

NATIONAL RIVERS AUTHORITY

SOUTH WEST REGION

AN INVESTIGATION INTO BATHING WATER

QUALITY AT MILLENDREATH

NOVEMBER 1989

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**AN INVESTIGATION INTO THE BATHING WATER
QUALITY AT MILLENDREATH**

SUMMARY

The sea off the beach at Millendreath has failed the bacterial criteria for compliance with the E.C. Directive concerning the quality of Bathing Waters on one occasion in 1988 and on twice in 1989.

The Tidal Waters Unit of the National Rivers Authority, South West Region investigated the area on 4/9/89 in an attempt to identify the cause of the failures. The investigation revealed the major contaminating source as Millendreath outfall which lies to the east of the beach, the end of which can be observed at Low Tide. The outfall discharges an effluent of poor bacteriological quality and was found to have a detrimental effect on the adjacent bathing waters.

Failure of the beach to comply with the directive in the past is believed to be due to Millendreath outfall discharging a poor quality effluent around the time of low water when the net tidal flow is in a westerly direction. These conditions were present at the time of the investigation on 4/9/89.

AN INVESTIGATION INTO THE BATHING WATER
QUALITY AT MILLENDREATH

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AN INVESTIGATION INTO THE BATHING WATER QUALITY AT MILLENDREATH

1. INTRODUCTION

The village of Millendreath consists largely of holiday dwellings and is located to the East of Looe, South Cornwall, Figure 1. Waters off the beach at Millendreath have been routinely sampled for checking compliance with the E.C. Directive concerning the quality of Bathing Waters(1); they failed on one occasion in 1988 and twice during 1989.

To identify the cause of the failures the Tidal Waters Unit(TWU) of the National Rivers Authority, South West Region investigated the area on 4/9/89.

2. ANALYSIS OF HISTORICAL DATA

Since 1986, regular water samples have been collected off the beach at Millendreath for the purpose of monitoring the quality of Bathing Water and its compliance with the E.C. Directive. On each sampling date various parameters are recorded e.g. Wind Direction, Time of Sampling, Time of High Tide, and are given in the Appendix.

On the three occasions in which the beach failed the bacteriological criteria, the samples were taken near the time of Low Tide. During such times the tidal currents flow to the west(2) indicating that the contaminant source(s) lie to the east of the beach.

3. OBSERVATIONS FROM THE INVESTIGATION

The beach at Millendreath had been cleared of debris prior to the arrival of the TWU, thus there was no visible pollution present at the strand line. An outfall exists to the east of the beach, some 30m east of the E.C. sampling point, the mouth of which is visible at Low Tide and is known to discharge sewage effluent from Millendreath Holiday Village. Plaidy beach, situated to the west, accomodates an overflow pipe from a sewage pumping station but at the time of the investigation the end of the pipe was not visible. In the vicinity of the overflow a pipe was seen to discharge on to the beach.

A stream enters the beach to the north and diperses over/through the sand. The area above the stream contained a number of open ended pipes but only two were in a state of flow. Pipes that appeared to be part of the sewerage system servicing Millendreath Holiday Village spanned the stream and converged to a point east of the stream.

FIGURE 1 - SAMPLING SITES AT MILLENDREATH



4. SAMPLING PROCEDURE

Samples were collected to assess the bacterial quality of the various discharges in the area, the stream, and seawater associated with the outfall to the east of the beach and the overflow at Plaidy.

5. RESULTS

The presumptive counts for total coliforms and E. coli are given in Table 1 with the sample site descriptions and National Grid references.

The data illustrate that the only major contaminant source on the day of the investigation was the Millendreath Holiday Village outfall to the east of the beach.

6. DISCUSSION

The investigation on 4/9/89 showed little contamination in the stream, the discharges into the stream, the seawater to the east of Millendreath outfall, and the seawater and pipe in the vicinity of the pumping station at Plaidy. However, the Millendreath outfall and the seawater west of the outfall revealed high bacterial contamination. This correlates with the Tidal currents at the time of sampling (approx. 6hrs after High Water i.e. Low Water) in which the net flow is to the west, causing the sewage effluent plume from the outfall to extend in this direction, towards the E.C. sampling point, with little contamination flowing in a easterly direction.

