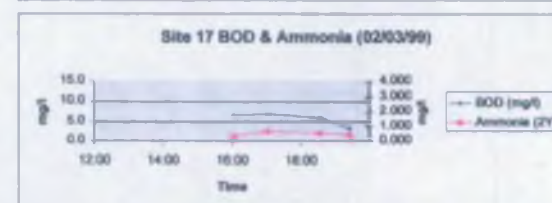
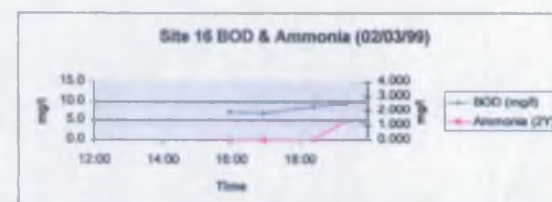
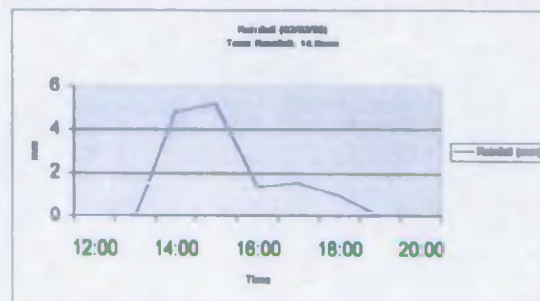


Table 1

Site	Date	Time	pH	Conductivity (µs)
Venton Veor Bridge	07/01/99	9:28	7.40	193.0
Looemills Bridge		10:07	7.45	194.0
Lamellon Mill		10:21	7.50	201.0
D/s of Liskeard STW		10:38	7.30	221.0
Bolithe Trib.		10:44	7.90	291.0
Trussels Bridge		10:53	7.55	224.0
Venton Veor Bridge	12/01/99	11:50	7.15	211.0
Looemills Bridge		12:08	7.25	207.0
Lamellon Mill		12:50	7.30	214.0
D/s of Liskeard STW		13:04	7.30	247.0
Bolithe Trib.		13:00	7.90	329.0
Trussels Bridge		13:15	7.40	258.0
Venton Veor Bridge	14/01/99	13:17	7.50	198.0
Looemills Bridge		13:27	7.55	No Result
Lamellon Mill		13:53	7.60	No Result
D/s of Liskeard STW		14:30	7.60	No Result
Bolithe Trib.		14:00	8.00	308.0
Trussels Bridge		14:47	7.70	No Result
Lower Trelaska Trib.	21/01/99	14:30	7.40	174.0
Treleathick Trib.		14:32	7.45	261.0
Venton Veor Bridge		14:48	7.45	187.0
Looemills Bridge		15:10	7.45	188.0
Lamellon Mill		16:10	7.45	200.0
D/s of Liskeard STW		16:21	7.45	212.0
Bolithe Trib.		16:25	7.85	289.0
Trussels Bridge		16:35	7.50	218.0
Venton Veor Bridge	28/01/98	13:30	7.55	195.0
Looemills Bridge		13:42	7.55	196.0
Lamellon Mill		14:22	7.60	202.0
D/s of Liskeard STW		14:37	7.30	220.0
Bolithe Trib.		14:31	7.95	303.0
Trussels Bridge		15:07	7.50	228.0
Venton Veor Bridge	05/02/99	11:15	7.55	189.0
Looemills Bridge		11:40	7.55	201.0
Lamellon Mill		11:47	7.65	208.0
D/s of Liskeard STW		12:05	7.60	238.0
Bolithe Trib.		12:00	8.05	313.0
Trussels Bridge		12:25	7.70	249.0

Turbidity (FTU)	Temp (°C)	D.O (% sat)	BOD (mg/l)	Ammonia (mg/l)	Solids (105°C) (mg/l)	Solids (500°C) (mg/l)
7.0	9.20	96.0	1.0	<0.03	14.8	No Result
6.7	9.30	94.3	1.1	<0.03	15.0	No Result
7.1	9.68	95.9	1.3	<0.03	17.1	No Result
6.1	9.76	92.8	1.1	<0.03	16.7	No Result
4.7	10.12	94.7	<1.0	<0.03	5.8	No Result
4.8	9.73	95.1	1.2	<0.03	17.1	No Result
400.0	8.60	95.6	14.8	1.260	469.0	383.0
200.0	8.56	99.2	8.4	0.565	244.0	198.0
183.0	8.70	98.4	7.4	0.497	207.0	171.0
120.0	8.80	95.3	6.3	0.414	146.0	116.0
30.0	9.40	97.1	2.2	0.100	23.7	<20.0
88.0	8.90	95.5	5.2	0.377	98.7	
9.5	9.50	97.5	<1.0	0.057	15.5	No Result
No Result	9.10	96.0	<1.0	0.035	16.2	No Result
No Result	9.10	95.6	<1.0	<0.030	15.2	No Result
No Result	9.30	94.9	<1.0	0.030	15.4	No Result
5.2	9.90	95.4	<1.0	<0.030	5.7	No Result
No Result	9.30	94.9	1.1	0.036	16.9	No Result
8.8	No Result	No Result	<1.0	0.033	16.6	No Result
35.1	No Result	No Result	1.3	0.157	69.1	61.0
30.7	10.60	97.0	1.0	0.088	50.6	42.0
25.3	10.08	111.0	1.4	0.050	43.4	38.0
25.3	9.90	97.1	1.1	0.059	39.4	34.0
21.5	10.00	95.6	1.7	0.137	31.3	28.0
9.1	10.20	96.5	1.0	0.042	13.6	No Result
20.2	9.70	91.7	1.8	0.128	39.2	34.0
8.1	11.30	97.2	<1.0	0.036	13.3	No Result
8.5	10.73	101.0	<1.0	<0.030	14.3	No Result
11.4	10.50	97.1	<1.0	0.031	20.1	No Result
10.8	10.70	95.6	1.1	<0.030	16.7	No Result
4.5	10.80	96.6	<1.0	<0.030	4.1	No Result
14.2	10.00	95.8	1.1	<0.030	19.7	No Result
8.4	9.50	98.0	<1.0	0.030	11.1	No Result
6.3	9.15	105.0	1.1	<0.030	9.0	No Result
7.2	9.60	96.7	<1.0	<0.030	9.7	No Result
6.6	9.50	95.1	1.4	<0.030	9.7	No Result
3.9	9.70	98.4	1.0	<0.030	5.0	No Result
6.9	9.34	101.9	1.6	<0.030	12.4	No Result

