

Environment B·O·P
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COMPLIANCE REPORT

BAY OF PLENTY FERTILISER LIMITED



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Chapter 1: Introduction

Bay of Plenty Fertiliser Limited operates a nine-hectare manufacturing site at Mount Manganui, adjacent to the Tauranga Harbour Bridge Toll Plaza. Fertiliser and raw products have been stored, blended and manufactured on this site since 1955.

BOP Fertiliser holds a number of resource consents for the discharge of contaminants and the taking of sea and ground waters. This report deals with consent number 02 4155 the discharge of site stormwater.

Chapter 2: Methodology

Environment B·O·P staff have assessed compliance with consent conditions in the following ways:

- Site inspections have been undertaken to assess compliance with conditions relating to the contingency and maintenance plan.
- Conditions relating to water quality have been assessed from monitoring data supplied by the consent holder.

Chapter 3: Consent 02 4155 Conditions and Compliance

The conditions that require monitoring are reported below:

3.1 **Condition 2**

Condition 2 authorises the discharge of 3,200 litres per second of stormwater to the Tauranga Harbour. This discharge rate has been calculated using the rational method and corresponds to the area of paved surfaces and building roofs and the 100 year design storm. The rate of discharge is monitored using a v-notch weir, and is recorded via a PLC to a daily totaliser.

3.2 **Condition 6.1**

Condition 6.1 requires that stormwater outfalls be designed and constructed as shown on plans submitted with consent application (04 0055). These structures complied with plans when installed and were checked for compliance in February 1995. The structures have not been altered since and consequently it was considered that these structures comply with consent conditions.

3.3 **Condition 6.2**

Condition 6.2 states that the consent holder shall collect and discharge all stormwater from the two outfalls aligned along the open drain on the southern property boundary to the main stormwater system. At the time of compliance checks taking place, works to realign these outfalls had not commenced and the outfalls were still operational, although not discharging. Since the issue of consent 02 4155, BOP Fertiliser Limited have applied for a change of conditions under section 127 of the Resource Management Act 1991 to allow the construction of a single settling chamber and discharge outfall. Consultation with submitters has been undertaken and written approval for the proposed discharge obtained. The change to conditions is currently being processed by Environment B.O.P staff.

3.4 **Condition 7.1 and 7.2**

Condition 7.1 states that all stormwater discharged shall be free of floatable solids and oil and grease. Condition 7.2 states that the consent holder shall exercise control to prevent introduction into the stormwater system of toxic substances that may be harmful to any form of aquatic life. Although the discharge of stormwater

was not observed the following should be noted in relation to the above conditions:

- Stormwater from the number one and two rock stores, the super store and the number one and two product stores passes through primary soakage/settling chambers that operate on an overflow system. The first flush of water that contains floatable suspended materials will be treated in the primary settling chambers.
- Significant quantities of oil and grease are unlikely to enter the stormwater system because of the existence of settling sumps.
- The company maintains a separate process water treatment and discharge system where compounds from acidulation and formulation are treated. Contamination of the stormwater system from this source therefore is unlikely.

3.5 **Condition 7.3**

Condition 7.3 gives limits that all stormwater must meet before discharge, they are as follows:

- (a) The pH shall be within the range of 4.0 to 9.0 units.
- (b) The total phosphorus concentration shall not exceed 180g/m^3 and the average total phosphorus concentration discharged over any twelve month period shall not exceed 30g/m^3 .
- (c) The ammoniacal nitrogen concentration shall not exceed 90 g/m^3 and the average ammoniacal nitrogen concentration discharged over any twelve month period shall not exceed 30 g/m^3
- (d) The suspended solids concentration shall not exceed 300 g/m^3 and the average suspended solids concentration discharged over any twelve month period shall not exceed 100 g/m^3 .

Compliance with the above conditions is reported in section 3.8.

3.6 **Condition 8.1**

Condition 8.1 specifies a sampling programme that the consent holder must undertake while consent 02 4155 is exercised. Samples are taken during six major rain events per year, during each event, six samples are taken at half hourly intervals. The results of the sampling programme for each rain event are to be sent to the Regional Council within one month of the sampling taking place. Returns for 1996 and the first half of 1997 were returned within this time limit, however those for late 1997 were returned in March 1998 and were therefore outside the one-month time limit. Parameters tested are:

- (a) Suspended Solids
- (b) Total Phosphorus

- (c) Ammoniacal Nitrogen
- (d) Fluoride.

3.7 **Condition 8.2**

Condition 8.2 outlines a similar sampling programme to that above, however samples are taken around the main loadout area rather than the two outfalls. The consent holder is required to test for the following on at least four occasions per year.