Analysis of the historical data also indicates the major contaminating source is to the east of the beach. Hence, the reason the beach had failed the bacterial criteria for E.C. compliance in 1988 and 1989 can be assumed to be due to the presence of crude sewage discharging into the bathing waters via the Millendreath outfall.

7. CONCLUSIONS

The historical data and the results obtained during the survey on 4/9/89 show the main contaminating source of the inshore waters at Millendreath, during the summer months, lies to the east. Millendreath outfall, situated to the east of the beach, is believed to be the major contaminating source in the area because it discharges an effluent of poor bacteriological quality that subsequently has a deleterious effect on the water quality of the receiving bathing waters.

8. REFERENCES

TABLE 1. BACTERIAL COUNTS AT SAMPLING SITES IN THE AREA OF MILLENDREATH

SITE	SITE DESCRIPTION	NGR	TIME OF SAMPLING	BACTERIAL COUNTS	
				T. coli	E. coli
1	Stream at Spinney	SX27845486	12.40	2400	600
2	2 inch pipe into stream	SX27785425	11.30	20	2
3	4 inch pipe into stream	SX27775418	11.22	46	0
4	Stream onto beach	SX27835406	11.08	1060	570
5	East of outfall	SX27965399	13.07	1300	230
6	Mouth of outfall	SX27955393	13.10	5800000	3000000
7	West of outfall	SX27885395	13.05	154000	31000
8	West end of beach	SX27765390	12.55	258	36
9	15 inch pipe onto beach	SX27505386	12.05	198	98
10	Sea near pump' stn outfall	SX27555380	12.06	10	8

All results are filed under reference: RPL/14B

Approx. time of High Water; 07.50hrs

(1) Article 5: Council Directive of 8 December 1975 concerning the quality of Bathing Water. (76/160/EEC).
Official Journal of the European Communities.
Appendix 4, No. L31/3.

(2) Admiralty Tidal Stream Atlas. The English and Bristol Channels. NP250

M. HARRIS

2 NOVEMBER 1989.

APPENDIX - Historical Data from the EC Directive sampling programme at Millendreath

1987 MILLENDREATH BEACH	SX26805410		ECB0460		CARADON D.C.							
TOTAL COLIFORM/100ML	32	34	770	4	350	3500	1010	490	320	520	410	120
FAECAL COLIFORM/100ML	14	22	190	2	70	300	130	80	220	110	92	60
FAECAL STREPTOCOCCI	40	4	24	2	26	208	28	90	174	14	86	16
SALMONELLA												
TRANSPARENCY M	2.9	1.2	1.2	> 3.9	< 1.0	4.0	> 3.9	> 3.9	< 1.0	< 1.0	< 1.0	1.2
WATER TEMPERATURE C	12.0	14.0	13.0	14.0	15.0	17.0	18.0	18.0	16.0	17.0	18.0	18.0
VISIBLE POLLUTION	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible
CLOUD COVER	8/8	1/8	3/4	1/2	8/8	7/8	8/8	3/8	8/8	1/2	1/4	1/8
HOURS OF SUNSHINE												
WEATHER YESTERDAY	Hot	Warm	Mild	Mild	Warm	Hot	Warm	Hot	Hot	Mild	Mild	Mild
WEATHER TODAY	Warm	Warm	Mild	Warm	Warm	Hot	Warm	Hot	Warm	Warm	Warm	Mild
SEA STATE	Calm 0-10cm	Calm 0-10cm	Moderate 1.25-2.0M	Smooth 10-50cm	Smooth 10-50cm	Calm 0-10cm	Smooth 10-50cm	Calm 0-10cm	Smooth 10-50cm	Light 0.5-1.25M	Light 0.5-1.25M	Light 0.5-1.25M
SEA COLOUR	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
MINERAL OIL	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell
FOAM	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	Lasting Foam	No Lasting Foam
PHENOL	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour
PH	8.30	8.30	8.20	8.30	8.20							
WINDSPEED	Light Air	Gentle Breeze	Moderate Breeze	Light Air	Calm	Light Air	Light Breeze	Light Air	Light Breeze	Fresh Breeze	Light Breeze	Light Breeze
WIND DIRECTION	NW	NE	SW	NW		SW	NE	N	SW	N	SE	SW
RAINFALL	0.0	0.0	5.8	15.2	3.0	0.0	0.0	0.0	1.4	0.4	1.1	1.6
SALINITY	32.3	30.1	33.0	33.3	31.7	32.6	33.3	32.1	32.5	31.7	30.9	32.5
NO. BATHERS IN WATER	None	None	None	1 to 10	1 to 10	1 to 10	1 to 10	10 to 100	1 to 10	1 to 10	None	1 to 10
TIME OF HIGH TIDE												
TIME OF SAMPLING	1000	1000	955	1025	1015	1030	1050	1010	1240	1100	1015	1005
DATE OF SAMPLING	11/05/87	21/05/87	03/06/87	16/06/87	29/06/87	09/07/87	22/07/87	04/08/87	13/08/87	27/08/87	09/09/87	22/09/87