**Table 2**

Site	Date	Time	pH	Conductivity ( $\mu$ S)
Venton Veor Bridge	09/02/99	10:25	7.60	198.0
Looemills Bridge		11:25	7.55	
Lamellion Mill		12:20	7.65	
D/s of Liskeard STW		12:33	7.55	
Bolitho Trib.		12:27	8.05	318.0
Trussels Bridge		12:50	7.65	
Venton Veor Bridge	17/02/99	11:40	7.65	199.0
Looemills Bridge		12:40	7.65	204.0
Lamellion Mill		13:22	7.75	212.0
D/s of Liskeard STW		13:30	7.70	265.0
Bolitho Trib.		13:33	8.15	322.0
Trussels Bridge		13:42	7.80	264.0
Venton Veor Bridge	25/02/99	10:50	7.55	194.0
Looemills Bridge		11:43	7.55	198.0
Lamellion Mill		12:15	7.65	206.0
D/s of Liskeard STW		12:24	7.55	253.0
Bolitho Trib.		12:30	8.10	320.0
Trussels Bridge		12:41	7.60	254.0
Venton Veor Bridge	05/03/99	12:05	7.45	192.0
Looemills Bridge		14:15	7.50	192.0
Lamellion Mill		15:55	7.60	204.0
D/s of Liskeard STW		16:03	7.55	217.0
Bolitho Trib.		16:08	8.00	297.0
Trussels Bridge		16:25	7.65	222.0
Venton Veor Bridge	15/03/99	11:56	7.65	194.0
Looemills Bridge		12:06	7.65	198.0
Lamellion Mill		12:31	7.70	205.0
D/s of Liskeard STW		13:01	7.65	239.0
Bolitho Trib.		13:40	8.20	316.0
Trussels Bridge		13:51	7.75	244.0

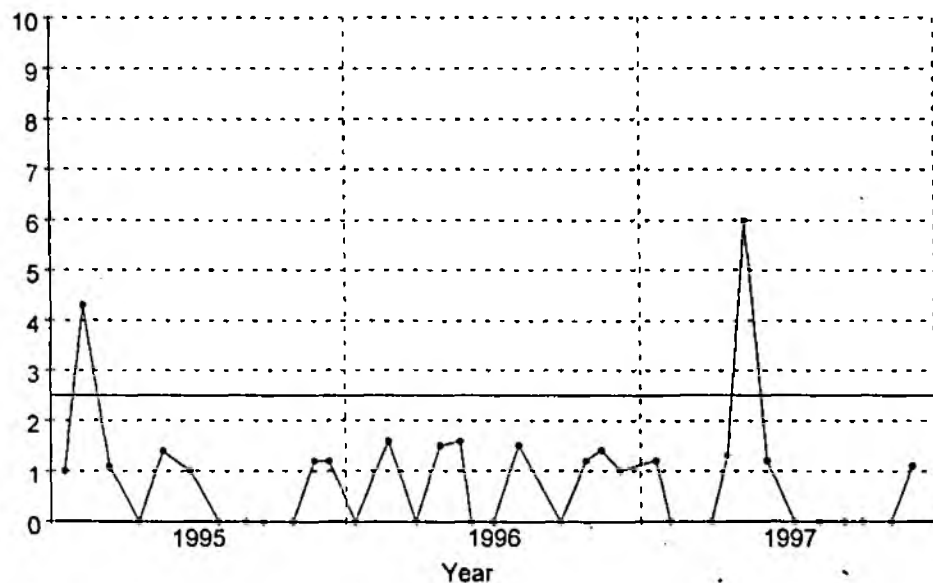
Turbidity (FTU)	Temp (°C)	D.O (% sat)	BOD (mg/l)	Ammonia (mg/l)	Solids (105°C) (mg/l)	Soilds (500°C) (mg/l)
7.1	5.86	93.3	1.4	0.040	10.8	No Result
	6.30	100.0	1.4	<0.030	9.4	No Result
	6.70	98.4	1.4	<0.030	10.2	No Result
	7.30	98.4	2.0	0.075	14.3	No Result
3.3	7.70	97.9	1.0	<0.030	3.1	No Result
	7.10	98.0	1.9	0.062	14.3	No Result
5.2	9.10	96.3	1.2	<0.030	6.4	No Result
4.4	9.00	97.8	1.1	0.044	7.2	No Result
6.2	9.20	97.0	1.3	<0.030	6.8	No Result
7.7	9.40	98.0	2.0	0.034	12.1	No Result
2.4	10.00	98.3	1.0	<0.030	<3.0	No Result
10.5	9.40	98.0	1.6	<0.030	11.5	No Result
14.0	9.40	99.6	1.0	<0.030	18.7	No Result
7.6	9.30	99.3	1.0	<0.030	9.3	No Result
5.3	9.40	100.0	<1.0	<0.030	9.1	No Result
4.4	9.50	99.5	1.7	<0.030	9.3	No Result
1.7	10.00	98.9	<1.0	<0.030	<3.0	No Result
6.4	9.50	98.9	1.6	<0.030	14.2	No Result
10.0	8.60	94.0	1.3	0.277	15.7	No Result
7.4	8.70	102.0	1.4	0.087	11.7	No Result
22.7	No Result	No Result	1.5	0.093	29.6	23.0
15.3	No Result	No Result	1.4	0.080	20.2	No Result
6.9	No Result	No Result	1.0	<0.030	8.5	No Result
13.0	No Result	No Result	1.4	0.069	17.9	No Result
2.8	10.60	99.0	1.1	<0.030	7.1	No Result
2.6	10.10	100.0	1.1	<0.030	4.8	No Result
2.6	9.80	99.0	1.3	<0.030	4.1	No Result
3.8	10.40	100.0	1.6	<0.030	6.2	No Result
4.5	11.50	100.0	1.5	<0.030	5.0	No Result
4.3	10.80	100.0	1.5	<0.030	5.4	No Result

# Appendix 1

Time Series Plot - BOD (mg/l) 18-01-1995 to 03-12-1997

East Looe River at Looemills (81420288)

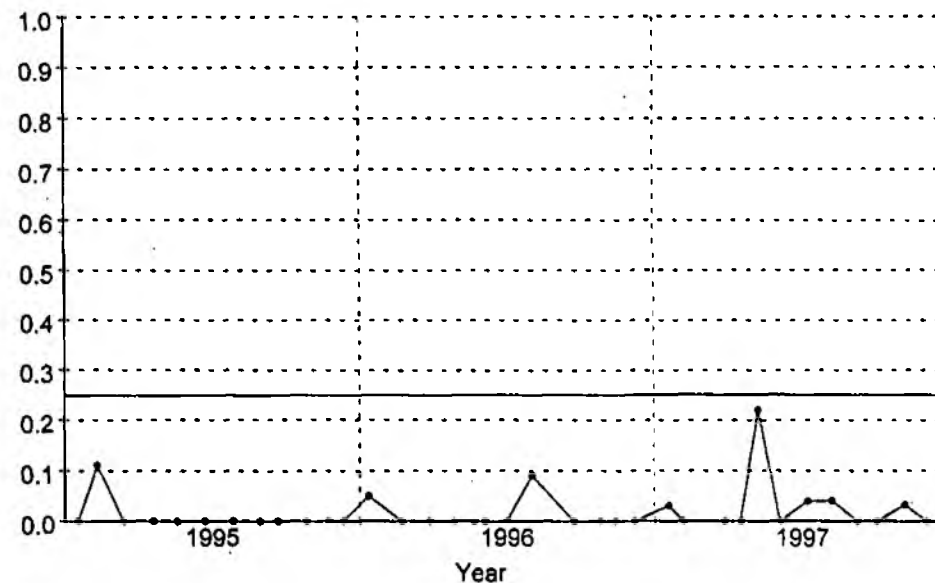
BOD (mg/l)