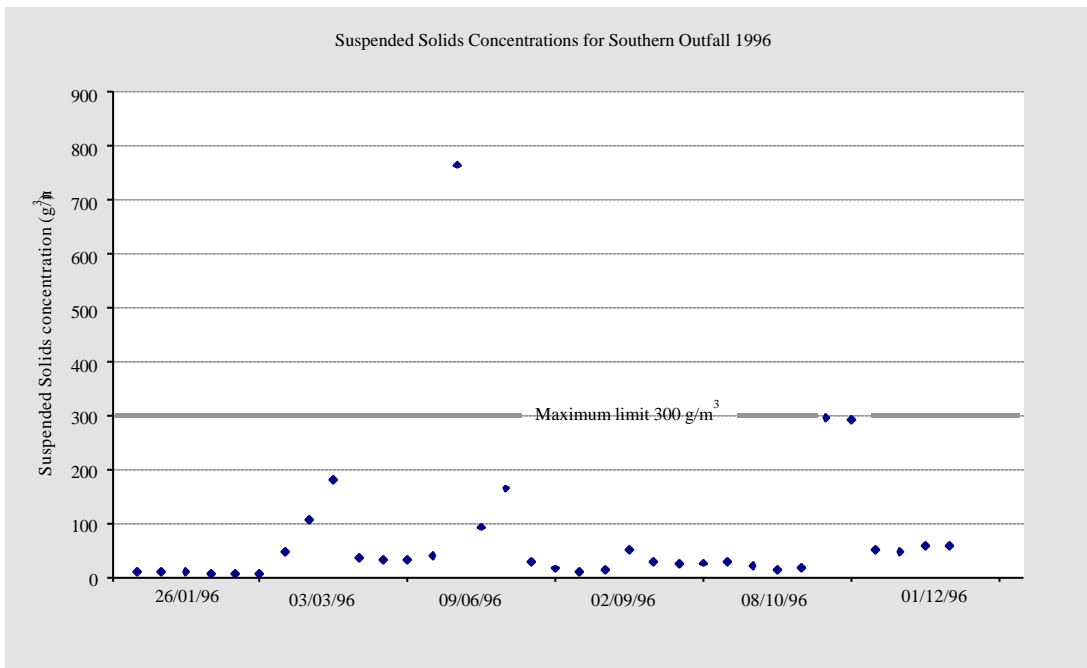
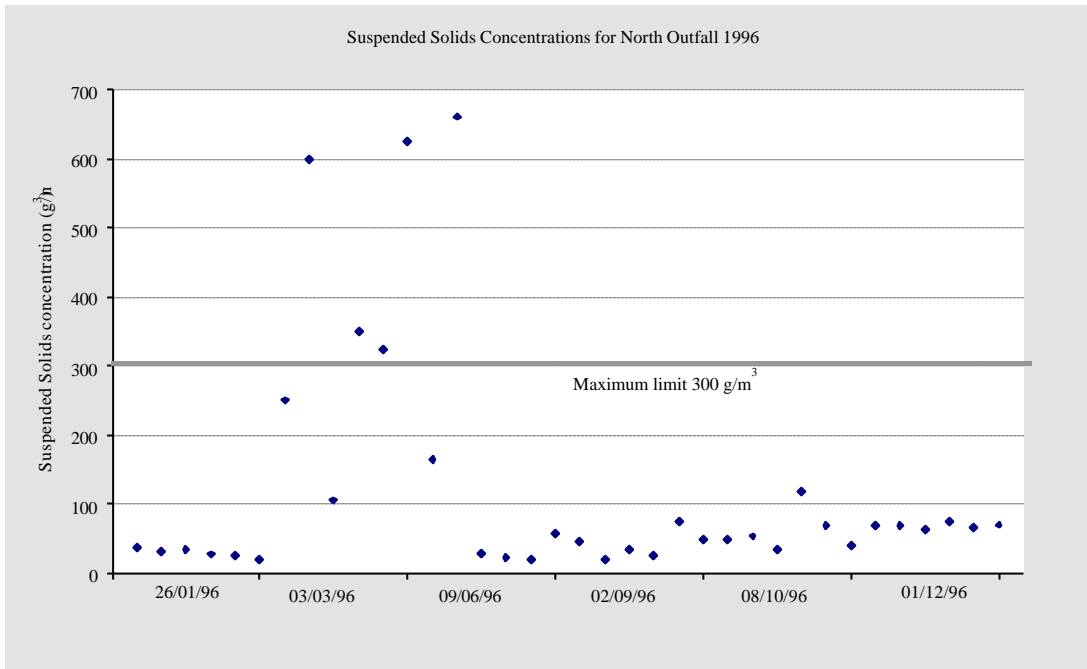
- (a) Suspended Solids
- (b) Total Phosphorus
- (c) Ammoniacal Nitrogen.

