

5 MW PULSE MAGNET AND CRYOSTAT DESIGN

1. Related Projects

60T, 100T Pulse Magnet and 45T DC Magnet

2. Magnet Support and Cryostat Design Concept

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(20.767 - 21.593)
LENGTH B (SHT 2)

(18.817 - 19.573)
LAYER 4

ø (13.078)

VIEW D
SHT 4 ZONE B3

VIEW C
4 ZONE B6

ID (8.845)

1907

181

161

F EPOXY

181

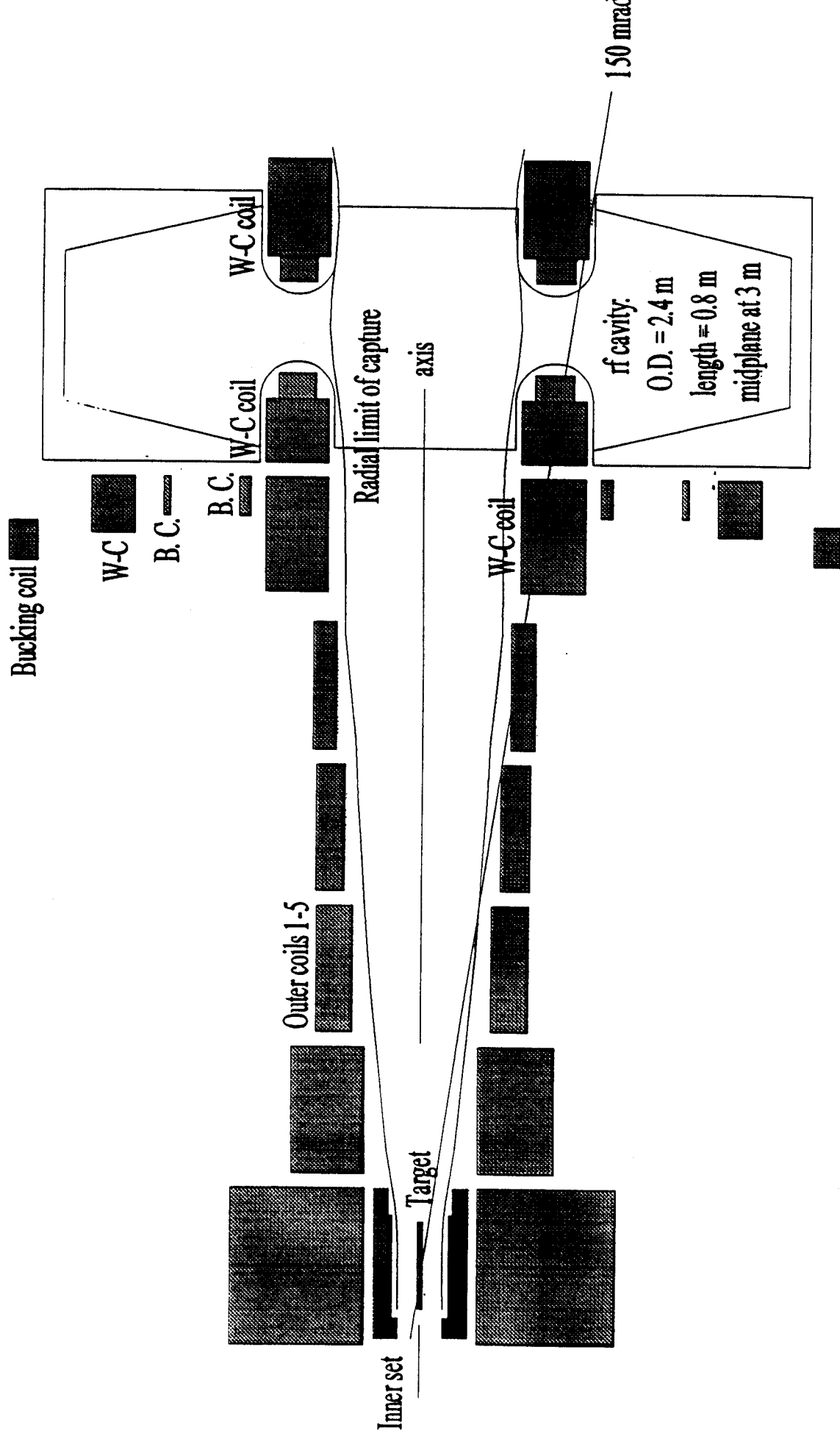
ENLARGED VIEW OF SECTION A-A

(FROM SHEET 2)