Time Series Plot - Ammonia (mg/l) 18-01-1995 to 03-12-1997

East Looe River at Looemills (81420288)

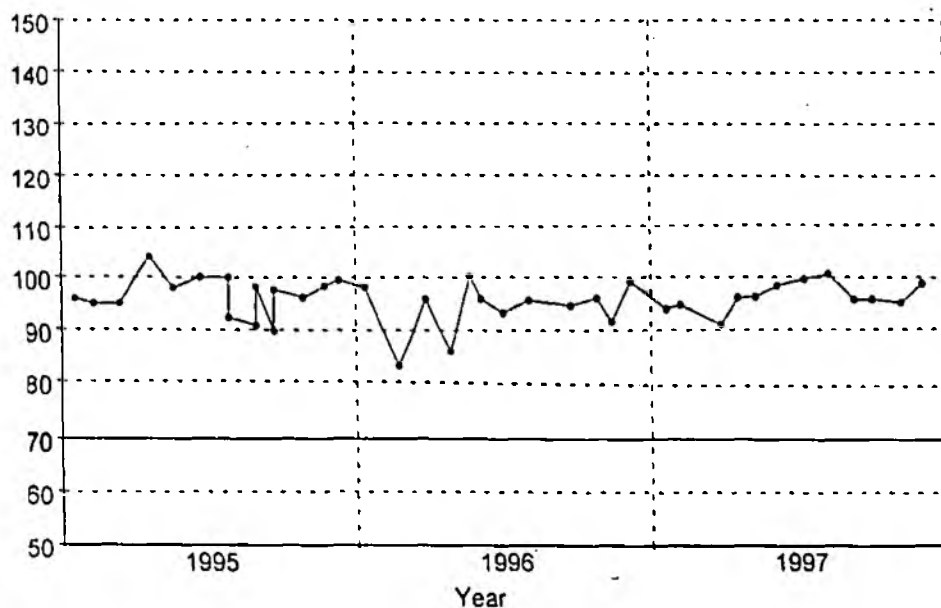
Ammonia (mg/l)



Time Series Plot - D.O (% sat) 18-01-1995 to 03-12-1997

East Looe River at Looemills (81420288)

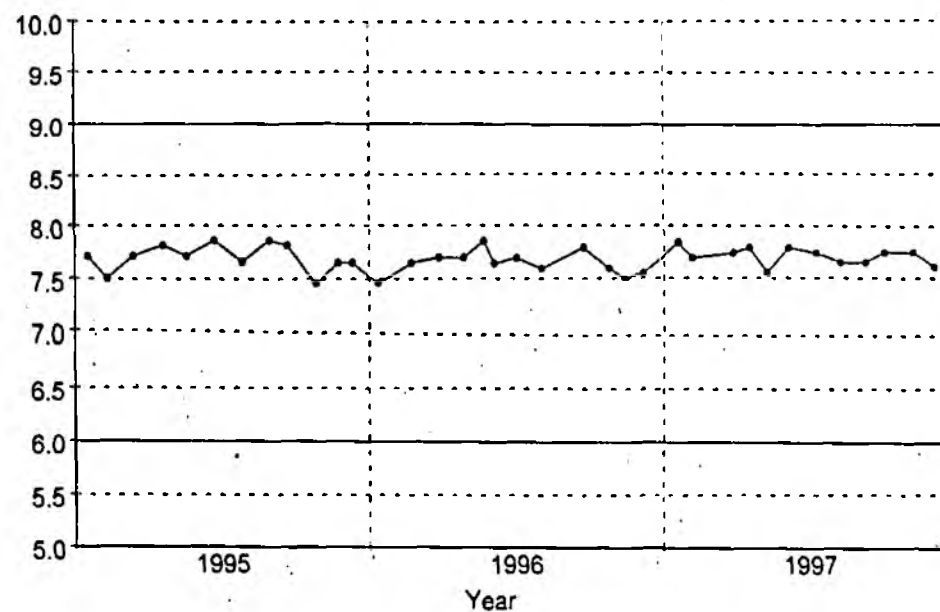
D.O (% sat)



Time Series Plot - pH 18-01-1995 to 03-12-1997

East Looe River at Looemills (81420288)

pH



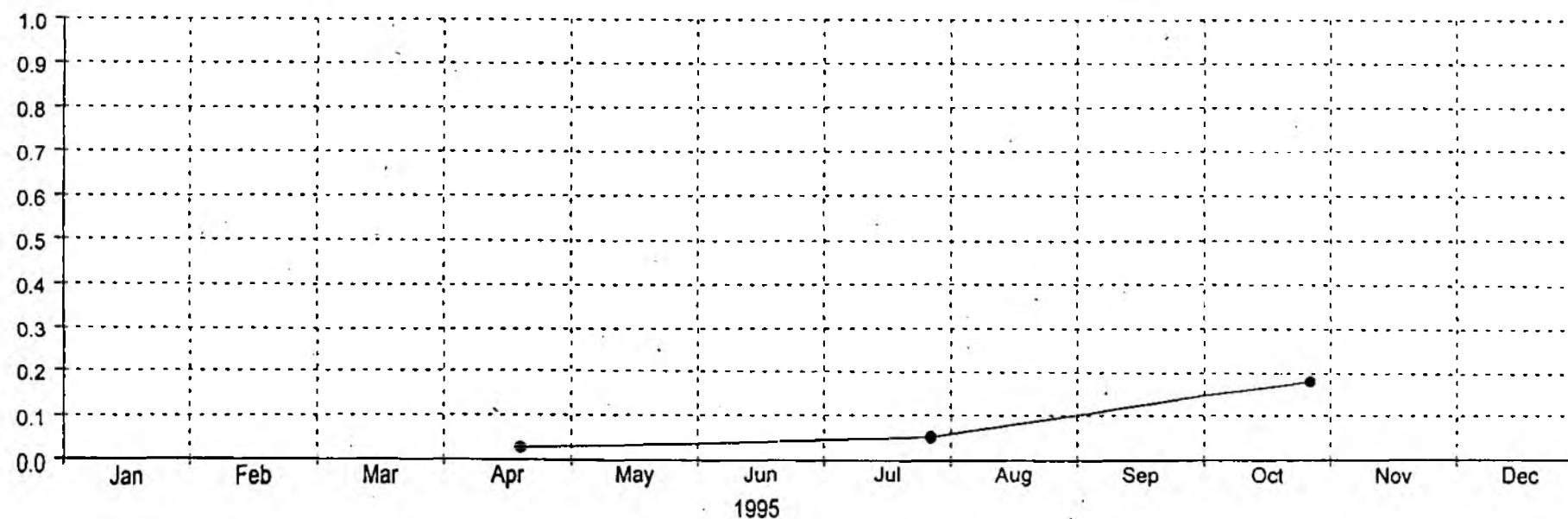
## Appendix 2

Time Series Plot - Ammonia (mg/l)