APPENDIX - Historical Data from the EC Directive sampling programme at Millendreath

1988 MILLENDREATH BEACH	SX26805410		ECB0460		CARADON D.C.									
TOTAL COLIFORM/100ML	4	620	30	2730	66	178	72	480	1360	232	63	194		
FAECAL COLIFORM/100ML	4	150	8	570	8	56	31	70	640	84	28	50		
FAECAL STREPTOCOCCI	0	4	5	42	26	4	4	98	62	10	13	2		
SALMONELLA														
TRANSPARENCY M	> 3.9	2.9	> 3.9	> 3.9	> 3.9	> 3.9	> 3.9	1.5	1.1	1.6	< 1.0	3.0	> 3.9	
WATER TEMPERATURE C	12.0	13.0	14.0	15.0	17.0	16.0	16.0	16.0	15.0	15.0	14.0	15.0		
VISIBLE POLLUTION	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible
CLOUD COVER	3/4	1/2	7/8	8/8	1/4	8/8	1/2	1/4	8/8	7/8	3/4	8/8		
HOURS OF SUNSHINE	3.7	10.7	8.0	1.4	11.0	5.9	9.6	10.8	4.5	2.9	1.2	2.6		
WEATHER YESTERDAY	Mild	Mild	Warm	Hot	Warm	Warm	Warm	Warm	Warm	Warm	Warm	Warm		
WEATHER TODAY	Mild	Warm	Warm	Warm	Hot	Warm	Warm	Warm	Warm	Warm	Warm	Warm		
SEA STATE	Calm 0-10cm	Smooth 10-50cm	Smooth 10-50cm	Smooth 10-50cm	Calm	Calm 0-10cm	Light 0.5-1.25M	Smooth 10-50cm	Smooth 10-50cm	Smooth 10-50cm	Calm 0-10cm	Calm		
SEA COLOUR	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Not Normal	Not Normal	Not Normal	Not Normal	Normal	Not Normal	
MINERAL OIL	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell
FOAM	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam
PHENOL	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour
PH			8.40											
WINDSPEED	Moderate Breeze	Gentle Breeze	Gentle Breeze	Light Breeze	Light Air	Light Breeze	Gentle Breeze	Gentle Breeze	Moderate Breeze	Gentle Breeze	Gentle Breeze	Gentle Breeze	Gentle Breeze	Gentle Breeze
WIND DIRECTION	NW	NW	NW	NE	SW	N		SW	SW	SW	SW	SW	N	
RAINFALL	0.0	0.1	5.8	0.0	0.0	0.1	9.1	9.7	4.3	3.7	0.1	0.0		
SALINITY	26.9	30.9	32.5	29.7	31.5	32.1	31.7	29.3	28.9	30.1	31.7	32.1		
NO. BATHERS IN WATER	None	None	1 to 10	None	10 to 100	None	None	1 to 10	None	1 to 10	1 to 10	1 to 10		
TIME OF HIGH TIDE	1156	834	921	704	954	452	744	1129	605	5900	822	1059		
TIME OF SAMPLING	1315	1305	1143	1147	1240	1030	1050	1158	1136	1212	1055	1240		
DATE OF SAMPLING	09/05/88	19/05/88	04/06/88	15/06/88	20/06/88	28/06/88	01/07/88	06/07/88	11/07/88	25/07/88	31/07/88	04/08/88		

