NCSX June 2007 ETC
TABLE II- Materials and Subcontracts

WBS Number: 162
WBS Title: Coil Electrical Leads
Job Number: 1601-162
Job Title: Coil Electrical Leads
Job Manager: Paul Goranson

Description:
This effort covers all coil leads that connect the coil terminals to the buswork at the boundary of the cryostat. The lead cables are all the same except for length, and will be procured from a qualified vendor. All installation will be performed as pa

Assumptions:

			Basis of Estimate
outside engr rate =	120	$ per hour	Based on recent experiences on NCSX and UT work being done at MDL
outside fab rate =	60	$ per hour	Based on recent experiences on NCSX and UT work being done at MDL
outside inspection/technician rate =	80	$ per hour	Based on recent experiences on NCSX and UT work being done at MDL

TOTAL MATERIAL COST = $86,687

Purchased parts:

set of cables	$0		
misc attachment hardware	$11,091	@10$/ft	
thermal transition box material	$0		Based on recent experiences on NCSX and UT work being done at MDL
subtotal, purchased parts	$11,091		

Lead bundles consist of six, 250 MCM cable with teflon sleeve. Lead ends are cooled by bleed liquid nitrogen supplied by the coil coolant header (WBS 161)
Leads connect from coil terminals to buswork at bottom of machine.
Each coil is connected separately except PF1 and PF2, which are connected in series within the central solenoid assembly

Purchased materials for in-house fabrication and sub-assembly

None required	$0	
subtotal purchased materials	0	

Worksheet, TF Coils:

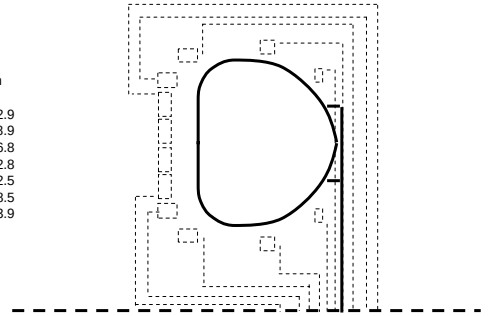
Lead cost, TF Coils

Terminations,assembly	$200	ea	Based on recent experiences on NCSX and UT work being done at MDL
Cable with teflon insulation, reinforced teflon outer jacket	$50	per foot	Based on recent experiences on NCSX and UT work being done at MDL
Total number of cables	18		
Total length of cables	277		
Total cable cost	**$17,452**		

Geometry

radius of vertical runs	12	ft
height of upper terminals	11	ft
height of lower terminals	7	ft

Lengths	terminal radius (m)	height from floor (ft)	cable length (ft)
coils at 10, 130, 250 degrees	3.00	11.00	12.9
coils at 70, 190, 310 degrees	3.00	7.00	8.9
coils at 30, 150, 270 degrees	3.00	11.00	16.8
coils at 90, 210, 330 degrees	3.00	7.00	12.8
coils at 50, 170, 290 degrees	3.00	11.00	22.5
coils at 110, 230, 350 degrees	3.00	7.00	18.5
Subtotals			73.9
Total length	222	ft	
25% extra for bends, offsets	55		
Total procured length	**277**	ft	
Avg length per cable	15	ft	



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Worksheet, PF Coils:

Lead cost, PF Coils

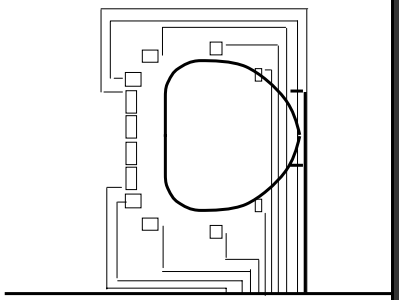
Terminations,assembly	$200 ea	
Cable with teflon insulation, reinforced teflon outer jacket	$50 per foot	Based on recent experiences on NCSX and UT work being done at MDL
Total number of cables	10	Based on recent experiences on NCSX and UT work being done at MDL
Total length of cables	181	
Total cable cost	**$11,052**	

Geometry

radius of vertical runs	10 ft
height of upper runs	12 ft
height of connection to buswork	0 ft