Moorswater China Caly Dries (81420282)

19-04-1995 to 27-10-1995

Ammonia (mg/l)

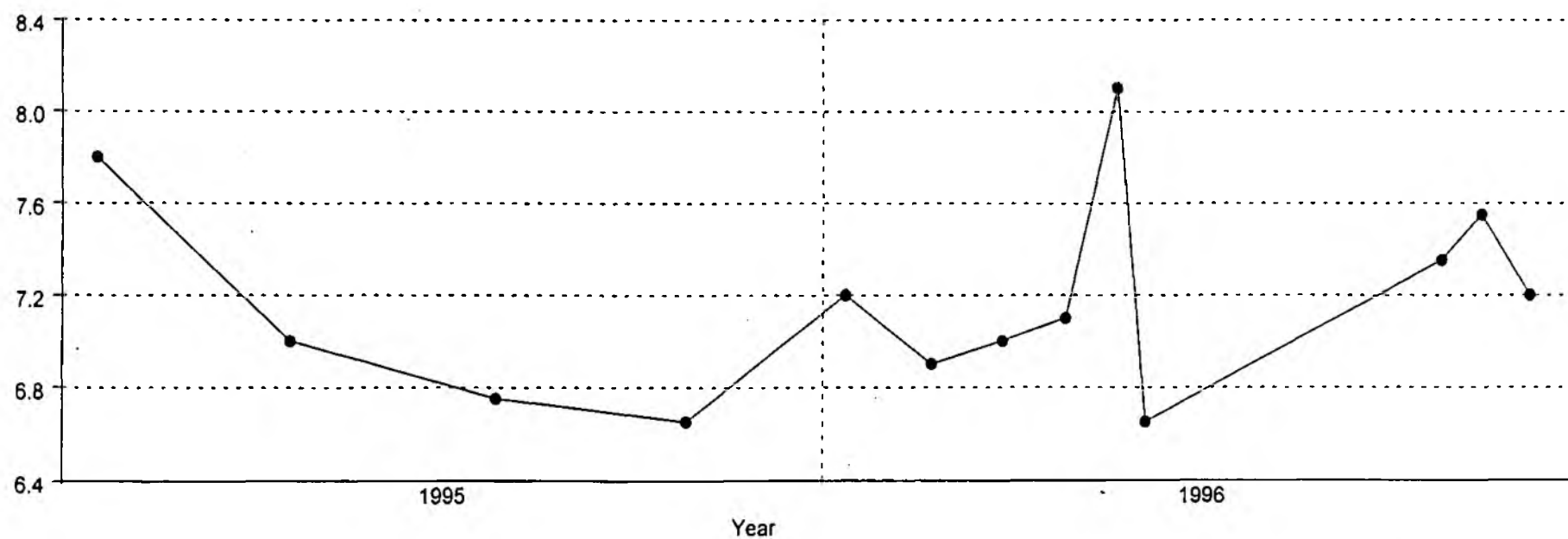


Time Series Plot - pH

Moorswater China Caly Dries (81420282)

18-01-1995 to 06-12-1996

pH

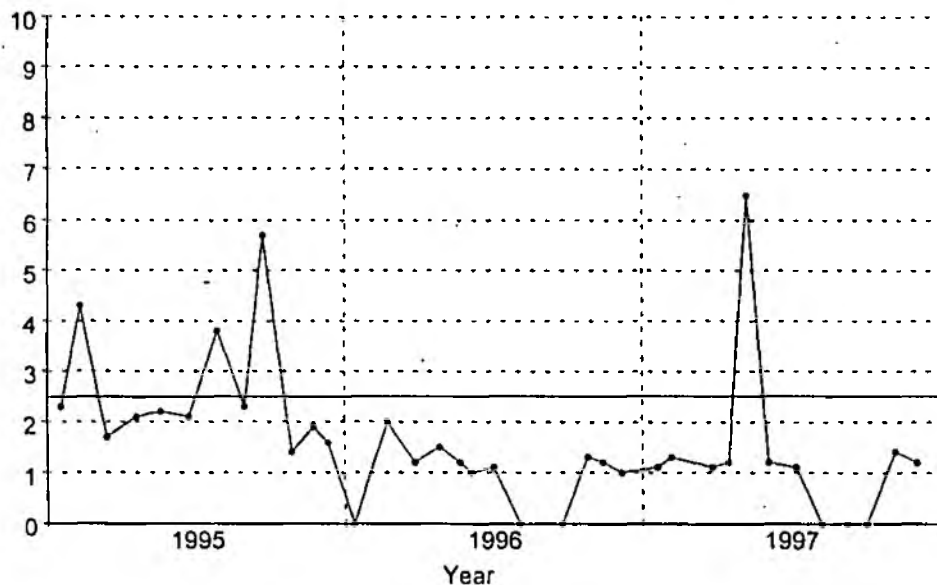


# Appendix 3

Time Series Plot - BOD (mg/l) 18-01-1995 to 03-12-1997

East Looe river Below Moorswater (81420280)

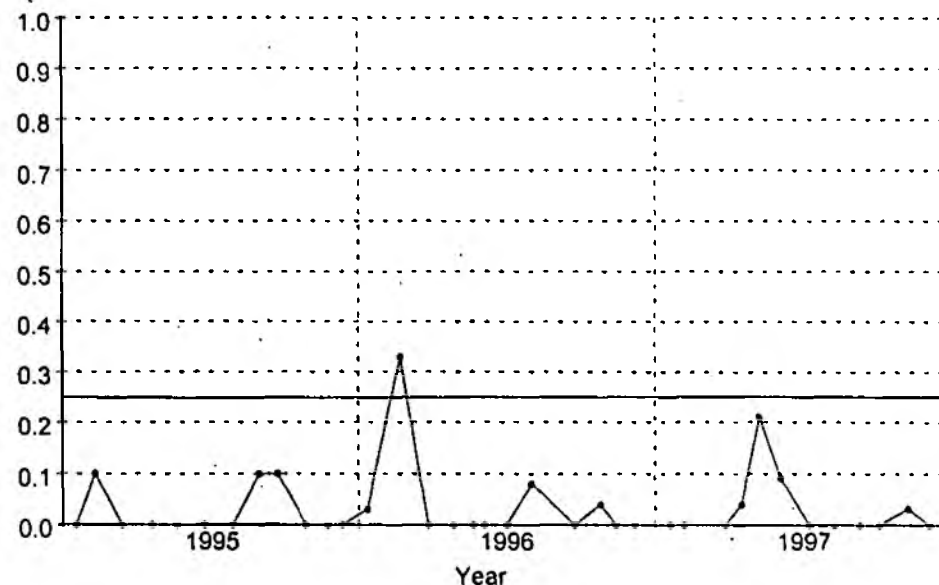
BOD (mg/l)



