The question at issue is whether to proceed with the original plan, as approved by Cabinet, to purchase a small 5MW Merlin Reactor now and possibly acquire a larger one later, or whether, in the altered circumstances prevailing, it would not be preferable to go for a larger 20MW ORR Reactor right away. The point was debated at the second meeting of the Research Advisory Committee, which favoured the second alternative. Dr. Roux has prepared a 22-page memorandum on the subject, which is summarised briefly in the following paragraphs.

2. The Board’s research programme requires a thermal neutron flux range of from $10^3$ to $10^{14}$ n/cm² sec.

3. The British-made Merlin 5MW open tank reactor offered thermal neutron fluxes up to $10^{13}$, and would thus be suitable for some of (but not all) the work to be done. In view, however, of its very low price (£280,000) it was decided to purchase this type and to build a second larger reactor later for the balance of the work which required a flux of $10^{14}$.

That was in 1958.

3. Since then the Merlin type reactor has risen in price to £531,000 (without fuel). At the same time a quotation was received from the United States firm of Allis-Chalmers for £902,000 (without fuel) for a much larger 20MW closed-tank Oak Ridge Reactor (ORR), which could be started at 5MW and later adapted to reach 20MW at a cost of only £113,000, that is to say a total cost of £1,022,000. We know that this type is capable of reaching
of Merlin would provide an unproven maximum rating of
10MW because it is already doing so at Oak Ridge. It is
very risky. I should perhaps add that a third type, the
Dow reactor, is also considered but not very seriously,
a cost of £50,000 but only to 10MW and there is some doubt
as to whether the plant can in fact operate at that level;
and it is consequently ignored in this summary.
7. There are disadvantages also in the acquisition
it has not been tried before. The purchase of an ORR
of an ORR type reactor. Its cost will be twice as much
reactor would of course obviate the necessity for a second
as was originally approved (£550,000) although funds are in
reactor later.
4. As regards the building required to house the
be a proven overseas type, but it was the intention to build
a "controlled leakage" building would be perfectly
reactor, we would have provided
adequate at 5MW, but there is a risk – albeit a slight one –
available experience in technology which will not now be
that at 20MW a pressure resistant steel housing might be
Two reactors are better than one; there are
required at an increased cost of as much as £150,000.
difficulties in undertaking materials testing, isotopes
Present indications seem to show that this will not be
necessary.
5. Fuel costs are a major item. If obtained (leased)
from the United States, as they would be if an ORR Reactor
were purchased, the initial charge would be only £10,000
for 5MW operation. If obtained (bought outright) from the
United Kingdom, "the capital tied up at 5MW operation will be
about £240,000". Whether one could approach the United
States for fuel for a British reactor is problematical.
6. Thus we have the following costs:

<table>
<thead>
<tr>
<th>ORR</th>
<th>Merlin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactor</td>
<td>£964,000</td>
</tr>
<tr>
<td>Initial fuel</td>
<td>10,000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>70,000</td>
</tr>
<tr>
<td>Conversion to higher power</td>
<td>118,000</td>
</tr>
<tr>
<td></td>
<td>£1,162,000</td>
</tr>
</tbody>
</table>

The difference in cost here is £258,000, but in return the
ORR would provide a proven maximum rating of 20MW, while
Merlin would provide an unproven maximum rating of only 1000 kw. I should perhaps add that a third type, the ANN 5MW Reactor, is also considered but not very seriously, and it is consequently ignored in this summary.

7. There are disadvantages also in the acquisition of an OHR type reactor. Its cost will be twice as much as was originally approved (£550,000) although funds are in fact available to meet this difference. A first reactor must be a proven overseas type, but it was the intention to build the second reactor ourselves, which would have provided valuable experience in technology which will not now be gained. Two reactors are better than one; there are difficulties in undertaking materials testing, isotope production and more fundamental research all in one reactor.

8. There are also questions still to be resolved such as the general technical standard and facilities of the manufacturers, operational difficulties and costs, what contract terms and conditions are available, whether a controlled leakage building is adequate etc.

9. Nevertheless the recommendation is that the OHR Reactor be acquired subject to satisfactory answers being provided to the unresolved questions mentioned in paragraph 8 above; that Dr. Roux and Mr. Colley (Reactor Manager) proceed overseas for further enquiry; that Dr. Roux appoint a consultant abroad; and that a Letter of Intent be sent to the chosen manufacturing group.

It is also understood that the United States Atomic Energy Commission will make available to countries who have signed bilateral agreements.