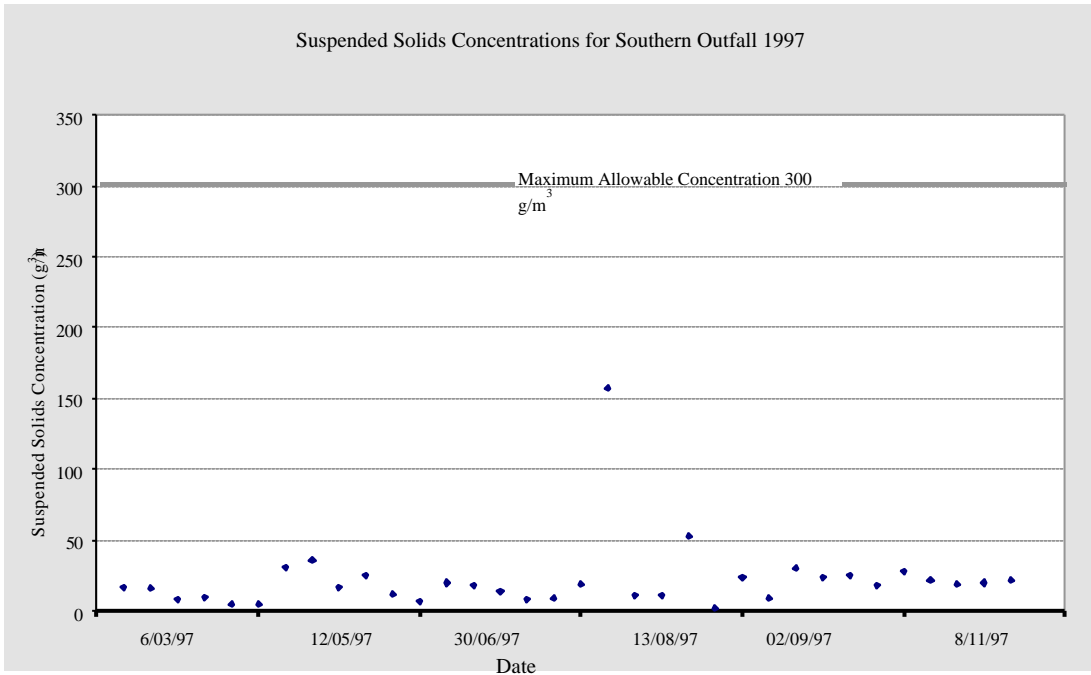
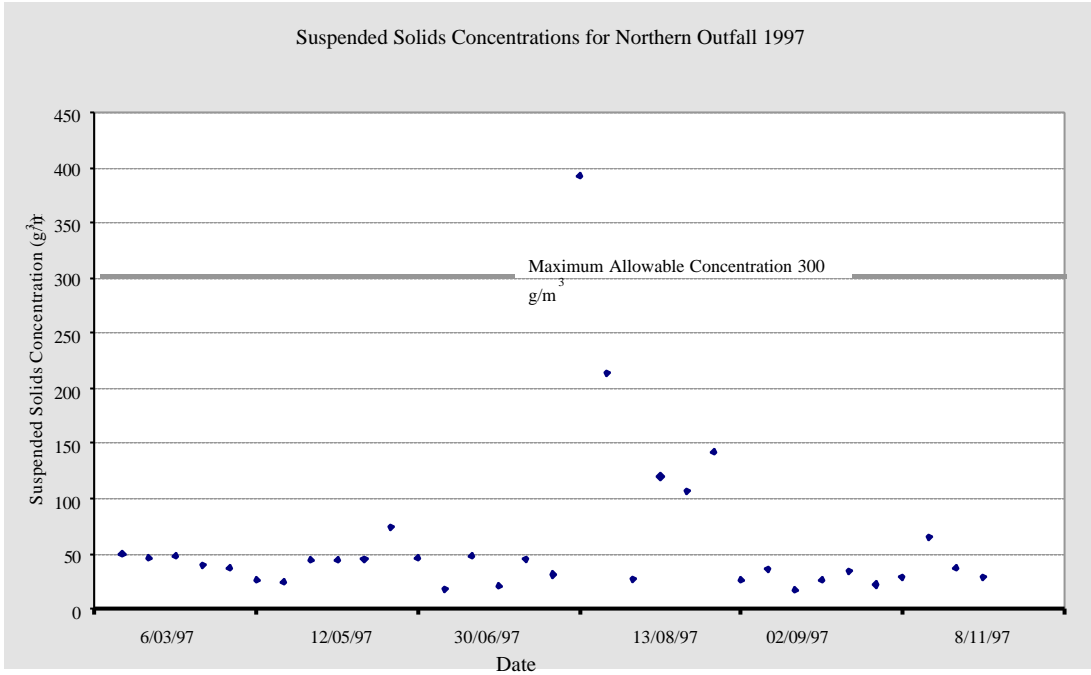
3.8 **Monitoring Results**

