NRA

National Rivers Authority
South West Region

ENVIRONMENTAL PROTECTION

INVESTIGATION OF THE EFFECTS OF SEWAGE TREATMENT WORKS DISCHARGES ON RECEIVING WATERS IN THE LOWERMOOR WATER TREATMENT WORKS SUPPLY AREA NOVEMBER 1989

FEBRUARY 1990
FWI/89/005

GORDON H BIELBY BSc
Regional General Manager

C V M Davies BSc
Environmental Protection
Manager

INVESTIGATION OF THE EFFECTS OF SEWAGE TREATMENT WORKS DISCHARGES ON RECEIVING WATERS IN THE LOWERMOOR WATER TREATMENT WORKS SUPPLY AREA NOVEMBER 1989

M R N Newton

Freshwater Investigation Team
NRA South West Region
Manley House
Exeter

February 1990
FW1/89/005

SUMMARY

On 20 November 1989 NRA South West Region received a report from South West Water Plc that high levels of aluminium had entered the distribution system of Lowermoor Water Treatment Works. As a result of this information an investigation was undertaken to determine if sewage treatment works in the Lowermoor distribution area were discharging high levels of aluminium and to establish any consequent effects on receiving water quality.

Ten works were examined on 21 November 1989. One works was used as a control site. This works was outside the Lowermoor distribution system.

None of the sewage treatment works monitored was found to have significantly elevated levels of aluminium in their discharge.

All receiving waters monitored complied with applicable environmental quality standards, apart from the River Camel downstream of Camelford STW which was non-compliant with respect to ammonia. The non-compliance was considered to be the result of ammonia discharged from Camelford STW and it has been recommended that an appropriate ammonia standard is incorporated into the consent conditions for this discharge to ensure compliance with objectives and standards.

1. INTRODUCTION

On 20 November 1989 the National Rivers Authority South West Region were informed by SWW Plc that a fault had developed in the Lowermoor Water Treatment Works near Camelford in Cornwall. The fault had allowed high levels of aluminium into the water supply system.

It was decided the Freshwater Investigation Team should assess the effects of sewage treatment works discharges on receiving waters where the sewage treatment works were in areas supplied by the Lowermoor Water Treatment Works, particularly in relation to aluminium.

Nine sewage treatment works were identified in the Lowermoor Water Treatment Works supply area:-

1. Treknow STW
2. St Teath STW
3. St Breward STW
4. Delabole STW
5. Camelford STW
6. Bodmin (St Lawrence) STW
7. Bodmin (Scarletts Well) STW
8. Blisland STW
9. Helstone STW

Each of these works were assessed. A further works at Callington which was not in the Lowermoor supply area was assessed as a control site.

2. METHODS

Sanitary and metal samples were obtained from the final effluent of each works, and upstream and downstream of the discharge points. Where possible samples of the crude sewage entering each works were obtained for metals analysis only.

3. RESULTS

Sample results are shown in Table 1.

4. DISCUSSION

4.1 Aluminium

Compared with the control site at Callington STW none of the effluents sampled showed significantly elevated levels of aluminium.

The pH of all receiving waters were found to be neutral (around pH 7). It is generally regarded that aluminium values of less than 100 ug/l are not toxic in waters with a pH range of 5.2 - 6.9 and none of the receiving waters exceeded this value.

4.2 Consent Compliance

Current consent conditions and receiving water River Quality Objectives for works sampled are given in Table 1.

All works monitored during the survey complied with consent conditions.

Blisland STW which has a descriptive consent was found to have a poor quality effluent. However, due to the large dilution availability for this discharge it did not appear to be significantly affecting receiving water quality.

The up and downstream samples from Delabole STW were not obtained due to time shortage as the discharge was a large distance from the works. Laboratory analysis was not undertaken for sanitary determinands at the Bodmin (Scarletts Well) and Helstone STW.

Of the remaining samples all receiving waters complied with their River Quality Objectives (RQO) where RQO's had been set except for a sample taken downstream of Camelford STW discharge. This river sample was non-compliant with EIFAC ammonia criteria and also the NWC ammonia criteria for a Class 1B river. This non-compliance was apparently the result of Camelford STW discharge which has no consent for ammonia.

5. CONCLUSIONS

5.1 There were no significant increases in aluminium concentration in sewage treatment works effluents in the Lowermoor water supply area following high aluminium levels in the water supply system.

