

U.S. ATLAS PROJECT RESEARCH PROGRAM CHANGE PROPOSAL (RPCP)

1) RPCP Number: 3		2) RPCP Title: FY2007 Research Program Re-Baseline	
3) Budget Number: WBS All		4) MSA Title: U.S. ATLAS	
5) Date Submitted (Project Office): 12/12/2006			
6) Change Designation: Priority <input type="checkbox"/> Routine <input checked="" type="checkbox"/>		7) RPCP Level Level 0 <input type="checkbox"/> Level 2 <input checked="" type="checkbox"/> Level 1 <input type="checkbox"/> Level 3 <input type="checkbox"/>	
		8) Directed Change? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
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14) Change Description:			
<u>2 Computing</u>			
See Annexed Computing WBS changes and Milestone changes/additions. 2.1 Physics – Event Generators now part of software.			
2.2 Software – The Software changes are due to the decrease of the manpower for Software Coordination, while the manpower for Root, ASC Support, Graphics and DDM has been increased.			
2.3 Facilities – No large change.			
<u>3 Maintenance & Operations (M&O)</u>			
3.1 Silicon - The major increase in the FY07 budget for Silicon was to support pixel integration and pre-commissioning. Several problems arose with the pixel system, which required considerable labor and some re-fabrication. These included faulty joints in the barrel cooling pipes, breaks in the fine wires making up the electrical service harnesses and failures of the optical transmitters. While most of these problems did not involve US deliverables, the US had the necessary manpower and expertise to contribute to the solutions. There was a general call from ATLAS management for institutions, not just those that are part of the Pixel community, to contribute whatever help they could in order to resolve these problems and have the pixel system ready before closure of the ATLAS detector in 2007. The increase in the LBNL budget was to pay for extra technical support, COLA for people at CERN and some fabrication of replacement cooling parts. The additional funds for the other Pixel institutions were primarily to cover COLA for the technical staff sent to CERN in response to this call for added help. The additional SLAC funds are to cover salary and COLA for one professional programmer needed to solve specific issues with the Pixel readout system. The small increase in Wisconsin funding was to cover a change in overhead rate for LBNL personnel working on RODs and supported by Wisconsin.			
3.2 TRT - The main increase in cost is for the UPenn budget. Due to the delay in getting barrel installed and the expected time for completion of the DAQ, we had to extend the Electrical Engineering support for 3 months and the DAQ computing personnel for 8 months, as well as cover the extra travel involved.			
3.3 Liquid Argon – The major increase in FY07 budget for Liquid Argon Calorimeter is mostly due to the continuing problems discovered during commissioning of the front-end electronics and the breakdown of low voltage power supplies. The insufficient number of available power supplies slowed down the commissioning and required multiple moves of the available units. During commissioning we found about 15% of the front-end boards that need to be repaired mostly due to problems with the signal shapers. The major part of the increase at BNL is related to the increase of the number of tests of the retrofitted power supply units and to troubleshooting the causes of the failures. The remaining increases are related to the work planned for the campaign to burnout shorts observed after cool down of the cryostats. The procedures for burnout require the isolation of the high voltage supplies for specific calorimeter areas and the removal of endangered electronics from the front-end crates. The burnout procedures will take about 3 months for each of the cryostats.			
3.4 Tile - Commissioning of the Tile Calorimeter by sectors (groups of 16 module readout "drawers") proceeded more slowly than expected in FY 2006. As a result, more commissioning work remains to be completed in FY 2007 and the estimate of the effort required to complete the remaining tasks has increased. Sector commissioning has been slow for two main reasons. The first reason is that services including signal cables and fibers and pipes for cooling water were not installed by ATLAS on the originally foreseen schedule. The second reason, more connected with the work of the Tile Calorimeter group itself, is that significant modification has been found necessary in the low voltage power supplies that provide power for the readout electronics before they will fully meet the operating requirements of the Tile Calorimeter readout drawers. Thus unexpected levels of effort have been needed to understand the properties of the power supplies. Substantial progress has been made, but the work continues in FY 2007. In addition, the drawers themselves have had more problems and have taken additional effort for diagnostics and repair beyond what was anticipated.			

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3.5 Muon - The M&O FY07 budget is increased by 1.773 M\$ because of schedule delays in the Small Wheels - due to the lack of beneficial occupancy of B191, where the ECTs are being integrated, and the delay in the installation of MDT BW sectors in UX15 determined by the overall ATLAS installation schedule. Relative to the original budget planning, the installation and integration of the Muon MDT EC System has accumulated almost a year's delay. It is estimated that the manpower level at CERN will have to be sustained at approximately the FY06 level for another fiscal year in order to complete the integration and commissioning of US ATLAS Muon EC deliverables.