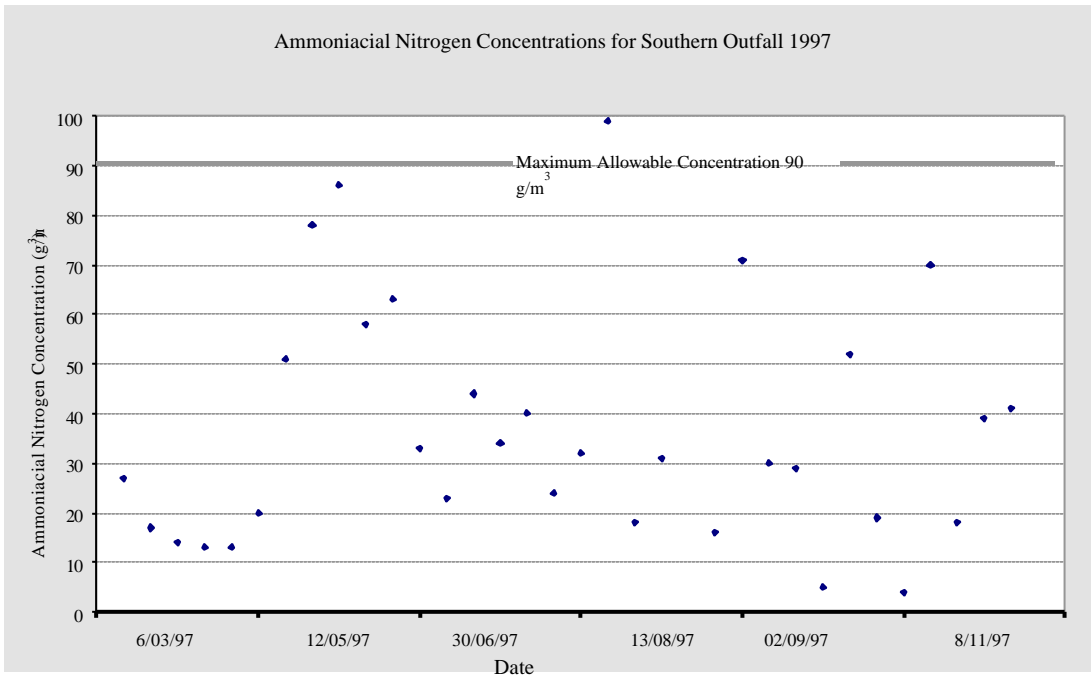
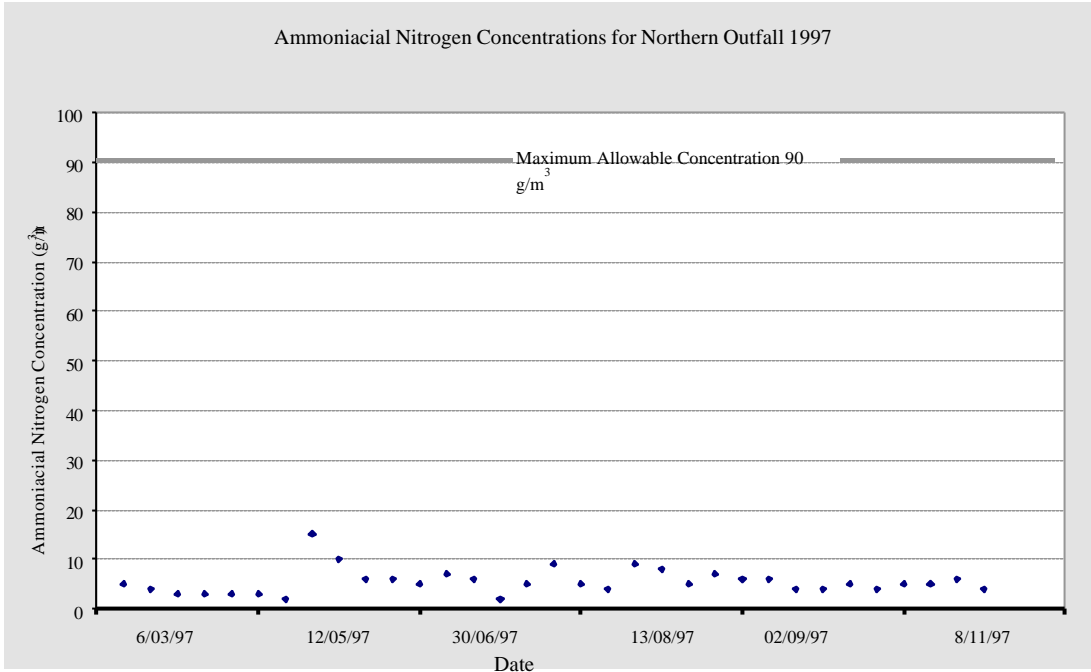
Monitoring Results for 1996