5.2 There were no problems with aluminium levels in the receiving waters of any of the monitored discharges.

5.3 All sewage works sampled complied with their consent conditions.

5.4 All receiving waters of the works sampled complied with their river quality objectives except the River Camel which was non-compliant with the required ammonia standard downstream of Camelford STW.

6. RECOMMENDATIONS

6.1 An appropriate ammonia standard should be incorporated into the consent conditions of Camelford STW.

Action by Quality Regulation Officer.

6.2 Appropriate River Quality Objectives should be set to protect the uses of the receiving waters of Treknow and Bodmin (Scarletts Well) STW discharges.

Action by Freshwater Officer.

[EP.WQ]MRNN18_1

TABLE 1 CONSENT CONDITIONS AND RECEIVING WATER QUALITY OBJECTIVES FOR WORKS SAMPLED 21 NOVEMBER 1989

S.T.W.	Consent Standard			Comments	R.Q.O.
	B.o.D.	S. Solids	Ammonia		
Callington	55	80	-	Control Points	3
Treknow	40	60	-		Not identified
St Teath	40	85	-		1A
Delabole	30	60	-	No look up table but to a max of 60/100 to 1992 only	1A
Camelford	50	70	-		1B
Bodmin St Lawrence	80	120	30	To 1992 only	1B
Bodmin Scarletts Well	30	50	15	Current	Not identified
Blisland	-	-	-	Descriptive	1B
Helstone	-	-	-	Descriptive	1B
St Breward	40	50	40		1A

DATE: 21 November 1989

BLISLAND STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1430	1425	1440	1445
pH (as pH units)	7.4	7.4	7.3	7.3
BOD (5 day ATU mg/l)	185.0	70.F	<1.0	<1.0
AMMONIA (mg/l N)	30.0	42.8	0.02	0.08
SOLIDS SUSPENDED (105 C mg/l)	78.0	144.F	2.8	3.6
SOLIDS SUSPENDED (500 C mg/l)	22.0	16.0	1.2	1.6
TOTAL HARDNESS (mg/l)			28.0	28.0
SODIUM (Total mg/l)			10.6	10.9
POTASSIUM (Total mg/l)			1.8	1.8
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.03 0.042	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			3.5	3.4
CALCIUM (Total mg/l)			5.5	5.5
ZINC (Dissolved mg/l) ZINC (Total mg/l)	0.074 0.105	<0.025 <0.025	<0.005 <0.005	<0.005 0.006
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.134 0.308	0.073 0.370	0.057 0.084	0.058 0.091
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.006	0.006
IRON (Total mg/l)			0.073	0.079
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005

DATE: 21 November 1989

BODMIN (SCARLETTS WELL) STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME		1505	1500	1515
pH (as pH units)		6.6	7.2	7.2
BOD (5 day ATU mg/l)				
AMMONIA (mg/l N)				
SOLIDS SUSPENDED (105 C mg/l)				
SOLIDS SUSPENDED (500 C mg/l)				
TOTAL HARDNESS (mg/l)			80.0	71.0
SODIUM (Total mg/l)			14.7	15.0
POTASSIUM (Total mg/l)			2.3	2.7
COPPER (Dissolved mg/l) COPPER (Total mg/l)		<0.03 <0.03	0.007 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			6.4	5.5
CALCIUM (Total mg/l)			21.5	19.5
ZINC (Dissolved mg/l) ZINC (Total mg/l)		<0.025 0.036	<0.005 0.006	<0.005 0.008
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)		<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)		0.046 0.096	0.010 0.081	0.011 0.056
LEAD (Dissolved mg/l) LEAD (Total mg/l)		<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)		<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.052	0.043
IRON (Total mg/l)			0.227	0.154
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)		<0.03 <0.03	<0.005 <0.005	<0.005 <0.005

DATE: 21 November 1989

BODMIN (ST LAWRENCE) STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME		1610	1545	1600
pH (as pH units)		6.7	7.1	6.9
BOD (5 day ATU mg/l)				
AMMONIA (mg/l N)				
SOLIDS SUSPENDED (105 C mg/l)				
SOLIDS SUSPENDED (500 C mg/l)				
TOTAL HARDNESS (mg/l)			79.0	81.0
SODIUM (Total mg/l)			19.0	27.6
POTASSIUM (Total mg/l)			2.9	4.4
COPPER (Dissolved mg/l) COPPER (Total mg/l)		<0.03 <0.03	0.005 0.005	0.006 0.006
MAGNESIUM (Total mg/l)			8.2	7.5
CALCIUM (Total mg/l)			18.0	20.1
ZINC (Dissolved mg/l) ZINC (Total mg/l)		<0.025 <0.025	0.026 0.0037	0.026 0.045
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)		<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)		0.105 0.210	0.016 0.027	0.025 0.059
LEAD (Dissolved mg/l) LEAD (Total mg/l)		<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)		<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.060	0.064
IRON (Total mg/l)			0.158	0.194
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)		<0.03 <0.03	<0.005 <0.005	0.006 0.006