APPENDIX - Historical Data from the EC Directive sampling programme at Millendreath

1988 MILLENDREATH BEACH	SX26805410	ECB0460	CARADON D.C.						
TOTAL COLIFORM/100ML	10300	1278	1580	42	22	68	13.0	54	
FAECAL COLIFORM/100ML	2300	390	430	8	0	24	680	30	
FAECAL STREPTOCOCCI	434	68	356	4	2	22	10	51	
SALMONELLA									
TRANSPARENCY M	3.1	1.1	< 1.0	2.2	> 3.9	1.2	< 1.0	< 1.0	
WATER TEMPERATURE C	15.0	15.0	15.0	14.5	15.0	14.0	13.0	14.0	
VISIBLE POLLUTION	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	Not Sewage	Not Sewage	
CLOUD COVER	8/8	7/8	8/8	7/8	3/4	7/8	3/8	8/8	
HOURS OF SUNSHINE	0.1	3.1	4.9	7.0	6.9	9.4	4.6	0.0	
WEATHER YESTERDAY	Warm	Warm	Warm	Warm	Warm	Mild	Mild	Mild	
WEATHER TODAY	Warm	Warm	Warm	Warm	Warm	Mild	Mild	Mild	
SEA STATE	Light 0.5-1.25M	Light 0.5-1.25M	Rough 2.5-5.0M	Smooth 10-50cm	Calm 0-10cm	Light 0.5-1.25M	Light 0.5-1.25M	Light 0.5-1.25M	
SEA COLOUR	Not Normal	Not Normal	Abnormal	Not Normal	Normal	Not Normal	Not Normal	Not Normal	
MINERAL OIL	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	
FOAM	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	
PHENOL	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	
PH									
WINDSPEED	Light Breeze	Gentle Breeze	Fresh Breeze	Fresh Breeze	Gentle Breeze	Gentle Breeze	Light Air	Moderate Breeze	
WIND DIRECTION	SW	S	S	NW	NW	NW	E	E	
RAINFALL	1.3	0.0	28.6	0.3	0.0	1.9			
SALINITY	26.9	26.1	31.7	30.1	30.1	30.1	26.1	29.7	
NO. BATHERS IN WATER	None	10 to 100	None	None	None	None	None	None	
TIME OF HIGH TIDE	556	1220	952	740	904	847	707	917	
TIME OF SAMPLING	1050	1220	1050	1150	1050	1205	1216	1100	
DATE OF SAMPLING	11/08/88	22/08/88	01/09/88	13/09/88	17/09/88	29/09/88	12/10/88	17/10/88	

APPENDIX - Historical Data from the EC Directive sampling programme at Millendreath