SCALE: 2/1

5 MW Pulse Magnet with Three Uncooled Bucking Coils

1.35 MW Water-Cooled Coils; 8.4+4.8=13.2 Metric Tons



Coil #	Axial Location		Radial Location		Current Density
	Z1	Z2	R1	R2	
	(cm)		(cm)		KA/cm2
Inner 1	-39.9	-33.0	5.84	9.44	19.18
Inner 2	-39.9	2.4	9.44	10.22	17.91
Inner 3	-39.9	11.3	10.72	13.29	17.96
Inner 4	-39.9	11.3	13.29	15.74	18.78
Outer 1	-41.9	11.3	18.74	63.84	2.174
Outer 2	16.3	60.7	18.89	42.71	2.174
Outer 3	65.7	110.2	23.23	35.08	2.174
Outer 4	114.2	155.6	26.11	35.50	2.174
Outer 5	164.6	209.0	28.92	36.11	2.174

Inner Coils Set	1.24 MN	0 Deg.
Outer 1	4.72 MN	180 Deg.
Outer 2	4.52 MN	180 Deg.
Outer 3	0.96 MN	180 Deg.
Outer 4	0.32 MN	180 Deg.
Outer 5	0.34 MN	180 Deg.

These forces agreed well with the BNL analysis.

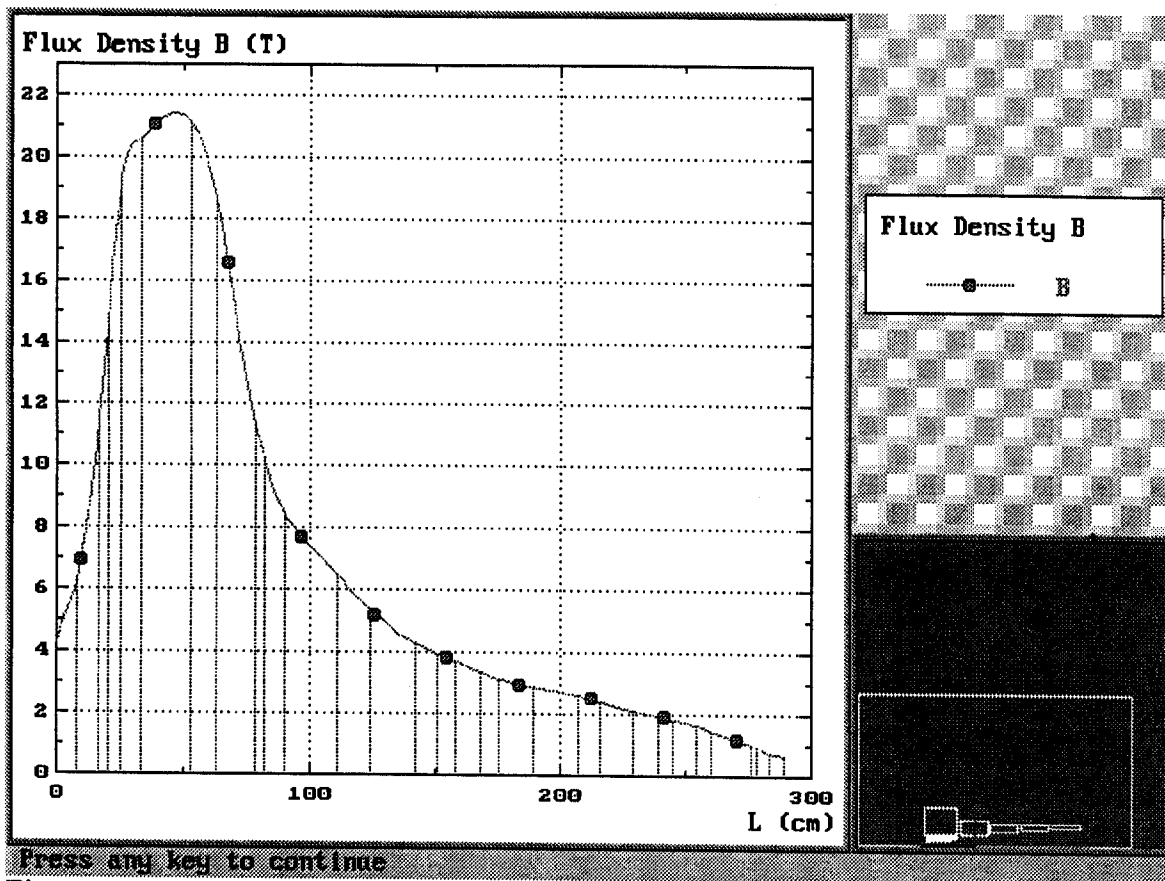
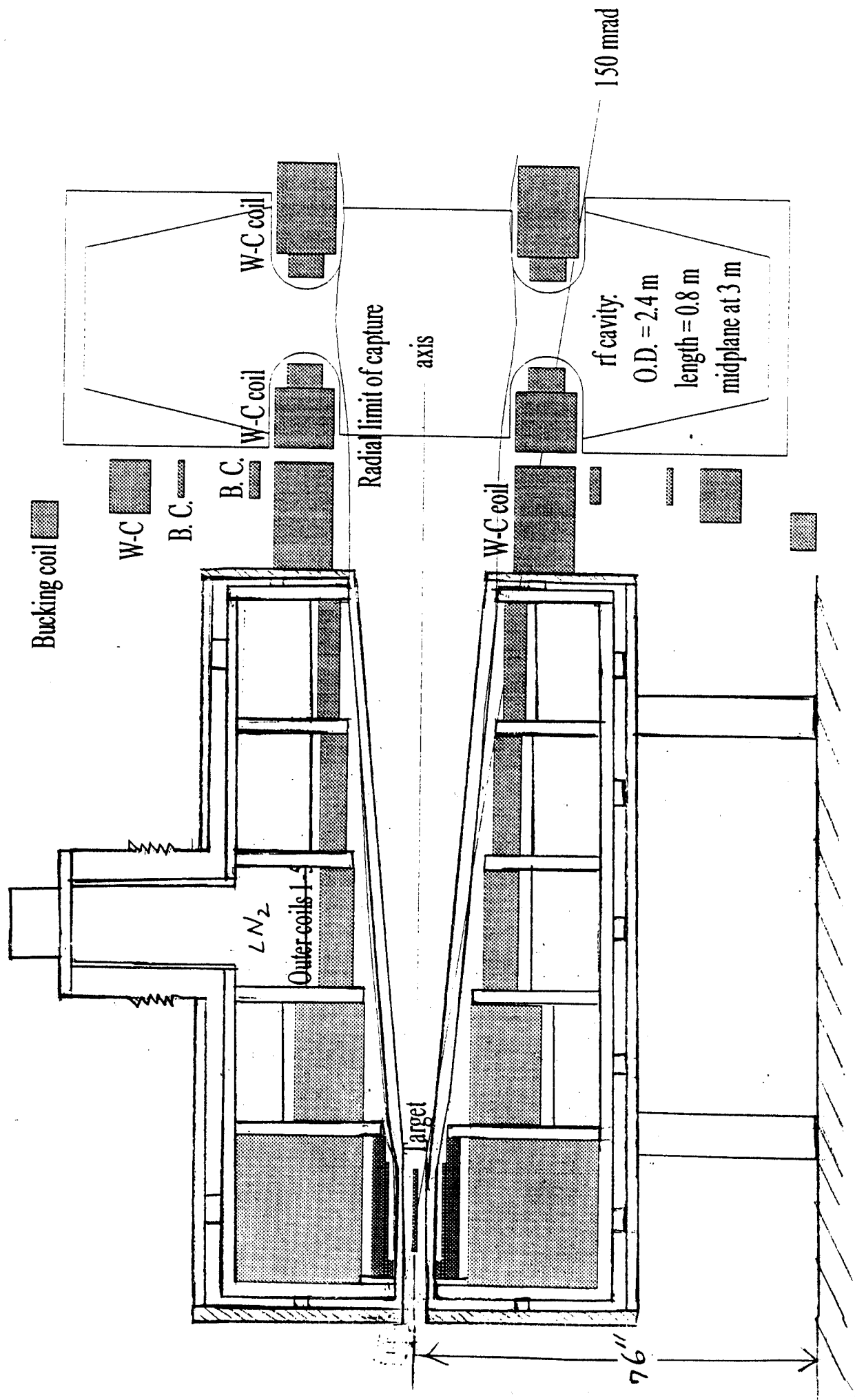


Figure 1, Magnetic Field Profile for BNL 20T Pulse Coils @80K

5 MW Pulse Magnet LN2 Cryostat Concept



We summarize the proposed tasks for the Phase I work in the followings:

1. Magnetic Field and Forces Calculation to include water cooled coils.
2. Coils Support Analysis: Material, Geometry, Stress, Mounting Interface.
3. Conceptual Coils Support Design
4. Conceptual Cryostat Design
 - 4.1 Working Pressure, Volume and Heat Leak Design Requirement
 - 4.2 Geometry, Material Selection for LN2 and Vacuum Walls
 - 4.3 Coils Assembly Supports
 - 4.4 Vacuum Space Requirement and MLI Insulation Design
 - 4.5 Coils Support Penetration.
 - 4.6 Fill and Vent and Pump-out Design
 - 4.7 Safety Analysis :Pressure Relief and Burst Disc
 - 4.8 Current Leads and Feed-through design
 - 4.9 Instrumentation and Feed-through design