DATE: 21 November 1989

CALLINGTON STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1315	1330	1335	1340
pH (as pH units)	6.0	6.9	7.3	7.3
BOD (5 day ATU mg/l)	>784.0	4.0	<1.0	<1.0
AMMONIA (mg/l N)	30.6	0.8	0.05	0.1
SOLIDS SUSPENDED (105 C mg/l)	3596.0	14.0	2.4	3.2
SOLIDS SUSPENDED (500 C mg/l)	464.0	4.0	1.2	0.8
TOTAL HARDNESS (mg/l)			57.0	58.0
SODIUM (Total mg/l)			10.9	14.1
POTASSIUM (Total mg/l)			2.6	3.9
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.030 0.094	<0.03 <0.03	0.012 0.013	0.009 0.009
MAGNESIUM (Total mg/l)			4.4	4.5
CALCIUM (Total mg/l)			15.6	15.9
ZINC (Dissolved mg/l) ZINC (Total mg/l)	<0.025 0.447	0.030 0.065	0.231 0.305	0.202 0.281
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.743 19.42	0.261 0.320	0.029 0.046	0.032 0.077
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.020 <0.025	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.047	0.050
IRON (Total mg/l)			0.09	0.099
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	0.01 0.01	0.009 0.009

DATE: 21 November 1989

CAMELFORD STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1445	1440	1430	1436
pH (as pH units)	6.3	7.3	7.4	7.3
BOD (5 day ATU mg/l)	65.0	33.0	<1.0	3.0
AMMONIA (mg/l N)	67.2	33.9	0.02	1.5
SOLIDS SUSPENDED (105 C mg/l)	304.0	48.0	3.6	5.6
SOLIDS SUSPENDED (500 C mg/l)	36.0	10.0	2.0	2.4
TOTAL HARDNESS (mg/l)			42.0	45.0
SODIUM (Total mg/l)			9.8	12.4
POTASSIUM (Total mg/l)			1.8	2.5
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			3.1	3.3
CALCIUM (Total mg/l)			11.7	12.4
ZINC (Dissolved mg/l) ZINC (Total mg/l)	0.082 0.172	<0.025 <0.025	<0.005 0.006	<0.005 0.007
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.207 0.873	0.136 0.366	0.024 0.049	0.027 0.053
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.014	0.016
IRON (Total mg/l)			0.085	0.087
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005

DATE: 21 November 1989

DELADOLE STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1359	1355		
pH (as pH units)	6.5	6.8		
BOD (5 day ATU mg/l)	202.0	7.0		
AMMONIA (mg/l N)	13.5	4.7		
SOLIDS SUSPENDED (105 C mg/l)	108.0	13.0		
SOLIDS SUSPENDED (500 C mg/l)	16.0	1.0		
TOTAL HARDNESS (mg/l)				
SODIUM (Total mg/l)				
POTASSIUM (Total mg/l)				
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.03 <0.03	<0.03 <0.03		
MAGNESIUM (Total mg/l)				
CALCIUM (Total mg/l)				
ZINC (Dissolved mg/l) ZINC (Total mg/l)	<0.025 <0.025	<0.025 <0.025		
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007		
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.097 0.389	0.090 0.334		
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08		
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02		
MANGANESE (Total mg/l)				
IRON (Total mg/l)				
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03		

DATE: 21 November 1989

HELSTONE STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1546	1535	1530	1531
pH (as pH units)		7.2	7.0	7.3
BOD (5 day ATU mg/l)				
AMMONIA (mg/l N)				
SOLIDS SUSPENDED (105 C mg/l)				
SOLIDS SUSPENDED (500 C mg/l)				
TOTAL HARDNESS (mg/l)			71.0	65.0
SODIUM (Total mg/l)			15.9	15.1
POTASSIUM (Total mg/l)			3.8	3.7
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.030 0.054	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			7.8	6.8
CALCIUM (Total mg/l)			15.7	14.8
ZINC (Dissolved mg/l) ZINC (Total mg/l)	<0.025 0.262	<0.025 <0.025	<0.005 <0.005	<0.005 0.007
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.083 1.690	0.115 0.140	0.014 0.097	0.015 0.495
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.021	0.004
IRON (Total mg/l)			0.140	0.634
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005