Time Series Plot - Ammonia (mg/l) 18-01-1995 to 03-12-1997

East Looe river Below Moorswater (81420280)

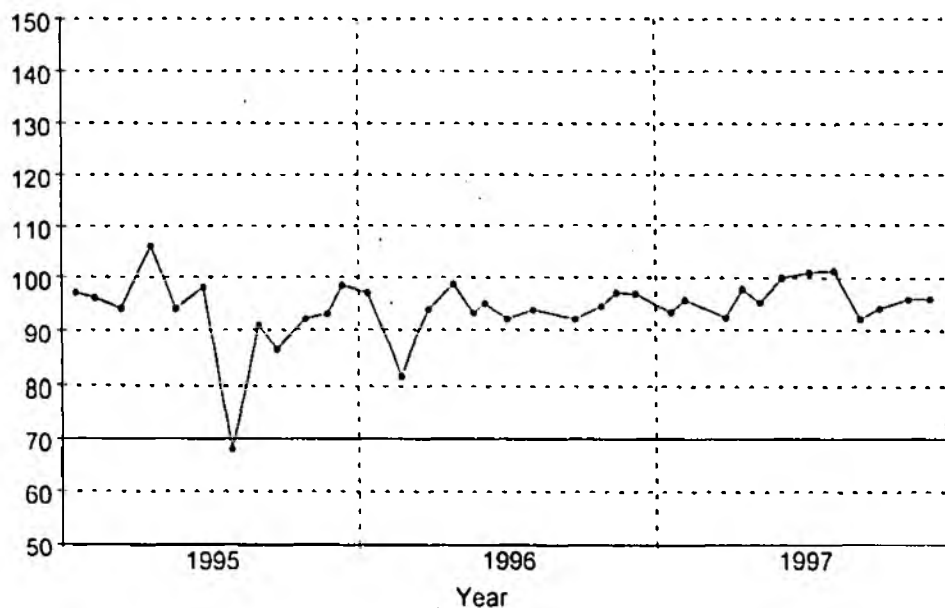
Ammonia (mg/l)



Time Series Plot - D.O (% sat) 18-01-1995 to 03-12-1997

East Looe river Below Moorswater (81420280)

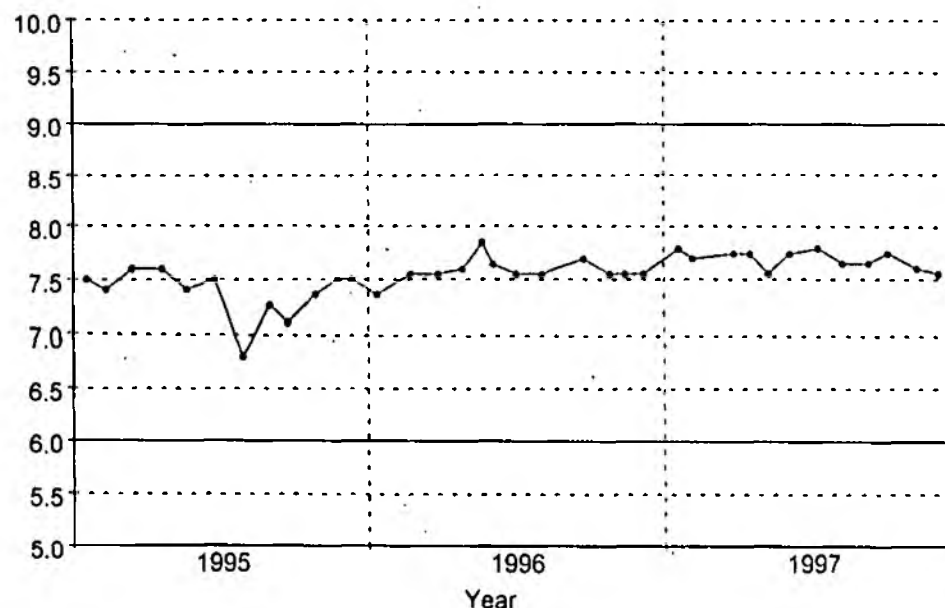
D.O (% sat)



Time Series Plot - pH 18-01-1995 to 03-12-1997

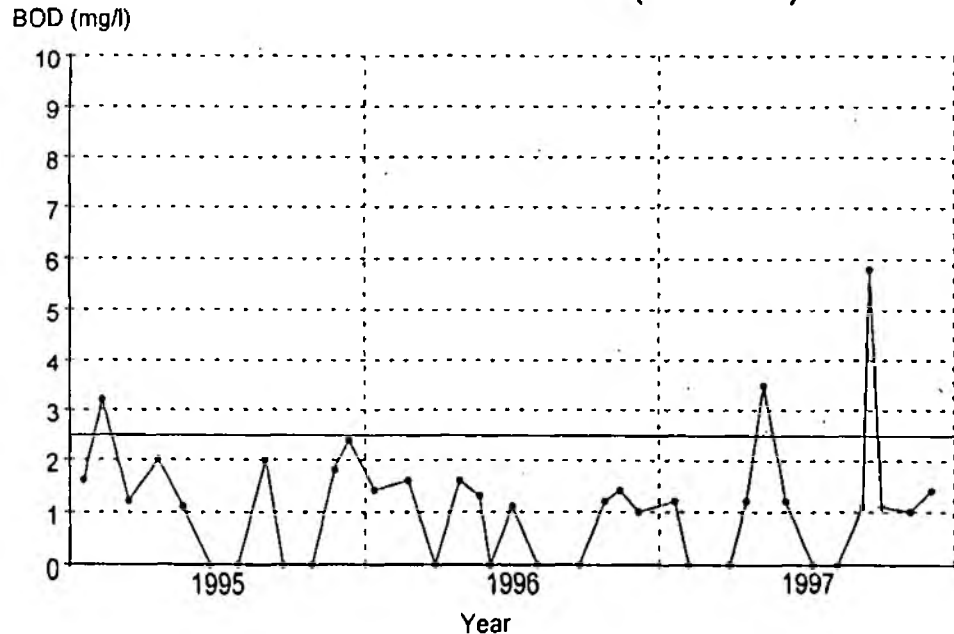
East Looe river Below Moorswater (81420280)