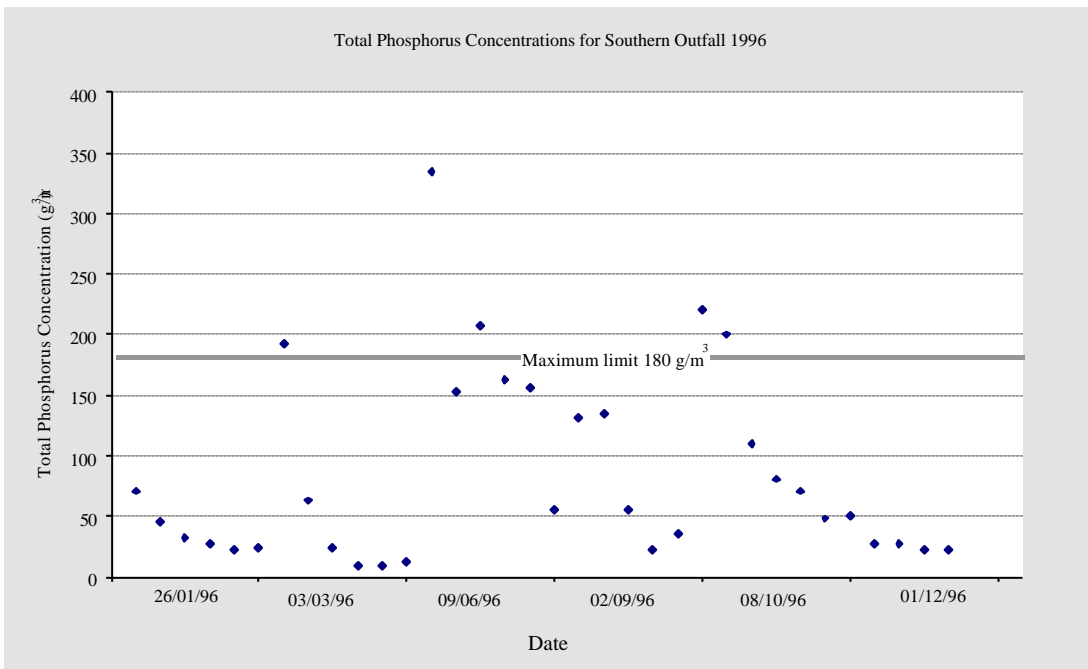
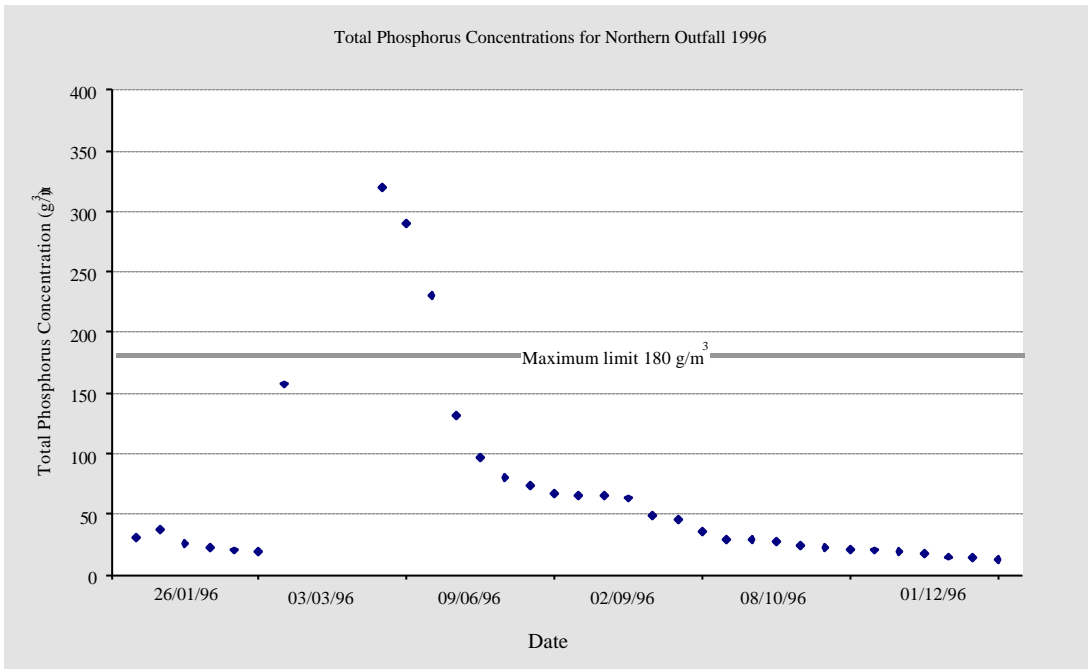
The following is a graphical summary of compliance data for 1996 and 1997 pursuant to conditions seven and eight outlined above. For comparative purposes each constituent is presented on a yearly basis for each outfall, and an annual summary of results is given for each.

The graphs below show plots of concentration versus date. The date on the 'x' axis shows the date of the rainfall event sampled and the 'y' axis shows the corresponding concentration of each sample.









