

THE TANESCO POWER STATION

and

OIL POLLUTION IN KIGOMA BAY

Report by:

**Chris Foxall
School of Environmental Sciences
University of East Anglia
Norwich NR4 7TJ**

1. Background

From the earliest days of the LTBP in Kigoma, it has been evident that waste oil from the TANESCO Power station has been flowing into the lake near to TAFIRI. It is not uncommon for a substantial oilslick to form which begins at the shore just to the north of TAFIRI and extends southwards and westwards to include the shoreline below the prison and the headland on which the Hilltop restaurant is situated. The slick frequently extends up to 200 metres offshore.

In several areas immediately to the north of TAFIRI, there are pools of oil on the shore within 2 metres of the lake edge. These appear to be permanent features of the shoreline even during the periods of the year when rainfall is low. An inspection of the beach below these pools suggests that a section of the foreshore of at least 100 metres in length is saturated with oil and that this is acting as a continuous source of oil entering the lake.

During periods of heavy rain, the quantities of oil originating from the plant and its environs increases substantially and the resulting oil slick is particularly noticeable. On one day during the recent visit (Monday 8 December) heavy rain during the previous night resulted in a quantity of oil entering the lake that was sufficient to coat sampling equipment with a film of oil, made diving thoroughly unpleasant and indeed dangerous (report from Catherine O' Reilly) and resulted in the on-shore wind smelling very strongly of oil throughout the day.

Such levels of pollution are likely to pose health risks to those bathing or swimming in the waters of the bay and may well have detrimental impacts on the organisms living in the affected areas. It is also important to note that the intake for the Kigoma Water supply is only a few hundred metres north of the point where the majority of the oil appears to enter the lake. To my knowledge no study of the direction and strength of the currents in Kigoma Bay has yet been carried out. It is therefore not possible at present to assess the risk of the town water supply being contaminated by oil from the TANESCO plant.

In view of the declared objectives of the LTBP not only to investigate the impact of pollution on the biodiversity of the lake but also to suggest appropriate pollution control strategies, a number of meetings have taken place in the last few months between LTBP personnel and the Regional manager of TANESCO, Mr Mshanga, to discuss potential short-term and long-term strategies to the problem in Kigoma. As part of such initiatives, permission was granted by Mr Mshanga for a fact-finding visit to the TANESCO plant on Wednesday December 10. Present were K. West, I Katonde, F. Chale and C Foxall. The group was shown around by Mrs Rosemary

Chijendi, the plant engineer who was very helpful in providing details of the power station, its operation and the sources of the major oil leaks from the plant.

2. Sources of Oil Leaks

The TANESCO power station is nominally comprised of 7 diesel generators all of them manufactured by Stromberg of Finland. At the time of the visit, only 4 were in operation. The remainder were non-operational owing to lack of spare parts. According to Mrs Chijendi this is a fairly typical situation -in fact the last time that all 7 generators were functioning simultaneously was in 1993.

Fuel oil is supplied to the power station from the Kigoma oil depot by a road tanker owned by TANESCO. The oil is stored in 3 underground tanks situated near the main gate. The tanks have a combined capacity of 40 500 litres. Fuel and lubricating oil consumption is, on average, around 10 000 litres/day and 150 litres /day respectively. The fuel oil is pumped from the underground storage tanks near the gate into the header tanks from which the oil is supplied to the diesel generators.

The pump used for this transfer operation, located alongside the main hall of the power station, was identified by Mrs Chijendi as being the principal source of oil leaks from the plant. No spare pump is available and it is in more or less continuous use. Few opportunities therefore arise for the necessary maintenance and repairs. In order to collect the leaking oil, a large collector tray has been placed under the pump. Judging by the extensive area surrounding the pump which is heavily contaminated by oil, this control measure would appear to be largely ineffective.

After the main oil pump described above, the next largest loss of oil from the plant itself emanates from the fuel pump systems of the generating sets themselves. At present no money is available to purchase the spare parts required.

A further source of oil loss results indirectly from the practice of using untreated lake water for cooling purposes. Lake water has a relatively high pH (9) and dissolved solids content and the use of such water results in the build-up of scale in the cooling water circuits and on the cylinder head gaskets. In the latter case, the build up of such deposits results in oil loss via the gaskets. In order to remove these deposits, the generators affected have to be shut down so that the gaskets can be removed, scraped clean and replaced. Apart from the amount of work and down-time involved, such operations inevitably result in further losses of oil from the plant. It is also worth noting that no water recycling system is in operation at the plant. The volume of cooling water used is thus quite substantial, all of which, contaminated or otherwise, is discharged from the power station. Once again lack of finance has prevented the construction of the planned water recycling facility.

