

TENDER INFORMATION - IN CONFIDENCE23 February 1962NI/GP/62/10NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCEGENERAL PURPOSES COMMITTEEHeavy Liquid Bubble Chamber Magnet

Covering Note by the Secretary

The attached paper by the Chairman of the Nuclear Equipment Project Committee makes recommendations for the contract for the magnet for the Heavy Liquid Bubble Chamber. As will be seen, after a sustained effort, a satisfactory offer has been obtained at a price which can be met within the funds available, by making only a reasonable call on the sum set aside for contingencies.

Although the Committee do not now normally require contracts to be referred to them, it is thought right to submit this one for approval, and in doing so, to outline the history of the tendering, so that the questions of technical acceptability and of the selection of a foreign supplier, may be presented properly. In short, while the final choice seems to be quite clear, the history is rather complex and it is thought right to lay it before the Committee for review, and to ask for their endorsement.

Contract action is now required urgently and I shall be very grateful if members of the General Purposes Committee will reply by correspondence. A tear-off slip is included below for use if desired.

To: The Secretary
NIRNS
Rutherford High Energy Laboratory
Harwell
Didcot, Berks

GENERAL PURPOSES COMMITTEE - Paper NI/GP/62/10

Reply from

I approve/do not approve the recommendations in Paper NI/GP/62/10 for placing a contract with ACEC for the Heavy Liquid Bubble Chamber magnet.

Signed

15th February, 1962

NI/GP/62/10

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

GENERAL PURPOSES COMMITTEE

Heavy Liquid Bubble Chamber

Tenders for Magnet

1. The production of an intense magnetic field for the Heavy Liquid Bubble Chamber is a most important factor in its use in the proposed nuclear physics experiments. Moreover, the mechanical problems of the chamber have made it desirable to integrate the magnet with the bubble chamber structure; this problem did not arise in the National Hydrogen Bubble Chamber. The designers from University College (London) consulted a number of electrical firms and then proceeded to work out a detailed design of the magnet yoke and coils. Drawings of this design went out with the tender documents, but manufacturers were invited to submit alternative schemes if they wished.

2. To cover the maximum range of possible suppliers tenders were invited separately for the yoke and the coils (including some instrumentation) as well as for the complete magnet. Complete tenders were received from one British electrical firm out of four invited to tender, and from one European electrical firm out of two. Tenders for the yoke were received from two British steel firms out of four.

	<u>Yoke</u>	<u>Coils</u>	<u>Complete magnet</u>
A.E.I. (Manchester)	£44,555 ¹ .	£90,860	£135,415
	1. Ex English Steel Corp. including integration cost		
Oerlikon (Switzerland)	(£35,000 ² .)	(£73,000)	£108,333)not inclu-
	£42,000 ³ .	£73,000	£115,000)ding possible
			import duty
	2. German Steel (Ruhrstahl). Price breakdown inferred		
	3. Ex English Steel Corp. including cost of commissioning		
Firth Brown	£32,860		
English Steel Corp.	£38,500		

3. These results were not regarded as conclusive for two reasons -

- (i) The sum included in estimates for the magnet yoke and coils was £100,000. The contingency for the whole of the plant, of which the magnet is rather less than a half, is £40,000.
- (ii) The number of tenders submitted for coils was disappointingly low with resultant lack of technical and financial competition.

It was therefore considered justifiable to delay the programme in order to extend the competition and in particular to explore alternative methods of coil insulation.

4. After further discussions with the firms concerned, they were asked to re-tender for the coils. Six more firms (3 British, 3 European) were included but tenders were received from only two (1 British, 1 European).

	<u>Coils</u>
A.C.E.C. (Belgium)	£71,113/£71,165
Oerlikon	£68,930/£70,930
A.E.I.	£70,950
Harland & Wolff (Belfast)	£52,800

5. Because of the diversity and specialist nature of the products now being offered the best knowledge available in the Laboratory was used in assessing the technical merit of the offers and the capabilities of the firms to meet the requirements. Further visits were made by Rutherford Laboratory engineers and University College staff to the various factories. The design and construction proposed by Harland & Wolff was unanimously agreed to be totally unacceptable, and their lack of experience of any remotely comparable work was very obvious. The reduction in the A.E.I. price was achieved by drastic reduction of their specification. The Oerlikon product was substantially the same as previously offered. The new tender from A.C.E.C. clearly offered the best technical design and moreover would meet all the requirements of the original specification.

