The purpose of this note is to summarize the tests made on the P.R.U.R. oil content meter and on expected developments. It is a follow-up to previous papers submitted to IMCO by the French delegation, notably MP XIV/6/5.

Following laboratory tests that proved difficult because of the specifications of the apparatus itself, which during the period in question required a continuous water supply of 3 cu.m/h, a prototype was built and installed on board the tanker "Isandia".

The result of these tests, though encouraging, demonstrated the considerable differences between tests carried out in fresh water and tests carried out in sea water.

Nevertheless, they made it possible to improve the performances and specifications of the apparatus very considerably, as follows:

- The output of the suction pump was reduced from 3 cu.m/h to 1 cu.m/h.
- The output of the recirculation pump was reduced from 30 to 10 cu.m/h.
- The dimensions of the captors were considerably reduced: the distance between the captor supports 10 cm, instead of 50, the diameter of the captor 1½" instead of 2".
There was no need to provide for air injection: in the laboratory tests, the injection of a small quantity of air (25 litres/h) created a finer emulsion of the oil in water and thus the results were less dispersed.

Because of the physical characteristics of sea water (a high degree of salinity), the oil can disperse better in the water and there is no need to inject air.

In the interval between the laboratory tests and the first test on board, the electrical apparatus was thoroughly modified; since an explosion-proof installation has been followed by an assembly for built-in safety.

To take advantage of what was learned, a new apparatus was built at the Grand Couronne Shell Research Centre. With the installations at this laboratory a true-scale experiment could be made. Tests were made on sea water brought by road tankers of 20 cu.m. capacity.

During these tests which lasted from autumn 1972 until the middle of 1973, various modifications were introduced as the work advanced:

- the volumetric suction pump was replaced by a special multicellular pump which allowed the first emulsion to be made;

- the centrifugal recirculation pump was replaced by a three-step multicellular pump which made a very fine emulsion of oil in the water.

The combination of these two pumps made it possible to obtain an emulsion as fine as the one made for laboratory samples by a very effective Turrax-type agitator.

At the same time the mechanical design of the plant was modified to take into account the lessons of the first experiments made on board the tanker.

- The pumps and the engines were fixed to the partition of the machine and pump room by welded panels. Alignment of the engine and pump axles was by self-centring fixing systems. The weight of these mechanisms was reduced to less than half their previous weight.

- The dimensions of the captor mechanism, properly so called, were much smaller.

- To avoid the need for any work on the pump room - engine room wall, the optical measurement apparatus, consisting mainly of the projector and cell
blocks, the tips of the corresponding fibres which ended there, and the
original adjusting system that was designed, was placed in a "captor casing", itself fixed to a welding panel, like the one supporting the two engine-pump blocks.

As a consequence of these tests at the Grand Couronne Research Centre, another apparatus was built incorporating these improvements.

All the specifications of the apparatus are listed in a fact-sheet which the French delegation will place at the disposal of all interested delegations during the Conference. The model that was built is at present being tested on the Magdala, a Shell petrol tanker.

Without waiting for these tests to be completed, and to take account of the most recent requests from tankers, two other apparatus are being manufactured, one for Shell, the other for B.P. For these, a double-gain amplifier is being studied which would make it possible to provide for a double play:

- 0-500 ppm for low content
- 0-1500 ppm for high content.

Passage from one play to the other is by double automatic switching of the amplifier gain. This double play will be perfectly reflected in the recording by the use of a 2-track recorder: track 1 printing in blue for the smaller play, track 2 printing in red for the larger play.

In the design of the "black box", which is being made simultaneously, account will be taken of these modifications. The technical design of the black box will involve no difficulties once an effective oil content meter is available.

In view of the results obtained and the tests being carried out, it is thought that the apparatus will be fully operational towards the end of March, 1974.

The French delegation has available for interested delegations a copy of the detailed descriptive brochure and service and maintenance booklet for the P.R.U.R. oil content meter. Only one copy is at present in its possession.