At present at least some of the equipment overhaul and repairs are carried out in an area alongside the entrance driveway to the power station. Such maintenance work involves removing oil from various components using water jets. These operations were in progress during our visit and the resulting waste oil/water mixture was flowing down the driveway into the road.

3. Interceptor Tanks

These are designed to collect waste oil and other fluids from the power station and to enable the oil and water to be separated from each other and subsequently recycled or disposed of as appropriate.

There are two such tanks at TANESCO. The one furthest (approx. 50 metres) from the road is circular, is around 2.5 metres in diameter and is capped with concrete. The date of construction is uncertain, but was certainly installed prior to the arrival of Mrs Chijendi in 1989. The second interceptor tank, which is within 5 metres of the road, was constructed in 1990. This is rectangular in shape, is capped and is fitted with ventilator pipes. Both of these interceptor tanks are apparently full. No estimate of the volume of waste oil/water could be provided as the internal dimensions of the interceptors is not known.

In order to accommodate further quantities of waste oil, two *open* interceptor pits were dug in 1996. These are located near the original circular interceptor tank. Information on the precise depth of these pits was not available but Mrs Chijendi estimated that they were in excess of two metres. It is oil from these pits that is the most obvious source of oil pollution as, especially during the rains, the pits overflow and the resulting oil flows across the road and thence directly into the lake. In addition to the obvious potential for environmental damage, these pits represent a considerable hazard to human life as they are unfenced and are located close to a frequently used footpath.

4. Mitigation Measures

As a result of the various meetings held between TANESCO staff and LTBP personnel a number of measures to control the flow of oil from the plant have been identified. These can be divided into the following categories :

- immediate
- short term

- long term

(a) immediate measures

The most immediate priority is to prevent the open pits overflowing into the lake. Following a meeting between Mr Mshanga, Mr Chitamwebwa and Kelly West, the LTBP agreed to pay casual labour to manually remove some of the oil from the pits and return it to the storage tanks. This operation has already commenced. The earth bank on the downward slope side of the pits has also been raised somewhat but it is quite possible that heavy rain will again demolish the bank.

These measures are clearly unsustainable in the longer term however and, in any case, fail to address the considerable hazard that such open pits represent to the casual labour employed and to the public at large. It is also possible that underground seepage of oil from these pits may continue to contribute to the oil entering the lake.

(b) short term measures

During the discussions held with TANESCO staff, two relatively inexpensive courses of action were suggested that, if implemented, should significantly reduce the off-site migration of oil from the plant.

The first of these involves the purchase of a submersible pump that would be used to pump out the existing interceptor tanks. It was suggested that the contents of the interceptor tanks could be pumped into two, presently unused header tanks to enable the water and oil to separate out. It is quite possible that much of the oil layer might be able to be used in fuel oil in the generating plant. The unusable components would then need to be properly disposed of off-site. In this context, the possibility of using a site some 10 km from Kigoma for disposal of such wastes was discussed during the discussions held with Mr Mshanga. No visit to the site was possible due to lack of time, but Mr Mshanga expressed an interest in LTBP personnel visiting site in order to assess its suitability for such disposal activities.

The second measure would involve fitting the TANESCO road tanker with its own oil pump so that the fuel oil brought to the site could be pumped directly to the elevated fuel feeder tanks rather than be supplied to the underground storage tanks at the front of the power station. As has already been highlighted earlier in this report, one of the major sources of oil loss from the plant is the main fuel pump used to transfer the fuel oil from these underground tanks to the header tanks. Use of the tanker pump would thus obviate the need for using the main pump, at least until such time as it could be repaired.

(c) Longer term measures

Taking a somewhat longer term view, it would seem that considerable investment in equipment, maintenance and waste treatment facilities will be required to effect a

substantial and permanent reduction in oil losses from the plant. This is likely to involve considerable expenditure and is probably outside the scope of the present project. It is suggested however that the LTBP could usefully alert other organisations and potential donors to the serious situation at the plant and thus catalyse activities to improve the environmental and commercial performance of the power station.

11 February 1998