1989 MILLENDREATH BEACH	SX26805410			ECB0460			CARADON D.C.						
TOTAL COLIFORM/100ML	990	930	1650	82	8	102	16	30200	10500	130	620	178	
FAECAL COLIFORM/100ML	106	270	540	62	2	26	8	800	2600	250	70	148	
FAECAL STREPTOCOCCI	4	37	64	2	1	21	1	2300	249	73	24	39	
SALMONELLA													
TRANSPARENCY M	2.4	> 3.9	> 3.9	> 3.9	> 3.9	> 3.9	3.4	> 3.9	> 3.9	2.1	< 1.0	> 3.9	< 1.0
WATER TEMPERATURE C	14.1	13.2	13.0	18.0	15.3	15.0	17.0	17.8	20.0			18.2	18.0
VISIBLE POLLUTION	None Visible	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage	Not Sewage
CLOUD COVER	1/8	8/8	5/8	1/4	1/4	8/8	8/8	1/8	1/8	1/8	1/8	1/2	1/8
HOURS OF SUNSHINE	14.0	5.6	8.3	12.8	15.0	0.4	7.2	14.2	11.5	9.6	7.2	11.7	
WEATHER YESTERDAY	Warm	Mild	Mild	Hot	Hot	Mild	Warm	Hot	Very Hot	Very Hot	Mild	Hot	
WEATHER TODAY	Warm	Mild	Warm	Hot	Hot	Mild	Mild	Hot	Very Hot	Very Hot	Warm	Hot	
SEA STATE	Smooth 10-50cm	Smooth 10-50cm	Calm 0-10cm	Calm 0-10cm	Calm 0-10cm	Light 0.5-1.25M	Calm 0-10cm	Calm 0-10cm	Smooth 10-50cm	Light 0.5-1.25M	Calm 0-10cm	Calm 0-10cm	
SEA COLOUR	Not Normal	Normal	Normal	Normal	Normal	Not Normal	Normal	Normal	Not Normal	Not Normal	Normal	Not Normal	
MINERAL OIL	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	No Oil Film or Smell	
FOAM	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	No Lasting Foam	
PHENOL	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	No Phenol Odour	
PH													
WINDSPEED	Light Breeze	Gentle Breeze	Light Breeze	Light Air	Light Air	Gentle Breeze	Light Air	Light Air	Light Breeze	Gentle Breeze	Light Air	Calm	
WIND DIRECTION	SE	SE	SE	NE	NW	W	NE	NW	NE	SE	NW	NW	
RAINFALL	0.0	0.2	1.1	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.2		
SALINITY	31.9	31.2	31.6	33.6	34.0	33.4	34.6	34.4	33.7	33.1	34.2	33.9	
NO. BATHERS IN WATER	1 to 10	None	1 to 10	10 to 100	1 to 10	None	None	1 to 10	10 to 100	1 to 10	1 to 10	10 to 100	
TIME OF HIGH TIDE	838	1632	553	1540	917	1325	1130	1552	658	1059	1758	911	
TIME OF SAMPLING	1055	1240	1045	1240	1045	1215	1165	1048	1210	1035	1245	1030	
DATE OF SAMPLING	08/05/89	17/05/89	02/06/89	15/06/89	23/06/89	28/06/89	11/07/89	15/07/89	19/07/89	25/07/89	31/07/89	06/08/89	

APPENDIX - Historical Data from the EC Directive sampling programme at Millendreath

1989 MILLENDREATH BEACH	SX26805410	ECB0460	CARADON D.C.
TOTAL COLIFORM/100ML	1150	220	
FAECAL COLIFORM/100ML	420	200	
FAECAL STREPTOCOCCI	32	444	
SALMONELLA			
TRANSPARENCY M	2.9	1.5	
WATER TEMPERATURE C	18.0	18.0	
VISIBLE POLLUTION	Not Sewage	Not Sewage	
CLOUD COVER	7/8	1/2	
HOURS OF SUNSHINE	6.7	10.0	
WEATHER YESTERDAY	Warm	Mild	
WEATHER TODAY	Mild	Warm	
SEA STATE	Light 0.5-1.25M	Smooth 10-50cm	
SEA COLOUR	Not Normal	Not Normal	
MINERAL OIL	No Oil Film or Smell	No Oil Film or Smell	
FOAM	No Lasting Foam	No Lasting Foam	
PHENOL	No Phenol Odour	No Phenol Odour	
PH			
WINDSPEED	Gentle Breeze	Moderate Breeze	
WIND DIRECTION	SW	SW	
RAINFALL			
SALINITY	33.6	34.0	
NO. BATHERS IN WATER	10 to 100	1 to 10	
TIME OF HIGH TIDE	1042	549	
TIME OF SAMPLING	1130	1100	
DATE OF SAMPLING	09/08/89	15/08/89	