3.6 Trigger/DAQ – TDAQ M&O costs are increased in order to provide more effort in the following areas: hardware commissioning (MSU, UCI); hardware maintenance (UCI); software commissioning (MSU); software maintenance (UCI, Wisconsin); detector data acquisition support (UCI); support of other TDAQ subsystems (Wisconsin); and systems operations (UCI, Wisconsin). (Institutions named in parentheses are the primary institutions providing additional effort.) Additional effort is needed to account for an earlier transition than originally planned from Construction activities to Maintenance & Operations activities such as hardware and software commissioning and maintenance. Additional effort is also required to cover previously unbudgeted effort, primarily in the areas of support of detector data acquisition development and commissioning, support of commissioning of other TDAQ subsystems such as LVL1 and HLT algorithms, and operations of pre-series data acquisition system.

3.7 Common – The major change is the addition of the cost of Commissioning and Integration. The U.S. was assigned a pro-rata share of the Cost-to-Complete of 12.2 MCHF. We committed 6.2 MCHF and at the October 2006 Resource Review Board meeting, pledged 1.5 MCHF for FY07 with a best effort in subsequent years, for a total 6.0 MCHF.

3.9 Program Management – We lost the Project Engineer from the Program Management office and reduced our planned expenses.

3.10 Technical Coordination - There are serious issues that came up in the last few months that needed additional U.S. support. BNL had to take over the design of the JTT in the EC Toroid as well as additional design work related to the integration of the small wheels.

4.0 Upgrade R&D – 4.1 The increase in WBS 4.1 is almost entirely for one item. This is for R&D on a new pixel front-end chip in 0.13 micron CMOS technology. The work is to be done by LBNL and they have hired an experienced analog designer to work on this chip. This is a crucial item for the upgrade and it will take a significant amount of time to develop an optimized chip. WBS 4.3: The initial budget was insufficient for all projects in this WBS since it was only about two-thirds of last year's allocation. The increased funds are needed for all subprojects in this WBS. These are: Studies of layer buildup in the forward calorimeters, development of new readout electronics, a new ROD for readout the signals, and radiation hard low voltage power supplies. WBS 4.5: The muon work involves a radiation monitoring system that will allow validation of the radiation numbers that are crucial for understanding the requirements of the upgrade. This work is nearly complete and the \$10k increment is to allow completion of this work before the detector is closed up.

15) Change Justification:

Pre-operations and serial commissioning efforts are intertwined with the ATLAS Installation schedule. These efforts are required now in order to maintain the installation schedule.

16) Impact of Non-Approval:

The ATLAS Commissioning schedule will be adversely impacted if this Change is not approved.

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19) Impact on Cost Baseline:		Baseline (AY\$ in Thousands)	Proposed (AY\$ in Thousands)	AY\$ Change
2.2 Software		5,273	5,268	(5)
2.3 Facilities		9,816	9,844	28
2.0 Total Computing		15,089	15,112	23
3.1 Silicon		1,352	2,095	743
3.2 TRT		378	547	169
3.3 Liquid Argon		1,868	2,716	848
3.4 Tile		1,131	1,531	400
3.5 Endcap Muon		941	2,714	1,773
3.6 Trigger/DAQ		1,223	1,814	591
** Common Funds Cat. B (Included in subsystems above)		859	1,066	207
3.7 Common Funds Cat. A		1,400	1,630	230
3.7.2 Cost-to-Complete		-	1,256	1,256
3.8 Outreach		46	50	4
3.9 Program Management		1,060	600	(460)
3.10 Technical Coordination		970	1,137	167
3.0 Total M&O		10,369	16,090	5,721
4.1 Silicon Upgrade R&D		1,593	2,015	422
4.3 Liquid Argon Upgrade R&D		514	1,053	539
4.5 Muon Upgrade R&D		-	10	10
4.0 Total Upgrades		2,107	3,078	971
Total U.S. ATLAS Research Program		27,565	34,280	6,715
20) Impact on Funding Profile:				
The budget has been adjusted to meet the latest guidance from the agencies.				
21) Explanation of Impact on Cost and Funding Baselines:				
The cost baseline has been decreased to match the Funding baseline.				
22) Other Impacts: (Health, Safety, Environment, etc.)				
None				
23) Interim or Corrective Actions:				
Not Applicable				

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PROGRAM DISPOSITION - LEVEL 3

26) REVIEW	RECOMENDATIONS:
U.S. ATLAS Research Program Manager M. Tuts 	Disposition <input checked="" type="checkbox"/> Approve <input type="checkbox"/> Reject DATE: 12/15/06
Acting BNL Associate Laboratory Director P. Bond	Disposition <input type="checkbox"/> Approve <input type="checkbox"/> Reject DATE:

LHC PROGRAM MANAGER DISPOSITION – LEVEL 2

DOE/NSF U.S. LHC Program Manager T. Ferbel	Disposition <input type="checkbox"/> Approve <input type="checkbox"/> Reject DATE:
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AGENCY DISPOSITION - LEVEL 1

27) Joint Oversight Group	RECOMMENDATION
Title: _____ Date _____	
ATLAS/CERN	RECOMMENDATION
Title: _____ Date _____	
DISPOSITION	
Chairperson _____ Date _____	<input type="checkbox"/> Endorsed <input type="checkbox"/> Approved <input type="checkbox"/> Rejected
34) Explanation (If Action is Approved with Conditions, or Not Concurred Upon)	