pH

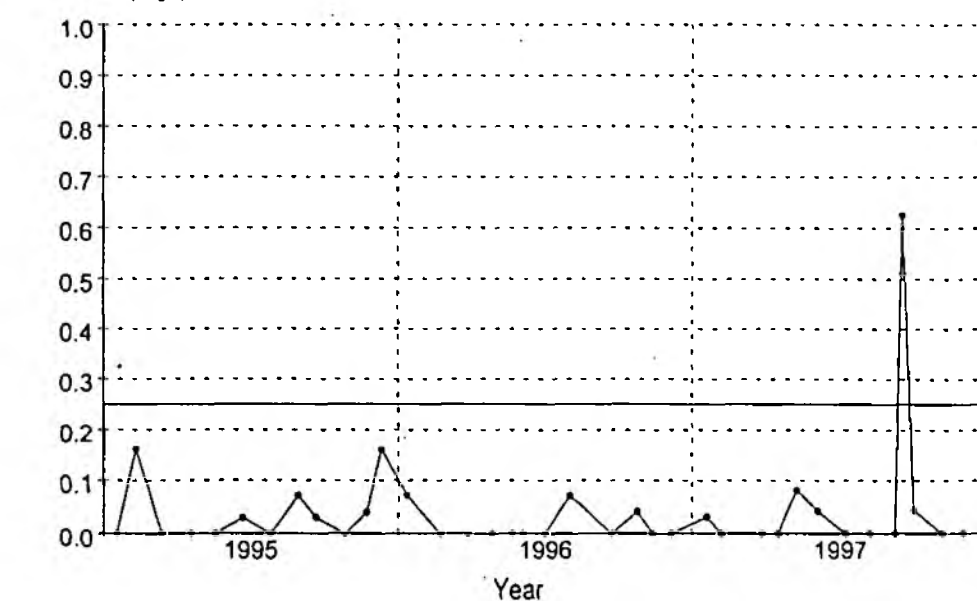


# Appendix 4

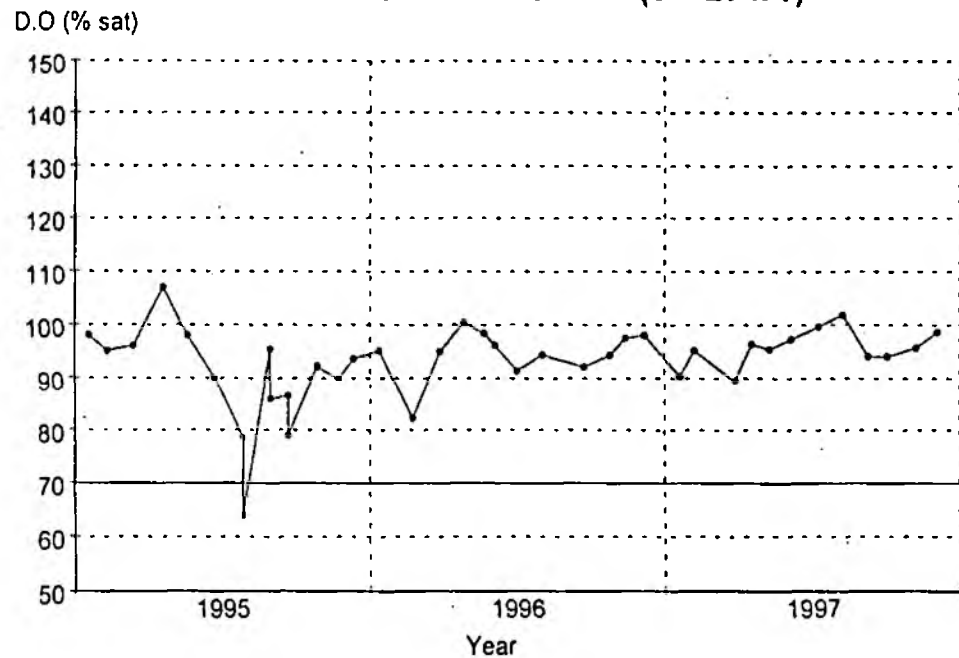
Time Series Plot - BOD (mg/l)  
East Looe River at Lamellion Mill (81420276) 18-01-1995 to 03-12-1997



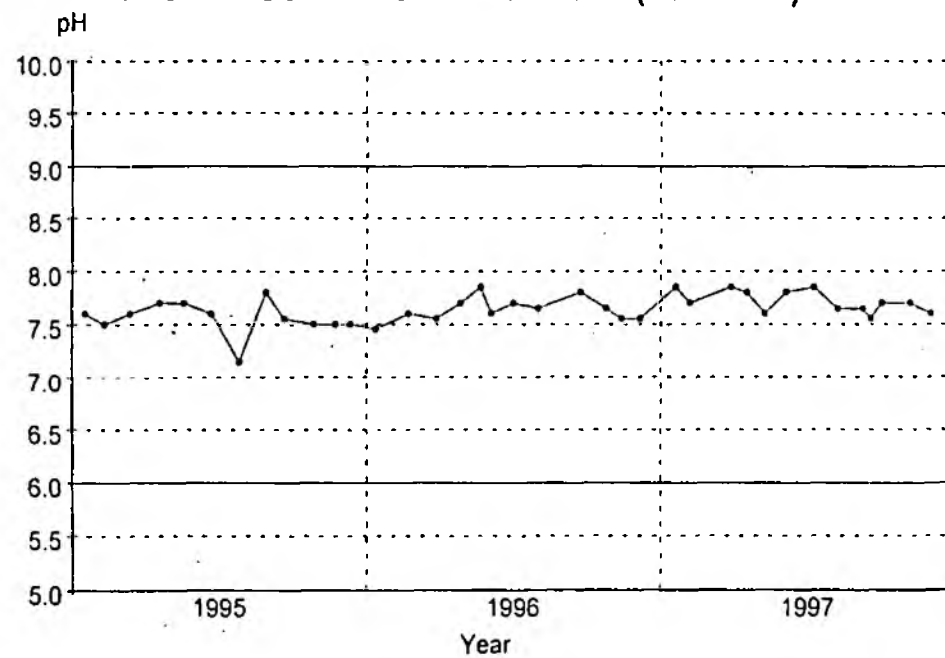
Time Series Plot - Ammonia (mg/l)  
East Looe River at Lamellion Mill (81420276) 18-01-1995 to 03-12-1997



Time Series Plot - D.O (% sat)  
East Looe River at Lamellion Mill (81420276) 18-01-1995 to 03-12-1997



Time Series Plot - pH  
East Looe River at Lamellion Mill (81420276) 18-01-1995 to 03-12-1997