Lengths	terminal radius (m)	height from midplane (m)	top length (ft)	bottom length (ft)
TF Coils				
PF1, PF2, connected in series as assy	0.00	1.30	29.7	14.3
PF3	0.00	1.30	29.7	14.3
PF4	0.69	1.60	26.5	13.0
PF5	2.23	1.50	7.6	7.6
PF6	2.80	1.00	4.1	4.1
External Trim Coils				
Mod Coils				
Subtotals			97.7	53.2

Total length	151 ft
20% extra for bends, toroidal offsets	30
Total procured length	**181** ft
Avg length per cable	18 ft



Worksheet, Error field correction coil leads:

Lead cost, Error field coils

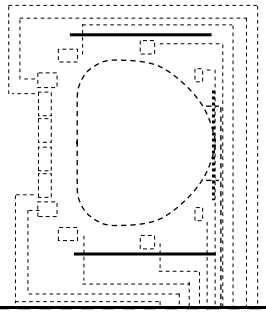
Terminations,assembly	$200 ea	Based on recent experiences on NCSX and UT work being done at MDL
Cable with teflon insulation, reinforced teflon outer jacket	$50 per foot	Based on recent experiences on NCSX and UT work being done at MDL
Total number of cables	2	
Total length of cables	104	
Total cable cost	**$5,620**	

Geometry

radius of vertical runs	12 ft
height of upper terminals	12 ft
height of lower terminals	6 ft

Lengths	terminal radius (m)	height from floor (ft)	cable length (ft)
coils at 0 degrees, top and bottom	3.00	12.00	13.9
Subtotals			13.9

Total length	84 ft
25% extra for bends, offsets	21
Total procured length	**104** ft
Avg length per cable	52 ft



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Worksheet, Mod coils:

Lead cost for modular coils

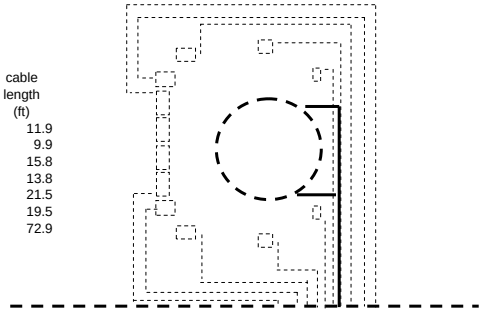
Terminations,assembly	$200 ea	**Based on recent experiences on NCSX and UT work being done at MDL**
Cable with teflon insulation, reinforced teflon outer jacket	$50 per foot	**Based on recent experiences on NCSX and UT work being done at MDL**
Total number of cables	36	
Total length of cables	547	
Total cable cost	**$34,529**	

Geometry

radius of vertical runs	12 ft
height of upper terminals	10 ft
height of lower terminals	8 ft

Lengths	terminal radius (m)	height from floor (ft)	cable length (ft)
coils at 10, 130, 250 degrees	3.00	10.00	11.9
coils at 70, 190, 310 degrees	3.00	8.00	9.9
coils at 30, 150, 270 degrees	3.00	10.00	15.8
coils at 90, 210, 330 degrees	3.00	8.00	13.8
coils at 50, 170, 290 degrees	3.00	10.00	21.5
coils at 110, 230, 350 degrees	3.00	8.00	19.5
Subtotals			72.9

Total length	219 ft
25% extra for bends, offsets	55
Total procured length	**547** ft
Avg length per cable	15 ft



Worksheet, lead thermal transition box

66 leads, 11 to a box	size (in)	number reqd	cost ea		total	
sheet material, foil backed insul. foam	1 x 48 x 96	5	25	$	125	**Based on recent experiences on NCSX and UT work being done at MDL**
end seals	1" tube x 6"	22	20	$	440	**Based on recent experiences on NCSX and UT work being done at MDL**
cryo epoxy		.5 lb	28	$	14	**Based on recent experiences on NCSX and UT work being done at MDL**
misc mount hardware, ss base frame				$	500	**Based on recent experiences on NCSX and UT work being done at MDL**
foam caulk	16 oz	4	4	$	16	**Based on recent experiences on NCSX and UT work being done at MDL**
acryic sheet window	3/8" x 12 x 24	1	62	$	62	**Based on recent experiences on NCSX and UT work being done at MDL**
assembly	40 hr each=	40				**Based on recent experiences on NCSX and UT work being done at MDL**
				$	1,157	each
number required for test floor					6	
			Total hrs for fab		240	
			Total M&S	**$**	**6,943**	