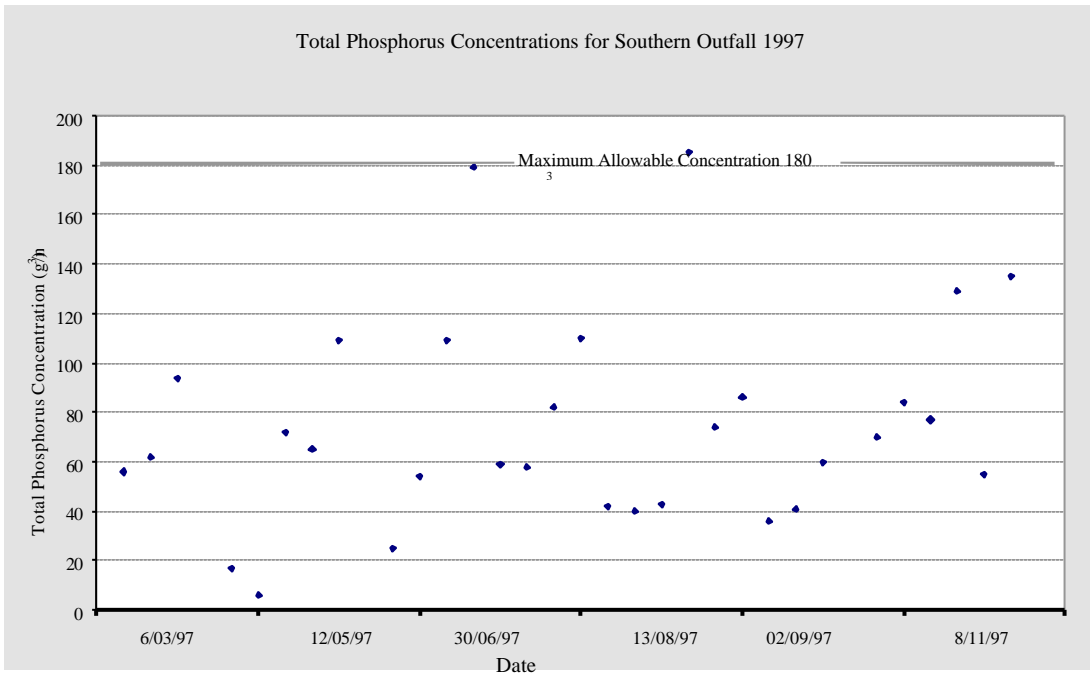
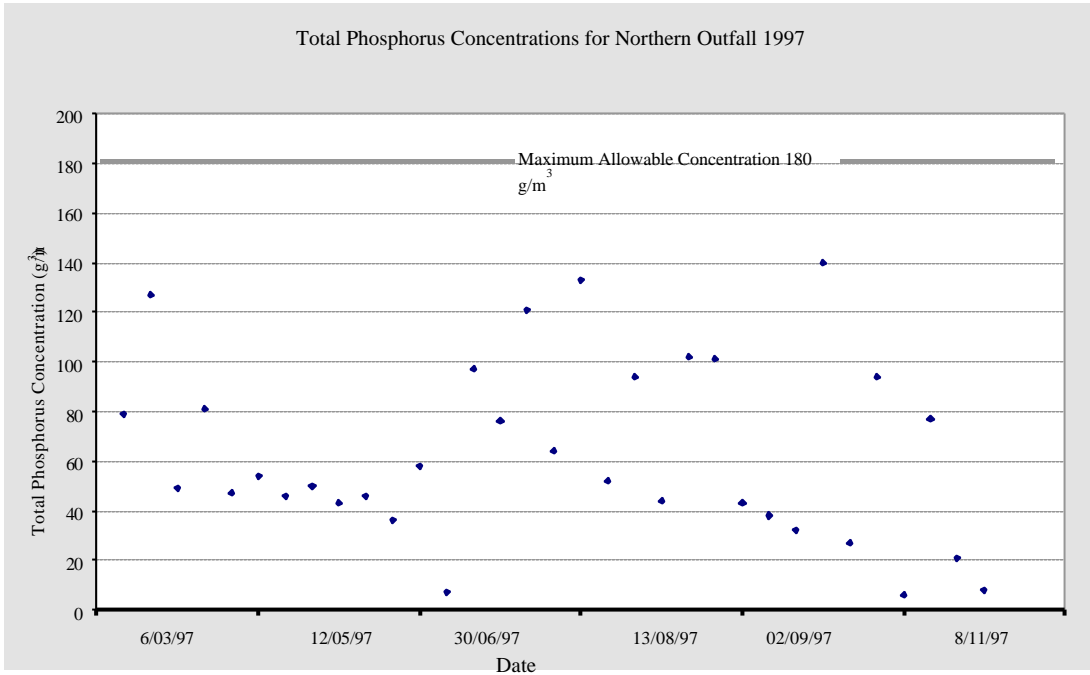
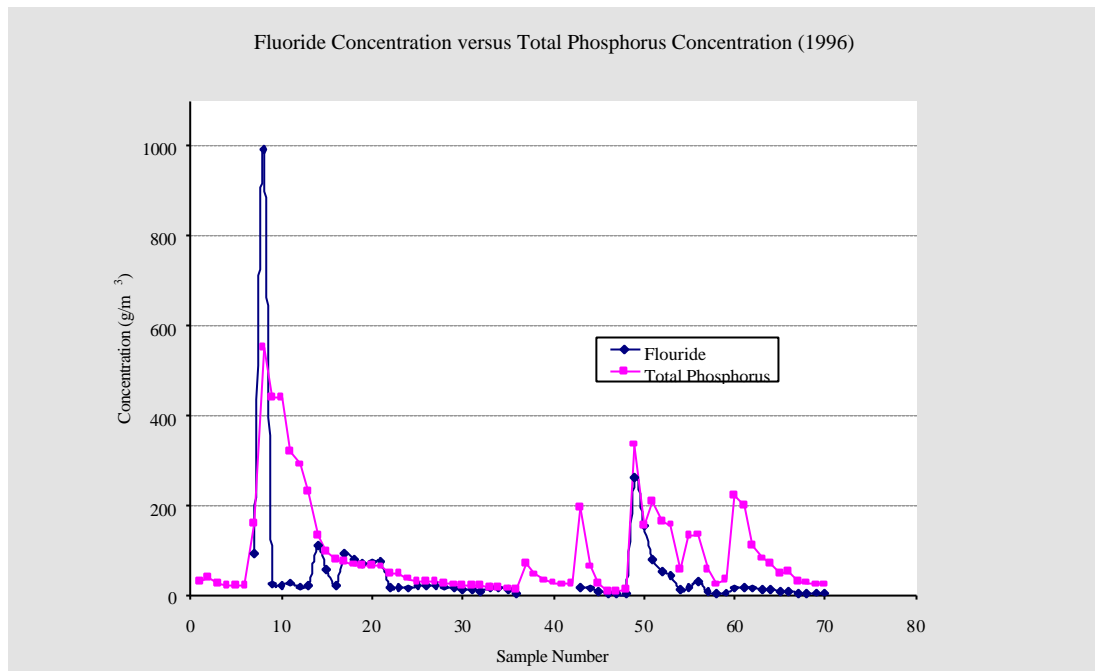