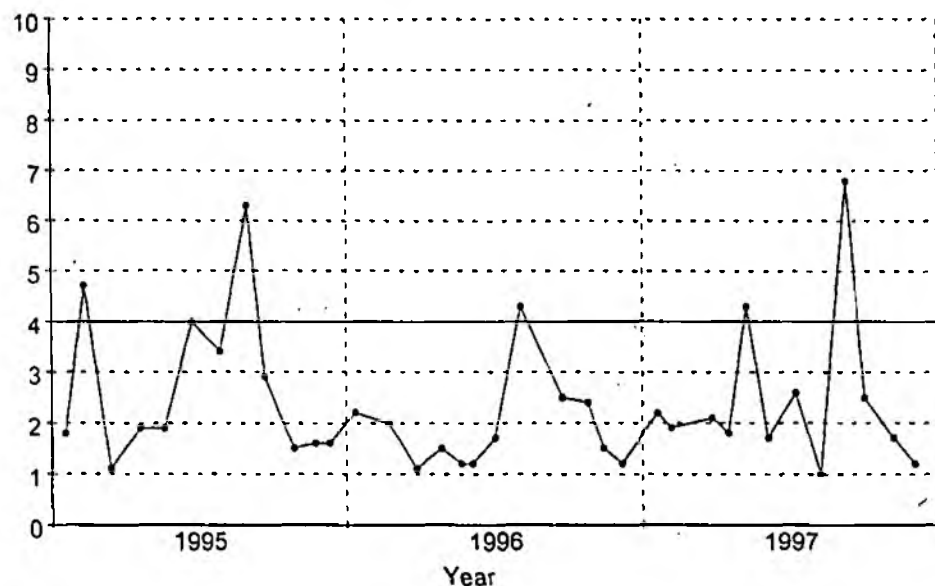


# Appendix 5

Time Series Plot - BOD (mg/l) 18-01-1995 to 03-12-1997

**East Looe River D/s of Liskeard STW (81420269)**

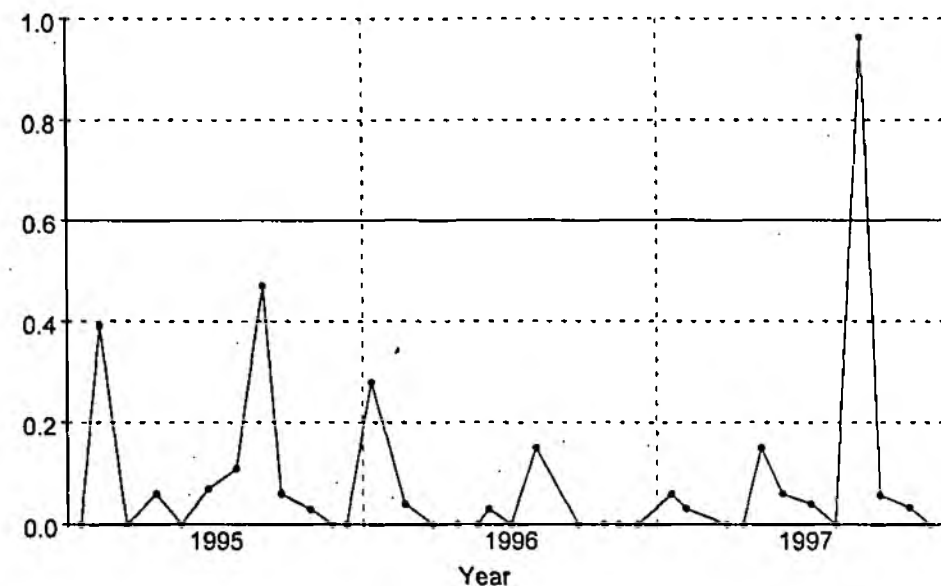
BOD (mg/l)



Time Series Plot - Total Ammonia (mg/l) 18-01-1995 to 03-12-1997

**East Looe River D/s of Liskeard STW (81420269)**

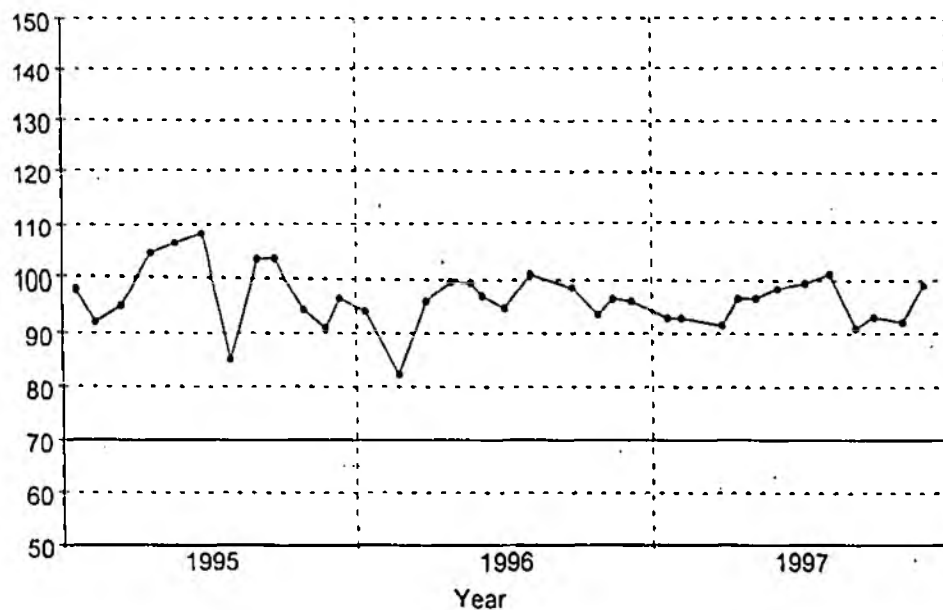
Total Ammonia (mg/l)



Time Series Plot - D.O. (% sat) 18-01-1995 to 03-12-1997

**East Looe River D/s of Liskeard STW (81420269)**

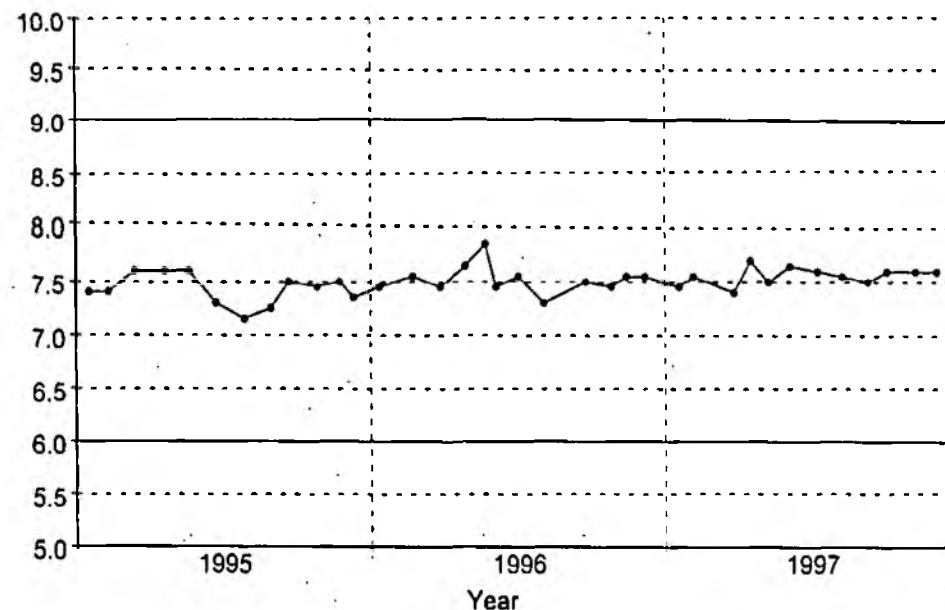
D.O. (% sat)



