FINANCE COMMITTEE
Hundred-and-fifty-ninth Meeting
Geneva ~ 13 December 1977

ADJUDICATION OF A CONTRACT FOR THE SUPPLY AND INSTALLATION
OF A HELIUM LIQUEFACTION PLANT FOR THE LOW-BETA INSERTIONS
OF THE CERN INTERSECTING STORAGE RINGS

The present adjudication concerns the supply and installation of a
helium liquefaction plant with a capacity of 200 litres per hour for the low-beta
insertions of the CERN Intersecting Storage Rings (ISR).

A call for tenders was sent out on 22 June 1977 to the four European
firms which have helium liquefaction plants of the required size in their
production programme. Two firms submitted tenders, the two others declined
to tender.

The Finance Committee is invited to agree that a contract be negotiated
with SULZER BROTHERS, the lowest bidder, for the supply and installation of
a helium liquefaction plant for the ISR low-beta insertions, including the option
for a vertical buffer tank and provisions for increased capacity, for a total net
price of 1 827 021 Swiss francs, not subject to revision.
ADJUDICATION OF A CONTRACT FOR THE SUPPLY AND INSTALLATION
OF A HELIUM LIQUEFACTION PLANT FOR THE LOW-BETA INSERTIONS
OF THE CERN INTERSECTING STORAGE RINGS

INTRODUCTION

1. CERN has decided to construct one low-beta insertion in each of
the two ISR rings in order to obtain a high-luminosity intersection.
The luminosity in this intersection will be about six times higher than
elsewhere in the machine.

2. One low-beta insertion consists essentially of four superconducting
quadrupole magnets which, to be operational, need to be supplied with
liquid helium.

3. The present adjudication, corresponding to the call for tenders
I-1688/ISR listed in document CERN/FC/2065, concerns the supply of
the helium liquefaction plant which will produce the required liquid
helium for the quadrupole magnets at a rate of 200 litres per hour.

4. In drawing up the tendering documents and assessing the replies
received, CERN followed the procedure concerning the technical
auditing of contracts of this size (cf. CERN/FC/1364).

CALL FOR TENDERS

5. Invitations to tender for the supply of a helium liquefaction plant
were sent out on 22 June 1977 (cf. letter to members of the Finance
Committee dated 30 June 1977) to the four European firms which have
helium liquefaction plants of the required size in their production
programme, i.e.

- France : L'AIR LIQUIDE Grenoble
- Germany : LINDE AG München
- Switzerland : SULZER BROTHERS LTD Winterthur
- United Kingdom : BRITISH OXYGEN COMPANY LTD London.

6. The closing date for the tenders, originally set at 27 August 1977,
was postponed to 9 September 1977 at the request of one firm.

7. At the closing date, CERN had received two offers, one from
L'AIR LIQUIDE and one from SULZER BROTHERS. L'AIR LIQUIDE
indicated a price subject to revision, whereas SULZER BROTHERS
offered a net and firm price, not subject to revision. Two firms,
LINDE and BRITISH OXYGEN, had verbally declined to tender. Table I
gives the prices quoted by the two tenderers.

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ANALYSIS OF THE TENDERS

8. Representatives of CERN have visited both tenderers, L'AIR LIQUIDE and SULZER BROTHERS, for technical discussions. As a consequence, in order to comply in all respects with CERN's technical specifications, both firms had to modify somewhat their tender. These modifications, however, do not alter the order of the tenders. Table II gives the prices quoted by the two tenderers after the technical discussions.

9. The price variation formula proposed by L'AIR LIQUIDE and applied according to the current practice for tender evaluations means that their tender price has to be multiplied by a factor of 1.133. The comparable prices of both tenders are listed in the last column of Tables I and II.

10. Both tenderers offered a horizontal helium buffer tank of 12 to 13 metres length. Since it is not yet known which ISR intersection will be equipped with the low-beta insertions, it cannot be determined whether the space for a horizontal buffer tank would be available. A vertical buffer tank would increase the SULZER price by 18,800 Swiss francs. The L'AIR LIQUIDE price would also have to be increased by approximately the same amount.

11. The design of the SULZER plant allows, in principle, the increase of the liquefaction capacity by 40% if an ejector system is added and if the electric drive motor of the compressor is replaced by a larger one. This increase in capacity could only be ensured if some provisions were made at the initial stage of the project. The SULZER price would thus be increased by 16,200 Swiss francs. Such provisions are considered to be extremely advantageous; it is, therefore, recommended that they be included in the contract.

RECOMMENDATION

12. The Finance Committee is invited to agree that a contract be negotiated with SULZER BROTHERS, the lowest bidder, for the supply and installation of a helium liquefaction plant for the ISR low-beta insertions, including the option for a vertical buffer tank and provisions for increased capacity, for a total net price of 1,827,021 Swiss francs, not subject to revision.
### TABLE I

RESULT OF THE TENDERS AT THE TENDER OPENING
(in Swiss francs)

<table>
<thead>
<tr>
<th>FIRM</th>
<th>DELIVERED AT CERN</th>
<th>SPARES</th>
<th>TEST EQUIPMENT</th>
<th>TOTAL</th>
<th>PRICE VARIATION FORMULA</th>
<th>COMPARABLE TOTAL</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULZER</td>
<td>1 579 200</td>
<td>103 721</td>
<td>61 600</td>
<td>1 744 521</td>
<td>Not subject to revision</td>
<td>1 744 521</td>
<td>1.000</td>
</tr>
<tr>
<td>L'AIR LIQUIDE</td>
<td>1 523 806</td>
<td>183 150</td>
<td>--</td>
<td>1 706 956</td>
<td>P=Po(0.10+0.40M/Mo +0.50L/Lo)</td>
<td>1 933 981</td>
<td>1.109</td>
</tr>
</tbody>
</table>

### TABLE II

RESULT OF THE TENDERS AFTER TECHNICAL DISCUSSIONS
(in Swiss francs)

<table>
<thead>
<tr>
<th>FIRM</th>
<th>DELIVERED AT CERN</th>
<th>SPARES</th>
<th>TEST EQUIPMENT</th>
<th>TOTAL</th>
<th>PRICE VARIATION FORMULA</th>
<th>COMPARABLE TOTAL</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULZER</td>
<td>1 629 900</td>
<td>103 721</td>
<td>58 400</td>
<td>1 792 021</td>
<td>Not subject to revision</td>
<td>1 792 021</td>
<td>1.000</td>
</tr>
<tr>
<td>L'AIR LIQUIDE</td>
<td>1 513 806</td>
<td>158 000</td>
<td>10 000</td>
<td>1 681 806</td>
<td>P=Po(0.10+0.40M/Mo +0.50L/Lo)</td>
<td>1 905 486</td>
<td>1.063</td>
</tr>
</tbody>
</table>

Prices do not include:

1. additional cost for vertical helium buffer tank (paragraph 10),
2. provisions for increase of liquefaction capacity by 40% (paragraph 11).