FINANCE COMMITTEE
Hundred-and-fifty-first Meeting
Geneva - 15 September 1976

ADJUDICATION OF A CONTRACT FOR THE SUPPLY
OF FIVE HELIUM LIQUEFACTION/REFRIGERATION PLANTS
FOR THE SPS NORTH EXPERIMENTAL AREA

This adjudication concerns five helium liquefaction/refrigeration plants required for the cooling of superconducting magnets and other experimental equipment to be used in the North Experimental Area of the SPS.

An invitation to tender was sent out on 27 February 1976 to four firms in four Member States. When the tenders were opened, CERN had received four offers.

The Finance Committee is invited to agree to the negotiation of a contract for the supply of five helium liquefaction/refrigeration plants for the SPS North Experimental Area with SULZER for a total amount of 5 200 000 Swiss francs, subject to a price revision formula.
ADJUDICATION OF A CONTRACT FOR THE SUPPLY
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INTRODUCTION

1. This adjudication concerns five helium liquefaction/refrigeration plants required for the cooling of superconducting magnets and other experimental equipment to be used in the North Experimental Area of the SPS.

2. The technical specification (document CERN-EF/Cryo, 11 February 1976) covered the design, fabrication, installation, commissioning and tests of the helium liquefaction/refrigeration plants.

   The performances for each plant were specified as follows:
   a) liquefaction duty: 100 l/h at 4.4 °K;
   b) refrigeration duty: 400 W at 4.4 °K;
   c) mixed duty: simultaneous liquefaction and refrigeration over the whole range from 100% refrigeration to 100% liquefaction.

3. The installation at the CERN site should start in October 1977 and the first plant be operational by the end of March 1978, with the other ones following at two-month intervals.

CALL FOR TENDERS

4. The tender documents were examined during a specification meeting on 20 February 1976 according to the procedure described in document CERN/FC/1564.

5. The invitation to tender was sent out on 27 February 1976, under reference III-186/SI (cf. letter to the members of the Finance Committee, reference SPS/DI-CP/RF/40.256, dated 10 February 1976) to
the following four firms, which to CERN's knowledge are the only companies in Europe capable of supplying this kind of equipment:

- BOC Ltd, London, United Kingdom
- L'AIR LIQUIDE, Champigny-sur-Marne, France
- LINDE, Höllriegelskreuth, Federal Republic of Germany
- SULZER, Winterthur, Switzerland

The closing date for tenders was 16 April 1976. At the request of two firms, this date was extended to 7 May 1976.

6. The tenderers were invited to quote a total price for three plants and a price for an option for one or two additional plants.

A price revision formula was proposed to the bidders, with a fixed part of 20%, and 30% and 50% for material and salaries respectively.

7. At the tender opening on 12 May 1976, each of the four firms contacted had submitted an offer. The quoted prices are given in the following table:

<table>
<thead>
<tr>
<th>Firm</th>
<th>Basic price for 3 plants SF</th>
<th>Price ratio</th>
<th>Price for 2 additional plants SF</th>
<th>Total price for 5 plants SF</th>
<th>Price ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULZER</td>
<td>2 696 100</td>
<td>1.000</td>
<td>1 707 500</td>
<td>4 403 600</td>
<td>1.000</td>
</tr>
<tr>
<td>BOC</td>
<td>3 755 900</td>
<td>1.393</td>
<td>2 438 800</td>
<td>6 194 700</td>
<td>1.407</td>
</tr>
<tr>
<td>L'AIR LIQUIDE</td>
<td>4 591 026</td>
<td>1.703</td>
<td>2 902 572</td>
<td>7 493 598</td>
<td>1.702</td>
</tr>
<tr>
<td>LINDE</td>
<td>7 950 000</td>
<td>2.949</td>
<td>4 800 000</td>
<td>12 750 000</td>
<td>2.895</td>
</tr>
</tbody>
</table>

ANALYSIS OF THE TENDERS

8. All tenderers accepted the delivery schedule requested by CERN.
L'AIR LIQUIDE and BOC agreed with the CERN price revision formula. LINDE and SULZER proposed their own method with one formula for delivery of materials and one for installation and tests.

9. The proposals submitted by all four companies represent valid technical solutions. The plants offered by BOC, L'AIR LIQUIDE and LINDE each include a LINDE compressor and a vertical cold box. SULZER proposes a compressor of its own and a horizontal cold box. The heat exchangers proposed by all companies are MARSTON-EXCELSIOR (United Kingdom). Each company offers turbines of its own design. The BOC, L'AIR LIQUIDE and SULZER turbines have gas bearings, whereas the LINDE turbines are oil-lubricated. All these items are of proven reliability.

10. After detailed analysis of the offers, BOC and SULZER, which have the lowest prices, were asked to complete their offers in order to meet the CERN specification in all points. Both firms quoted extra costs to fulfil the CERN requirements. The final prices for comparable offers are summarized in the following table:

<table>
<thead>
<tr>
<th>Firm</th>
<th>Total price for 3 plants SF</th>
<th>Price ratio</th>
<th>Total price for 5 plants SF</th>
<th>Price ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULZER</td>
<td>2 830 364</td>
<td>1.000</td>
<td>4 620 090</td>
<td>1.000</td>
</tr>
<tr>
<td>BOC</td>
<td>3 833 550</td>
<td>1.354</td>
<td>6 324 110</td>
<td>1.369</td>
</tr>
</tbody>
</table>

11. Since the tender was sent out, the SPS experimental programme has evolved in such a way that the option has to be taken up immediately. In addition, it has turned out to be necessary to purchase a complete spare compressor.

With these requirements the final prices are as follows:

<table>
<thead>
<tr>
<th>Firm</th>
<th>Price for 5 units SF</th>
<th>Price for one spare compressor</th>
<th>Total price</th>
<th>Price ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULZER</td>
<td>4 620 090</td>
<td>448 400</td>
<td>5 068 490</td>
<td>1.000</td>
</tr>
<tr>
<td>BOC</td>
<td>6 324 110</td>
<td>806 167</td>
<td>7 130 277</td>
<td>1.407</td>
</tr>
</tbody>
</table>
Application of the price variation formulae does not change the order of classification.

RECOMMENDATION

11. SULZER submitted a technically satisfactory proposal and quoted the lowest price. The Finance Committee is therefore invited to authorize CERN to negotiate a contract with SULZER for the supply of five helium liquefaction/refrigeration plants and one spare compressor at a cost not exceeding 5 200 000 Swiss francs, price subject to a revision formula.