

US LHC Accelerator Project		Baseline Change Request
BCR Number	10	
WBS	1.1.1 IR Quadrupoles	
Title	Cost Increase for IR Quadrupoles R&D Phase 1	
Change Control Level	2	
Originator	J. Kerby	
Date	15 Feb 1999	

Description of change

Increase the number of short (2 m) model magnets to be designed, fabricated, and tested in Phase 1 of the IR Quadrupole R&D program from the four models in the original baseline to seven, an increase of three.

Reason for change

While most of the IR quadrupole magnet performance parameters have been demonstrated by the testing of the model magnets, the quench performance through the first four magnet tests was not acceptable. (Note: the first three models were tested and one of them was modified and tested a second time. The fourth model magnet constructed has been removed from the test plan.)

The first of the additional Phase 1 model magnets has been built and is currently under test. The early test data show much improved quench performance. The quench performance still needs to be improved somewhat, and further design changes are planned for test in Phase 1 model magnet numbers six and seven.

Phase 2 of the model magnet program still contains the originally planned two short (2 m) model magnets, now numbered eight and nine.

Impact on other sub-systems

This BCR documents the cost increase and milestone changes at Fermilab, i.e. those associated with all of WBS 1.1.1 except 1.1.1.5 Cable and Wedges and 1.1.1.7.5 Cold Mass EDIA (LBNL), which represent work that is done at LBNL. There may also be a cost increase at BNL due to increased cable testing as part of the quadrupole Phase 1 R&D program. These will be documented in one or two BCRs to be prepared in the near future.

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Impact on cost

The cost impact is +\$1404.0K, broken out as follows:

WBS 1.1.1.2.1 Cold Mass, R&D (+\$95.2K).

Technician labor for the additional mechanical model effort to support R&D experiments of designs incorporation into the short models. FTE levels were estimated for cable cleaning and baking, coil winding and curing, collar assembly, and model assembly which were converted into hours for costing.

WBS 1.1.1.2.2 Cold Mass, 2m Models (+\$644.4K).

Parts, materials, and technician labor to assemble the remaining model (#6) and the models added by this BCR. Parts and materials were estimated at the same levels as the baseline per unit cost while the technician labor was increased to recognize the fact that it is taking more labor to assemble models than had been forecast in the original baseline. The per unit labor increase covers only the models not yet assembled (6 through 9). The cost variance experienced through model 5 will continue to exist.

WBS 1.1.1.4.2 Magnet Testing, Short Models (+\$194.4K).

Materials and technician labor to test the additional models. These were estimated at the same unit cost as the baseline.

WBS 1.1.1.7.2 EDIA, Cold Mass (+\$314.7K).

The additional physicist, engineering, design, and drafting effort required to support the changes being made to each new model. Total FTE requirements were estimated for the eight month period from 1 Mar 99 to 31 Oct 99 (the period for models 6 through 9) and then compared to previous time-phased budgets to determine the additional effort required.

WBS 1.1.1.7.4 EDIA, Magnet Testing (+\$155.3K).

The additional physicist, engineering physicist, and engineering effort to support three additional tests. These were estimated at the same unit test cost as the original baseline.

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Impact on schedule

Due to the addition of three short model magnets to the Phase 1 program, the completion of testing of the last Phase 1 magnet will be delayed from 11/3/98 to 8/13/99. This, in turn, delays the completion of testing of the last Phase 2 (proof of principle) magnet from 6/22/99 to 11/4/99. The Level 2 and Level 3 milestones that are affected by these schedule changes are as follows:

<u>Level</u>	<u>Number</u>	<u>Description</u>	<u>Old Date</u>	<u>New Date</u>
3	3-1.1.1-7	Complete model program phase 1	3/1/99	9/1/99
2	2-1.1-2	Complete model program phase 1	6/1/99	12/1/99
3	3-1.1.1-14	Complete model program phase 2	10/1/99	12/1/99
2	2-1.1-3	Complete model program phase 2	1/1/00	3/1/00

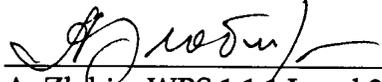
Other impacts (ES&H, etc.)

None

Change Control Board recommendation (if required)

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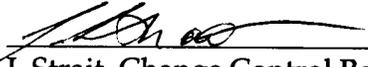
Approvals



 A. Zlobin, WBS 1.1.1 Level 3 Manager 03/22/99
Date



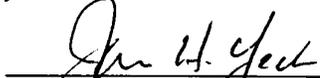
 J. Kerby, FNAL LHC Laboratory Project Manager 03/22/99
Date



 J. Strait, Change Control Board Chair 26 Mar 99
Date



 J. Strait, US LHC Accelerator Project Manager 26 Mar 99
Date



 J. Yeck, DOE LHC Project Manager 26 Mar 99
Date

Not Required

 Director, DOE Division of High Energy Physics Date