TABLE ONE				
SUMMARY OF MONITORING DATA FOR 1996 (BOTH OUTFALLS)				
	CONSTITUENT			
	Suspended Solids mg/L	Ammoniacal Nitrogen mg/L	Total Phosphorus mg/L	Fluoride mg/L
Annual average limit	100	30	60	N/A
Maximum Limit	300	90	180	N/A
Largest Value	765	159	550	990
Smallest Value	6	0.5	9	2
Annual Average from samples	100	17	92	48
Number of Exceedances	6	1	11	N/A

Notes:

- (i) The average annual limit for suspended solids and ammoniacal nitrogen were met, although the average for suspended solids was on the limit at 100 g/m³.
- (ii) The average annual total phosphorus concentration was 92 g/m³ compared to the limit of 60 g/m³ set in condition 7.3.2. This represents an exceedance of 53% over the 12 month period sampled.
- (iii) Total phosphorus was exceeded a total of eleven times out of seventy samples recorded or approximately 16% of the time. The suspended solids concentration was exceeded on 9% of occasions.
- (iv) While there is no concentration limit on and the discharge of fluoride Table 1 shows that a significant concentration is present in the stormwater. The primary source of fluoride onsite is in the manufacture of superphosphate fertiliser. In this process phosphate rock is reacted with sulphuric acid, with fluoride being generated as a by-product. For fluoride to enter the stormwater system, it must either come from the acidulation process or from finished products. If fluoride was derived primarily from finished product (i.e. superphosphate), then a correlation would exist between the phosphate and fluoride content of the stormwater. A plot of fluoride content versus phosphate for 1996 data is shown below.



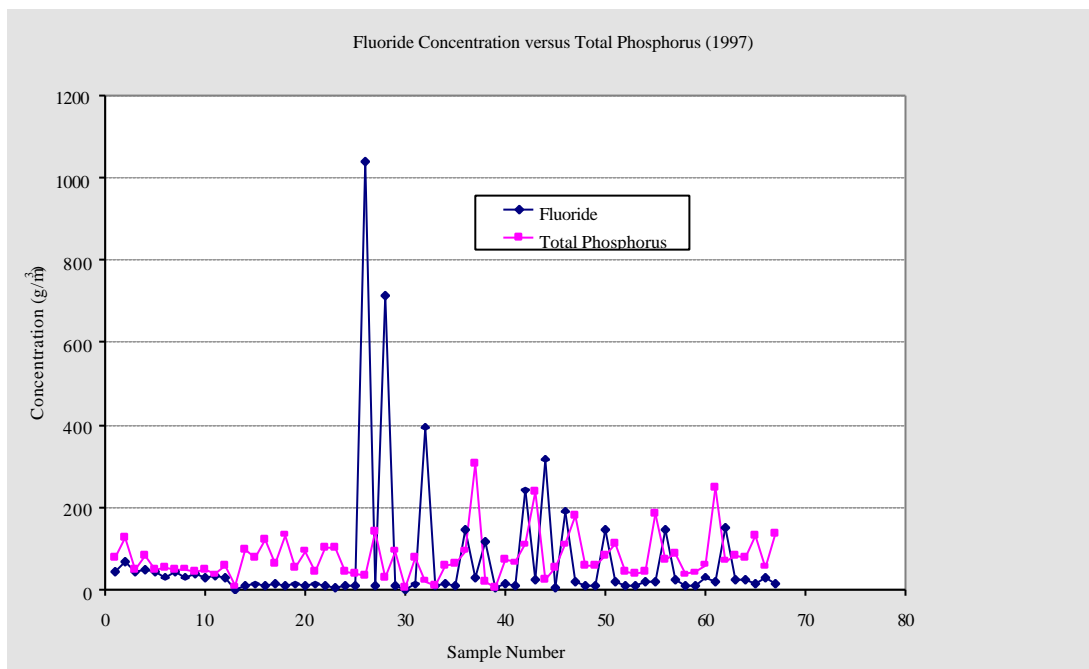
This plot shows a reasonably strong correlation between fluoride and phosphate, which could indicate that stormwater contamination in this sampling period was due to finished product contamination rather than from the manufacturing process.

