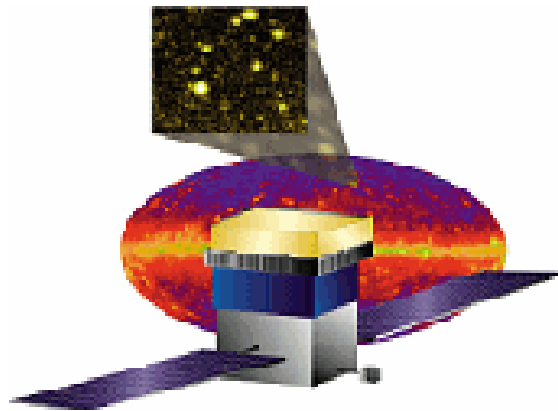


Monthly Progress Report

(Month Ending April 2005)

GLAST Large Area Telescope (LAT)



LAT-MR-06709-01

June 1, 2005

1.0 Introduction

This monthly progress report is submitted to the GLAST Project Office at the Goddard Space Flight Center and the Department of Energy SLAC Site Office. The report summarizes LAT project status as of the end of April, 2005.

2.0 Recent Progress and Status

4.1.4 Tracker

The third and fifth towers underwent thermal-vacuum testing. There were some small losses of efficiency from wire-bond encapsulation delamination; nevertheless, both towers gave excellent performance. All tests on the fourth tower were completed, including EMI/EMC qualification testing, and the tower is now ready for integration. The sixth tower was assembled, after some delay for cable delivery. It is now ready for environmental testing. All trays for the seventh tower are assembled and tested.

The new multichip module (MCM) pitch-adaptor bonding fixtures have dramatically increased yield and production speed. There are still occasional problems with pitch-adaptor trace cracking. There remains some concern about the MCM production rate reaching and holding the level needed to keep up with tray assembly, but so far the ramp-up is on target, with 33 MCMs delivered the last week of April.

Tray panels needed for assembly midway through the ninth tower have been produced, and so far Plyform is on track not to delay the ninth and tenth towers. There are now enough bottom trays for assembly through the tenth tower. Tungsten for the last one or two towers is being procured. The secondary vendor for ladder assembly, Mipot, is gearing up to assembly 300 ladders, while G&A is winding down production of its share of ladders. Sidewall fabrication is complete up through the 15th tower.

Connector cracking during installation of the flex-circuit cables is under investigation. In most cases Parlex has recently been rejecting connectors that are perfectly usable, resulting in needless and risky rework of the cables, so the connector acceptance criteria are being revamped. An alternate source of flex-circuit cables has been identified, and the purchase order has been placed to mitigate risk of program delay.

4.1.5 Calorimeter

All Calorimeter modules have been assembled; the first ten have either been shipped to SLAC or are ready to ship. EMI/EMC testing was completed on the final six modules. Vibration testing was completed on the final four modules. Thermal vacuum testing was completed on the final eight modules. Mass properties measurement is underway for the eleventh through fourteenth modules. Final comprehensive performance tests and calibration are being conducted on the final eight modules.

4.1.6 Anticoincidence Detector

A spontaneous increase in noise in some ACD channels has been traced to phototubes. Hammamatsu has reproduced the problem on one phototube sent back to them and one of

their own. Extensive long-duration tests have turned up just six noisy channels. Three were found at the PMT subassembly level and three were found on fully assembled flight electronics chassis. The three noisy PMTs on the electronics chassis have been replaced. Seven chassis have completed vibration and thermal-vacuum testing. Two chassis have been integrated to the ACD. All spare PMT assemblies have been completed. ACD channels were operated with an external trigger, using a muon hodoscope to emulate a Tracker. There are working versions of all but one of the ACD tests scripts.

