

ENVIRONMENTAL PROTECTION NRA



*National Rivers Authority
South West Region*

**INVESTIGATION OF
TECHNAZENE CONTAMINATION
IN THE CHYANDOUR BROOK
WEST CORNWALL
DURING SPRING 1990**

JUNE 1990

FW1/90/015

GORDON H BIELBY BSc
Regional General Manager

C V M DAVIES BSc
Environmental Protection
Manager

INVESTIGATION OF TECNAZENE CONTAMINATION IN THE CHYANDOUR BROOK,
WEST CORNWALL DURING SPRING 1990.

FWI/90/015

R.P. Smith
Freshwater Investigation Team
Environmental Protection
NRA South West Region
Manley House
EXETER

ENVIRONMENT AGENCY



130182

SUMMARY

Routine river quality sampling for pesticides in the Chyandour Brook on 30 January 1990 revealed 290 ng/l of tecnazene at the A30 roadbridge monitoring point.

Although the concentration of tecnazene was below the tentative EQS (= 1000 ng/l) adopted by the SW Region, an investigation was undertaken to trace the source of tecnazene and to gain more information about the variation in concentration of this scantily studied pesticide.

Three chemical surveys traced the source of tecnazene to a fish & chip shop at Treneere where potato washings are discharged directly to the river. The study demonstrated that discharges are intermittent and that routine river monitoring may miss periods of maximum contamination.

It was not possible to measure any toxic effect from tecnazene on the aquatic invertebrate fauna as upstream water quality problems had already impoverished the invertebrate community.

It is recommended that the discharge is controlled by the application of an appropriate consent.



CONTENTS

1. INTRODUCTION.
2. THE CHYANDOUR BROOK.
 - 2.1 River-Use.
3. TECNAZENE USES & HISTORIC RIVER POLLUTION.
4. METHODS.
5. RESULTS.
6. DISCUSSION.
7. CONCLUSION.
8. RECOMMENBDATION.

1. INTRODUCTION.

A pesticide monitoring programme was implemented in 1989 at 30 locations in coastal rivers of West Cornwall. This followed the discovery of aldrin & dieldrin contamination in the Newlyn River.

On the 30 January 1990 a routine river sample from the Chyandour Brook at the A30 roadbridge (NGR SW 479310) was found to contain 290 ng/l of tecnazene. Although this level was below the tentative environmental quality standard (EQS = 1,000 ng/l - adopted by the SW Region) an investigation was undertaken to locate the source of tecnazene and to assess in detail the variation in concentration of this compound which was occurring in the stream.

Tecnazene had previously been found in only one other river in the SW Region (the River Lynher). Therefore it was considered that an investigation would provide more information on likely sources of tecnazene and help to establish any impact on the aquatic environment as a result of discharge of this compound.

2. THE CHYANDOUR BROOK.

The Chyandour Brook lies to the north-west of Penzance on the Lands End peninsula (see Fig. 1). It is a small watercourse (width 2 to 3m) flowing 7 kilometres from its source near Boskedan (NGR SW 442341) to the tidal limit at Mount's Bay.

The catchment is essentially rural and is predominantly used for small scale horticulture and agriculture. The river has been canalized at Penzance as a result of the new A30 road by-pass.

2.1. River-Use.

The Newlyn River has the following designated uses:

- * Protection of Aesthetic Quality
- * Protection of Salmonid Fish
- * Protection of Other Aquatic Life & Dependent Organisms
- * Protection for Livestock Watering
- * Protection for Irrigation of Crops

The River Quality Objectives (RQO) of the river are shown in Table 1 together with the annual classification according to the National Water Council (NWC) classification system.

TABLE 1. Annual NWC classification of the Chyandour Brook.

River Length	River Quality					RQO
	85	86	87	88	89	
Heamoor to A30 roadbridge at Chyandour	2	2	1B	1B		1A

N.B. Annual classification is based on three years of data.