6. On the basis of this knowledge a new specification was drawn up for the coils to bring the various tenderers to a comparable basis. In the meantime, negotiations were stimulated between the electrical firms and the British steel firms with a view to reducing the price of the yoke. The complete specification was modified to place more emphasis on the desirability of the coil manufacturer being responsible for integration of the coils and yoke to form a complete magnet, and to include a number of tests which were now felt to be essential to ensure satisfactory operation of the magnet. The results were:

	<u>Yoke</u>	<u>Coils</u>	<u>Total</u>	<u>Delivery Months</u>
A.C.E.C.	£31,220 ¹ .	£75,550 ² .	£106,770	12/14
	With progress payments		£105,450	
Oerlikon	£31,070 ¹ .	£75,930 ³ .	£107,000	18
A.E.I.	£31,220	£79,350 ⁴ .		16/17
Cost of integrating yoke and coils				
from previous tender		£6,055	£116,625	
Harland & Wolff		£57,800		14
		(excluding over-voltage and surge protection)		
Firth Brown	£31,220)	Quotations to coil		9/12
English Steel Corp.	£31,220)	manufacturers		12

Notes:

1. Payment in Sterling
2. Payment in Belgian francs. Includes cost of integrating yoke and coils.
3. Payment in Swiss francs. Includes cost of integrating yoke and coils.
4. Not including cost of integrating yoke and coils.

7. The tenders have been assessed as follows:-

A.C.E.C. The technical ability of the firm is high and the insulation offered has all the properties required for a magnet coil with water cooling and intermittent use. Almost identical products have been made for a similar duty. The delivery is 12/14 months and a penalty clause is offered after 14 months.

Oerlikon The technical ability of the firm is high but the insulation offered is not quite so highly regarded as that from A.C.E.C. and consequently design concessions would have to be made. The delivery is 18 months and a penalty clause is offered.

A.E.I. The insulation offered is brittle and the firm have no experience of this material for a coil in any way approaching this size. Manufacture of a prototype and thermal cycling tests would resolve these doubts but at further cost and delay to the programme. The price is subject to variation clauses, and the delivery is 16/17 months with no penalty clause.

Harland & Wolff Again the technical quality of the tender was quite inadequate and this together with the complete dissatisfaction resulting from a visit to the firm makes it impossible to consider the offer further.

8. In further negotiations with A.C.E.C. it has been established that if progress payments are made (they are required in the A.E.I. tender) there will be a reduction in price of £1,320 leaving a total of £105,450 of which £74,000 is in foreign currency.
9. Experience at C.E.R.N. and in France on very similar coils for bubble chamber magnets and bending magnets has shown up the risk of coil failure in this type of operation. A number of serious breakdowns have resulted from the use of certain insulation materials and techniques which have been offered to us in earlier stages of this tendering exercise. On quality alone opinion is unanimously in favour of "Thermalastic" insulation offered by A.C.E.C. which has been most successfully applied to the magnet coils for the C.E.R.N. proton synchrotron and the C.E.R.N. 2 metre liquid hydrogen bubble chamber.
10. It is possible that import duty will not have to be paid, in which case the most desirable offer from A.C.E.C. is also the lowest acceptable tender.
11. If import duty has to be paid on the foreign currency part, the A.C.E.C. price will be increased by some £13,000, giving a new total of about £118,000. Although this is now marginally greater than the A.E.I. price it has the advantage of being a true fixed price without cost variation clauses.
12. It is recommended:-
 - (i) That a contract be placed with A.C.E.C. for the complete magnet.

- (ii) That the progress payment clause be accepted so as to give a fixed price of approximately £105,500 of which some £74,000 is in foreign currency.
- (iii) That the penalty clause be accepted.
- (iv) That the amount in excess of the sum in the approved estimate of £100,000 be taken from the contingency.

L. B. Mullett

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Chairman, Nuclear Equipment Project
Committee

Rutherford Laboratory,
Harwell.