TABLE 2				
MONITORING RESULTS 1997				
	CONSTITUENT			
	Suspended Solids mg/L	Ammoniacal Nitrogen mg/L	Total Phosphorus mg/L	Fluoride mg/L
Annual average limit	100	30	60	N/A
Maximum Limit	300	90	180	N/A
Largest Value	393	107	307	1040
Smallest Value	2	2	6	1
Annual Average from samples	41	22	78	163
Number of Exceedances	1	2	4	N/A

Notes:

- (i) The average annual concentration for suspended solids and ammoniacal nitrogen complied with consent conditions. The maximum limits were exceeded 1.5 % and 3% of the time respectively.
- (ii) The annual average limit for total phosphorus was exceeded by 30% over the sampling period.

Comparison of tables one and two shows a reduction on the mean amounts suspended solids, total phosphorus, and ammoniacal nitrogen discharged. The annual mean concentration of fluoride increased from 48g/m^3 in 1996 to 163g/m^3 in 1997, an increase of 240%. In the 1997 dataset no correlation is evident between the discharge of phosphorus and fluoride as shown in the figure below.

**Monitoring results for 1996 and 1997 show that:**

- Ammoniacal nitrogen is found in greater concentrations in the discharge from the southern outfall when compared that of the north outfall. This difference reflects contamination from different sources, as high analysis fertilisers are stored to the south of the site while the raw products are stored to the north.
- The results show an improvement in the quality of stormwater discharged between 1996 and 1997 with the exception of fluoride, which increased by 240%.
- A limit on the concentration of fluoride discharged may be appropriate when the consent is reviewed, if the environmental effect of this ion is found to be significant.

3.9 Environmental Monitoring

3.9.1 Condition 9.1 and 9.2

Condition 9.1 directs the consent holder to undertake environmental surveys within the receiving environment adjacent to the stormwater outfalls. These surveys are to be conducted every three years, and the results compared to the environmental quality of the harbour at locations remote to this or other discharges. Bioresearchers Limited conducted a study on the effects of both the stormwater and process water discharges from BOP Fertiliser's manufacturing site in 1997. This study showed a significant buildup of fertiliser wastes around the northern outfall and a lesser buildup around the southern outfall. . As previously discussed stormwater entering the north outfall is derived from formulation while that at the southern outfall is primarily from high analysis fertilisers. To prevent the passage of wastes to the stormwater system, improvements in on site maintenance may be required such as more regular sweeping and cleanup of product spills. The buildup of these waste materials was found only in the immediate area of the outfall structures and therefore should have a minor effect on the Harbour as a whole.

3.9.2 Condition 9.4

Condition 9.4 directs the consent holder to investigate and report on the pH of groundwater from the number three pumping bore by June 1996. Samples were taken on 23 April 1996 and 1 May 1998. Of these samples were 7.04 and 7.10 respectively.

3.10 Contingency and Maintenance Plan

3.10.1 Condition 10.1 and 10.2

Condition 10.1 states that the consent holder shall maintain and upgrade its contingency and maintenance plan that formed part of the application for consent 02 4155. Condition 10.2 outlines what this plan should, at a minimum, address. The points are presented in the table to follow. During the most recent compliance visit undertaken for this report each point was checked, the results of which are summarised in that table.

ENVIRONMENT PLAN ISSUE AS REQUIRED BY CONDITION 10.2	PLAN IMPLEMENTED	COMMENTS
Plans of areas and frequency of vacuum sweeping	Yes	Results have been submitted to Environment B.O.P for 1996. Some manual sweeping required.
Code of practice for loading and covering of trucks and wagons transporting product to and from the site	Not Checked	Company is trailing the use of bottom loading trucks for raw product transport
Ensuring that loading of product is done indoors	Yes	Still evidence of product blowing outside from main product loadout area.
Maintenance of product store doors and keeping these doors closed except when in use	No	High analysis doors open when site visit conducted
Ensuring that spills of products are cleaned up with appropriate tools available	Yes	Spill of 1 tonne of nitrate of ammonia while onsite for compliance visit. Spill cleaned up as soon as detected.
Checking of the site on a weekly basis for product leakage and ensuring these are stopped and spills cleaned up immediately	No	Small amounts of product spilled onsite
Investigation of alternative door types where existing doors fail regularly especially in the south end of the load out bay	On going	
Stormwater grate labelling to indicate that drains flow to the natural environment	No	Some pits were not labelled and it was unclear where they discharged to
Calibration of pH meters on a weekly basis	No	No calibration records available

Chapter 4: Summary and Conclusions

- 4.1 This consent has been effective in improving the quality of stormwater discharged from the Bay of Plenty Fertiliser Limited manufacturing site located at Mount Maunganui, Tauranga.
- 4.2 Ammoniacal nitrogen is found in greater concentrations in the discharge from the southern stormwater outfall than from the northern outfall.
- 4.3 Monitoring results show an improvement in the quality of stormwater discharged between 1996 and 1997 with the exception of fluoride, which increased by 240%.
- 4.4 A limit on the concentration of fluoride discharged may be appropriate if the consent is reviewed and if the environmental effect of this ion is found to be significant.
- 4.5 The discharge to the open drain on the southern property boundary is currently unauthorised under condition 6.2 but is subject to an application for change under section 127 of the Resource Management Act 1991.
- 4.6 Environmental impact studies conducted under condition 9.1 have shown a significant but localised build-up of fertiliser wastes around the two stormwater outlets discharging to the Tauranga Harbour.

APPENDIX I