DATE: 21 November 1989

ST BREWARD STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1315	1330	1340	1350
pH (as pH units)	7.0	6.5	7.5	7.3
BOD (5 day ATU mg/l)	116.0	6.0	<1.0	<1.0
AMMONIA (mg/l N)	19.7	4.1	0.02	0.08
SOLIDS SUSPENDED (105 C mg/l)	112.0	18.0	5.0	4.8
SOLIDS SUSPENDED (500 C mg/l)	14.0	4.0	2.0	2.8
TOTAL HARDNESS (mg/l)			33.0	34.0
SODIUM (Total mg/l)			10.6	10.8
POTASSIUM (Total mg/l)			1.6	1.8
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			3.0	3.2
CALCIUM (Total mg/l)			8.2	8.3
ZINC (Dissolved mg/l) ZINC (Total mg/l)	0.031 0.036	0.035 0.091	0.006 0.006	0.007 0.007
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.138 0.147	0.172 0.277	0.051 0.099	0.056 0.099
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.012	0.014
IRON (Total mg/l)			0.110	0.108
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005

DATE: 21 November 1989

ST TEATH STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME	1416	1410	1411	1405
pH (as pH units)	8.7	6.9	7.5	7.5
BOD (5 day ATU mg/l)	228.0	9.0	<1.0	1.0
AMMONIA (mg/l N)	87.6	4.7	0.01	0.21
SOLIDS SUSPENDED (105 C mg/l)	432.0	25.0	3.6	6.0
SOLIDS SUSPENDED (500 C mg/l)	32.0	4.0	1.6	4.0
TOTAL HARDNESS (mg/l)			81.0	84.0
SODIUM (Total mg/l)			14.8	18.4
POTASSIUM (Total mg/l)			1.6	2.6
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			6.7	6.8
CALCIUM (Total mg/l)			21.5	22.5
ZINC (Dissolved mg/l) ZINC (Total mg/l)	<0.025 <0.025	0.035 0.132	<0.005 <0.005	<0.005 <0.007
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.073 0.155	0.108 0.458	0.012 0.029	0.013 0.042
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.020	0.021
IRON (Total mg/l)			0.071	0.097
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005

DATE: 21 November 1989

TREKNOW STW

PARAMATER	CRUDE SEWAGE	STW FINAL EFFLUENT	UPSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT	DOWNSTREAM OF STW FINAL EFFLUENT DISCHARGE POINT
TIME		1257	1250	1255
pH (as pH units)		7.3	7.4	7.5
BOD (5 day ATU mg/l)				
AMMONIA (mg/l N)				
SOLIDS SUSPENDED (105 C mg/l)				
SOLIDS SUSPENDED (500 C mg/l)				
TOTAL HARDNESS (mg/l)			63.0	68.0
SODIUM (Total mg/l)			17.7	18.9
POTASSIUM (Total mg/l)			4.0	4.1
COPPER (Dissolved mg/l) COPPER (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005
MAGNESIUM (Total mg/l)			3.7	3.9
CALCIUM (Total mg/l)			19.0	20.7
ZINC (Dissolved mg/l) ZINC (Total mg/l)	0.040 0.055	<0.025 0.046	<0.005 0.006	<0.005 0.005
CADMIUM (Dissolved mg/l) CADMIUM (Total mg/l)	<0.007 <0.007	<0.007 <0.007	<0.70 <0.70	<0.70 <0.70
ALUMINIUM (Dissolved mg/l) ALUMINIUM (Total mg/l)	0.082 0.212	0.078 0.167	0.013 0.084	0.013 0.060
LEAD (Dissolved mg/l) LEAD (Total mg/l)	<0.08 <0.08	<0.08 <0.08	<0.008 <0.008	<0.008 <0.008
TOTAL CHROMIUM (Dissolved mg/l) TOTAL CHROMIUM (Total mg/l)	<0.02 <0.02	<0.02 <0.02	<0.005 <0.005	<0.005 <0.005
MANGANESE (Total mg/l)			0.018	0.013
IRON (Total mg/l)			0.166	0.109
NICKEL (Dissolved mg/l) NICKEL (Total mg/l)	<0.03 <0.03	<0.03 <0.03	<0.005 <0.005	<0.005 <0.005