Time Series Plot - pH 18-01-1995 to 03-12-1997

**East Looe River D/s of Liskeard STW (81420269)**

pH

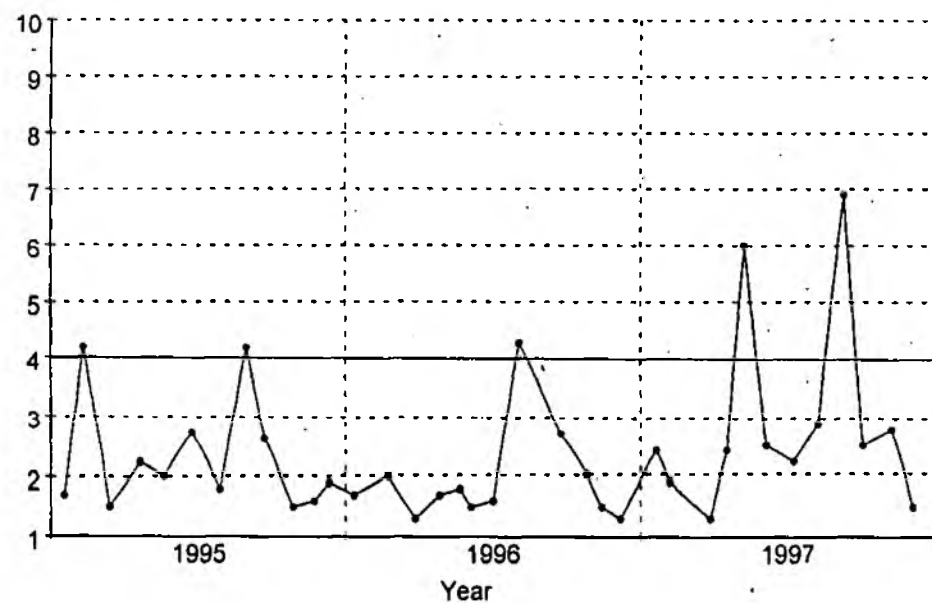


# Appendix 6

Time Series Plot - BOD (mg/l) 18-01-1995 to 03-12-1997

East Looe River at Trussells Bridge (81420261)

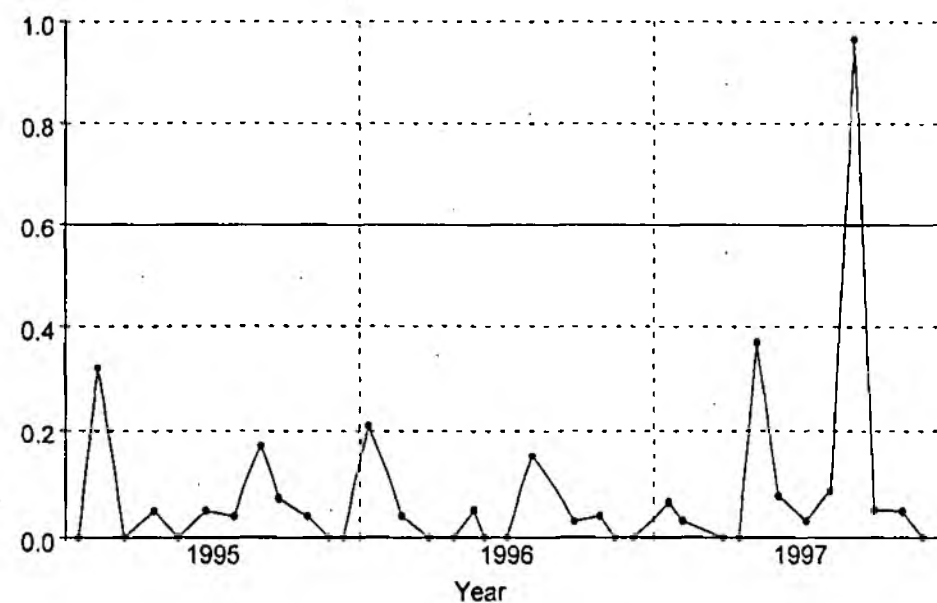
BOD (mg/l)



Time Series Plot - Ammonia (mg/l) 18-01-1995 to 03-12-1997

East Looe River at Trussells Bridge (81420261)

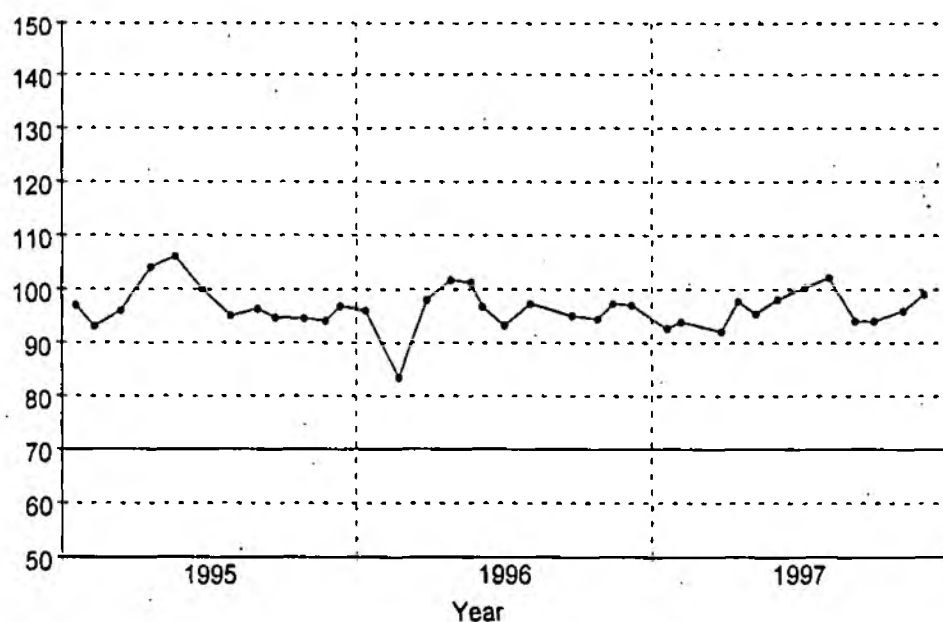
Ammonia (mg/l)



Time Series Plot - D.O. (% sat) 18-01-1995 to 03-12-1997

East Looe River at Trussells Bridge (81420261)

D.O. (% sat)



Time Series Plot - pH 18-01-1995 to 03-12-1997

East Looe River at Trussells Bridge (81420261)

pH