Fig. 1 Location of sampling sites on the Chyandour Brook



3. TECNAZENE USES & HISTORIC RIVER POLLUTION.

Tecnazene is a fungicide used to control Fusarium caeruleum in potatoes. It also inhibits sprouting in stored potatoes.

Tecnazene has been recorded previously at Callington STW (concentrations up to 1.9 million ng/l entering the STW). This STW discharges into the River Lynher. The source was traced to a trade effluent from a food factory where potatoes are washed before being used in pasties.

4. METHODS.

Spot samples were taken at various points along the river to isolate the point of entry of tecnazene.

Three surveys were required to identify the source. These were carried out on: 30 January 1990, 19 February 1990 and 1 March 1990.

Once the point of entry of tecnazene had been isolated, the aquatic invertebrate community was surveyed on 30 March 1990. Three sites were sampled to assess the impact of the discharge (see Report FWI/90/?). Sites were located 50m and 3.7 km downstream of the discharge and 100m upstream (see Fig. 1).

5. RESULTS.

The first survey (30 January 1990) indicated the point of entry of tecnazene was downstream of the Treneere Estate (see Table 2).

A surface-water outfall was located upstream of this point which was thought to be connected to a fish & chip shop at Heamoor. Potatoes are regularly washed at this shop and thus were a potential source of tecnazene.

5.1 Heamoor Fish & Chip Shop Investigation.

The Heamoor Fish & Chip Shop was investigated further despite the fact it was upstream of the Treneere Estate sampling point where tecnazene was not detected. It was considered that due to the intermittent nature of the discharge (since potatoes are washed on an irregular basis), a tecnazene pulse could have been missed by the initial survey.

During the second survey on 19 February 1990 tecnazene was again found to be entering the river downstream of Treneere Estate indicating the source was unlikely to be the Heamoor Fish & Chip Shop.

The surface-water outfall, thought to be connected to the Heamoor Fish & Chip Shop, was found to have very low concentrations of tecnazene (3 ng/l) during the potato washing period which again indicated this fish & chip shop was not the source.

TABLE 2. Tecnazene concentrations in river water of the Chyandour Brook and discharges from Fish & Chip Shops at Heamoor and Treneere.

Site	Time	Tecnazene Concentration (ng/l)	
<u>Survey 1.</u>			
1. A30 Roadbridge	1140	1,000	
4. Treneere Estate	1205	<1	
8. Heamoor	1230	<1	
9. Tremearne	1300	<1	
10. Kennels	1315	<1	
<u>Survey 2.</u>			
1. A30 Roadbridge	1100	160	
4. Treneere Estate	1200	<1	
5. D/S Heamoor Fish & Chip Shop	1235	<1	
6. Heamoor Fish & Chip shop discharge	1203	3	
7. Heamoor Fish & Chip Shop washings	1200	130	
8. U/S Heamoor Fish & Chip Shop	1210	<1	
<u>Survey 3.</u>			
1. A30 Roadbridge	0920	7	
	1045	6	
	1245	210	
2. Treneere Fish & Chip Shop discharge	0930	60	
	1025	27,000	
	1110	26,000	
3. Treneere Fish & Chip Shop washwater	1st wash of potatoes	1010	4,300,000
	2nd wash of potatoes	1050	15,000,000
	3rd wash of potatoes	1145	1,700
4. U/S Treneere Fish & Chip Shop	0945	3	
	1035	1	
	1125	<1	
5. D/S Heamoor Fish & Chip Shop	0900	<1	
	0940	<1	
6. Heamoor Fish & Chip shop discharge	0930	2	
	0950	1	
7. Heamoor Fish & Chip Shop washings	0940	2,200	
8. U/S Heamoor Fish & Chip Shop	1000	<1	

Dye tracing on 28 February 1990 revealed the surface-water outfall upstream of the Treneere Estate was not connected to the Heamoor Fish & Chip Shop and that the discharge in fact entered the foul sewer. This confirmed the Heamoor shop was not the source of tecnazene contamination in the Chyandour Brook.

