Mr P. Bowles. RLBC/P.65

R.I.

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

RUTHERFORD LABORATORY BUILDING COMMITTEE

Site Power Distribution

1. Introduction

An assessment of all the power demands for the National Institute Site shows considerable overloading on most of the medium voltage supplies when the present and projected installed plant is fully operational unless action is taken now to put in hand further capacity. The total load envisaged is 14.8 M.V.A. which, when added to the A.E.R.E. load of approximately 10 M.V.A. means that both 15 M.V.A. grid transformers need to be in service.

2. New Grid Sub Station

The second Grid Sub Station will therefore be needed to alleviate this condition of loading and this is proposed for operation by the end of 1963, on a firm 30 M.V.A. basis, i.e. 2 x 30 M.V.A. transformers. A site on the North side of Fermi Avenue has been agreed.

3. Immediate Extensions

To cope with loads required within the next two years, four extensions or modifications to the existing distribution scheme are put forward below in paragraphs 4, 5, 6 and 7.

4. Sub Station 10

Direct loading for P.L.A. area to remain as at present through 2 - 1 M.V.A. transformers. Projected total connected load 1800 M.V.A. This figure includes for the proposal to remove from Sub 10 and connect to Sub 13, buildings R1 and R2 and their extensions.

5. Sub Station 12

At present, adjacent to the Converter Plant Room (Building R4) there are 2 - 1 M.V.A. transformers and space for a third. There is also the space originally reserved for 6.5 M.V.A. transformer.

Each of these rooms is large enough to house a 2 M.V.A. transformer (confirmed by Yorkshire Electric Transformer Co.).

There is also the space originally reserved for the 3.3kV switchgear which could be taken for 415 volt distribution.

It is proposed that 4 - 2 M.V.A. transformers be installed here, the two existing 1 M.V.A. ones being removed. Two would be fed from Sub Station 10 and

two from an 11kV switching station which would ultimately be fed from the new grid sub station (see paragraph 7).

The connected loads envisaged would be:-

5300 kVA (see Table I)

3300 kVA Beam Handling

These reduce to anticipated maximum demands of 4500 kVA and 2500 kVA respectively.

The medium voltage switchboard will require modification to install larger incoming circuit breakers and the removal of a bus section switch.

6. Sub Station 13

At present there is one - 1 MVA transformer connected, and a second 1 MVA transformer about to be connected and two cells are available for their occupation.

There is 16'10" space at the end of the Brush 3.3kV switchgear which could be partitioned off to give room for a third 1 MVA transformer and still leave enough space for some extensions to the Brush switchgear.

The projected load would be - 2100 kVA (See Table II).

There is room and some spare ways sufficient in the MV switchgear room to accommodate this increase.

7. New 11kV Switching Sub Station

The development of an extension to the experimental area and to the parasitic area in advance of the new experimental area and its power supplies, suggests a requirement for power on the West side of the Nimrod site. A position near Building R14 is suggested for an 11kV Switch Sub Station, having a capacity of 10 MVA. This would need to be fed from Sub Station 10 until the new Grid Sub Station is operative.

The short term need would be for a 1 MVA transformer for the parasitic area, and 1 MVA transformer for the experimental area extension. These transformers would be housed adjacent to the areas using their output.

In the long term plan 4 MVA will be needed for beam handling and up to 5MVA at 3.3kV for bubble chamber magnets for the future Western experimental area.

8. The Pulsating Load Supply

It is proposed to keep this unaltered. The 20 MVA Grid Transformer will be loaded as follows:-

Main Machines	9000 kVA)	Direct 11kV
Machine Excitation	800 kVA)	
4 Bubble Chamber D.C. sets	5140 kVA)	3.3kV
300 H.P. Compressor	260 kVA)	
Alternator Fans	420 kVA	415V
TOTAL	15620	

For future D.C. sets there will be available 5 MVA at 3.3kV.

9. The above outline is made to enable a policy to be determined and if agreed, details of cost and design to be worked out.

H. HADLEY
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TABLE I

Connected Load on Sub Station 12.

	kVA
Vacuum Pumps (Magnet and Injector Rooms).	750
Lighting and Cranes.	144
Refrigeration Board.	295
Air Conditioning Board.	205
Ripple Filter Board.	470
Injector Room Fuse Board.	150
Injector Room Dist. Board.	352
B.T.H. Modulator.	55
Fast Kicker, R.F. Chill, R.F.	288
Extractor.	300
Magnet Room Dist. Board.	360
Alternator House Boards A&B.	500
Converter House Board.	580
Cooling Tower Dist. Board.	105
Cooling Water and Water Treatment.	600
Water Plant Starter Board.	200
TOTAL (not including loads in experimental area)	5324

TABLE II

Connected Load on Sub Station 13.

	kVA
Building R.1	250
R.2	120
Amplidynes.	17
R.20	30
Booster Pump.	104
Compressors 1 and 2	220
R.1 Link.	40
B.C. Plant Room Ventilating.	47
A Panels and Lighting.	11
Bus Bar Trunking.	115
H.L. Chamber Annexe.	126
B.C. Annexe Fans.	58
Counting Room R2 C	80
Canteen R22	175
R1 Extensions.	220
R2 D (5 storey block extension).	125
New Heavy Laboratory.	400
TOTAL	2138

TABLE III

P.L.A. Load on Sub Station 10.

	kVA
R.12 (with R.13 and R.15).	625
Additional load May 1962 on R.12 (new building).	800
R.18	60
Stores.	20
Building R.8 and R.9.	300
TOTAL	1805
