water treatment standards can be expected to show themselves quite rapidly by tube failures, which can be disastrous in many cases and certainly may be expensive to rectify.

In the next issue of Engineering News we will give a copy of a report on actual failure of a water-tube boiler at a Cooling Plant near Sheffield, U.K.

(J.H. Maycock)

● POLLUTION CONTROL

LEGISLATION IN THE CONTROL OF PALM OIL INDUSTRIAL EFFLUENT DISCHARGE (WATERCOURSE)

The Environment Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977 containing the enabling provisions for the stipulation of acceptable conditions of effluent discharge in licences was gazetted on 3 November 1977 and came into force on 1 July 1978. These acceptable conditions were in the form of a four-generation set of effluent standards. Since then, the standards have been revised and the existing palm oil mill effluent (POME) standards for watercourse discharge are shown in Table 1.

A monitoring exercise carried out recently indicated that most POME treatment plants adopted by the industry could comply with the Department of Environment (DOE) standards on BOD, SS, TN and AN most of the time. However most mills had difficulties in meeting the standards during peak crop periods. This is attributed to overloading of the treatment plants during these peak periods. The quality of the final discharge from three mills monitored is shown in Figure 1. The treatment technology for POME will be discussed in later issues.

The proposed standards for palm oil refinery effluent (PORE) are also shown in Table 1. These standards were accepted by the DOE at a meeting of the Tripartite Committee consisting of PORIM/PORAM/DOE in February 1986. It was also agreed that all refineries should build or be in the process of building their effluent treatment plants as soon as possible. A treatment system developed by PORIM for PORE will be discussed in later issues.

TABLE 1 : EXISTING PALM OIL INDUSTRIAL EFFLUENT STANDARDS FOR WATERCOURSE DISCHARGE

PARAMETER	POME	PORE
BIOCHEMICAL OXYGEN DEMAND (BOD) (3 days at 30°C)	100 (50)+	50
CHEMICAL OXYGEN DEMAND (COD)	—	250**
SUSPENDED SOLIDS (SS)	400	100
TOTAL NITROGEN (TN)	200++	—
AMMONIACAL NITROGEN (AN)	100++	—
OIL & GREASE (O & G)	50	10
pH	5.0 — 9.0	5.5 — 9.0
TEMPERATURE	45	40

* All values in mg/l except pH and temperature

\+ This additional limit is the arithmetic mean value determined on the basis of a minimum of four samples taken at least once a week for four weeks consecutively.

\+ + Values on filtered samples

** A maximum of 250 mg/l is acceptable until further notice.

● REFINING

REFINING AND FRACTIONATION OF PALM OIL : PART FOUR

This part, the final in the four part series, outlines the detergent and solvent fractionation processes and concludes with an examination of the exports from the Malaysian refining industry.

Detergent Fractionation (Figure 1)

Before the introduction of membrane filters, detergent fractionation enjoyed the distinct ad-