5.2 Treneere Fish & Chip Shop Investigation.

A more intensive search of the Chyandour Brook identified a second fish & chip shop on the Treneere Estate. Dye tracing on 28 February 1990 indicated the discharge from this fish & chip shop to a surface-water outfall. The dye tracing also gave an approximate time of travel from the shop to the A30 monitoring point (= 45 minutes).

To confirm the Treneere Fish & Chip Shop was the source of tecnazene in the Chyandour Brook samples were taken from the shop discharge during a period of potato washing and the effect was monitored on the Chyandour Brook by sampling upstream and downstream of the discharge. To ensure all aspects were covered the Heamoor surface water outfall was also assessed.

The results (see Table 2) indicated low concentrations of tecnazene (60 ng/l) in the discharge before potato washing. Tecnazene concentrations increased to a maximum of 27,000 ng/l in the discharge after the first washing of potatoes. The actual potato washwater before discharge, had very high concentrations of tecnazene (up to 15 million ng/l).

The first two samples of river water collected at the A30 roadbridge downstream of the discharge had low concentrations of tecnazene. These samples were taken before the pulse of tecnazene from Treneere Fish & Chip Shop discharge reached the site (i.e. within 45 minutes of the discharge leaving the shop).

The third sample collected at the A30 roadbridge contained 210 ng/l of tecnazene. This sample co-occurred with the arrival of the tecnazene pulse from the third potato wash since it was taken 1 hour after the third discharge left Treneere Fish & Chip Shop.

The pulse of tecnazene from the potato wash with the highest concentrations of tecnazene (i.e. the second wash) was missed at the time of sampling.

5.3 Aquatic Invertebrate Survey.

An invertebrate fauna dominated by organic tolerant taxa was found upstream of the discharge (ASPT = 4.37, BMWP = 70).

Although there was little change in species composition immediately downstream of the discharge (ASPT = 4.37, BMWP = 70), there was a marked increase in Asellidae (Water Hog Louse) presumably as a result of the increase in organic detritus from potato peelings.

At the third site 700m downstream of the discharge there was a further impoverishment of the invertebrate community (ASPT = 4.07, BMWP = 57).

This decline may reflect an oxygen sag resulting from the organic nature of the discharge.

6. DISCUSSION.

The investigations traced the tecnazene contamination in the Chyandour Brook to potato washings from a fish & chip shop at Treneere.

Apparently during the spring approx. 1 tonne of potatoes is delivered to the shop each week from a potato merchant in Penryn. Larger quantities are delivered in the summer. The potatoes are generally grown on farms in East Anglia but come from a number of sources.

Potatoes are washed and peeled daily in batches of 25 kg according to demand and the washwater with a proportion of the potato peelings are discharged to the Chyandour Brook 300m from the shop.

The surveys undertaken have clearly indicated that samples must be collected at the exact time of discharge in order to detect maximum contamination. This is due to the sporadic incidence of potato washing.

It was not possible to measure any possible toxic effects of tecnazene on the aquatic invertebrate fauna of the Chyandour Brook because it had already been impoverished by other organic discharges upstream.

7. CONCLUSIONS

1. The source of tecnazene contamination in the Chyandour Brook has been isolated to a fish & chip shop at Treneere (NGR SW 470314).
2. It is likely that routine river monitoring will miss periods of contamination of tecnazene in the Chyandour Brook due to the intermittent nature of the discharge.

8. RECOMMENDATIONS.

1. The discharge of tecnazene and organic matter from the fish & chip shop at Treneere should be controlled by the application of an appropriate consent.
2. Consideration should be given to other potato washing plants and their impact on receiving waters.
3. The cause of the impoverished invertebrate fauna in the Chyandour Brook upstream of the Heamoor should be investigated.