4.1.7 Electronics, Data Acquisition, and Flight Software

Transistors which had not been tinned were replaced on the third and fourth Tower Electronics Modules (TEMs) and Tower Power Supplies (TPSs). Some resistors were changed and one capacitor added to eliminate the oscillation discovered last month. Power distribution unit (PDU) assembly has been delayed at the vendor, and is expected to be completed in early May. An analog mux card for thermal vacuum test has been fabricated and assembled. The vacuum feed-through plate was received, installed, and is being leak-tested. A bottleneck has occurred at the vendor concerning PDU, GASU, and peripheral component interconnect connector assembly tests, resulting in additional delay. The SIU/EPU (spacecraft interface unit and event processor unit) board is being refabricated due to coupon failures. Five SIBs (spacecraft interface boards) and backplane boards were submitted for fabrication. The harness is being assembled. Two-tower testing support architecture was completed. The prototype virtual spacecraft simulator is under construction.

A substantially complete version of the intertask layer is being used to integrate the flight software packages into a coherent suite of functionality (the initial baseline candidate release). Development of the charge injection, mode control, and configuration packages continued. Command and telemetry was added to the LAT thermal control package. A command and telemetry database for the ground readiness test was delivered. The filter was tested on the test bed.

4.1.8 Mechanical Systems

The cross-LAT (X-LAT) assembly is complete. An MRB will be held to address the disbands at the ends of heat-pipe flanges on the X-LAT. The instrumentation build and installation of heaters, cabling, sensors, and thermostats on the radiators is underway. Planning is underway for vibration/acoustic testing. Design of the shaker interface plate for the sine vibration test is completed; hardware is being built. Design of the acoustic test support fixture is nearing completion. Planning is underway for the radiator panel thermal-vacuum testing; ground support equipment design has started. The procurement process for the grid static load test has started.

4.1.9 Integration & Test (I&T)

Receiving tests on the fourth Tracker tower were completed.

The test plan and electronics ground support equipment (EGSE) procedures for the two-tower test were completed. Installation of the two-tower EGSE was completed. Post-integration tests were completed in two grid bays.

Effects at the percent level on the first tower data are under study. Monte Carlo simulations have been generated for two towers with calibrations.

Version 4.8.3 of the LAT Test Executive (LATTE) was released, and installed in flight directories in the LAT I&T facility. The first design of LATTE 5 is being circulated for comment.



Figure 1: LAT Integration & Test team, with two towers installed on grid.

3.0 Schedule Status

The critical paths for the project are the fabrication of the Tracker MCMs and trays, as well as the fabrication of the LAT Communications Boards. There are 21 days of float to the shipment of the LAT.

The status of significant milestones is summarized in Attachments 1 and 2. Attachment 1 presents the status of the Level 1 and Level 2 milestones. LAT integration has commenced (1M1000740).

Attachment 2 shows the status of the remaining Level 3 milestones. The following level 3 milestones were completed during this reporting period:

Milestone Number	Description	Date Completed
1M79180	Demo: Inter-task Communications	4/15/05
1MRTS030	Calorimeter Module 6 Ready to Ship	4/25/05
1MRTS040	Calorimeter Module 7 Ready to Ship	4/25/05
1MRTS050	Calorimeter Module 8 Ready to Ship	4/25/05
1M99010	Start 2-Tower Comprehensive Performance Test	4/25/05

Unfavorable variance projections greater than one week are discussed below, listed by responsible subsystem.

4.1.4 Tracker

Delivery of the third Tracker tower (1M1000220) was delayed by failure of one ladder during thermal-vacuum testing. The tray was removed and environmental testing will be done in parallel with the fifth tower, resulting in minor impact to the overall schedule.

The fourth tower (1M1000221) was used for EMI/EMC qualification testing, delaying its ready for integration status.

The sixth tower (1M1000251) was delayed, awaiting readiness for thermal-vacuum testing of the seventh tower (1M1000260). The seventh tower was delayed for two reasons. After initial assembly, a problem was discovered with the wire bonding on one tray, which had to be removed and reworked. During removal process, a flex-circuit cable connector was damaged, and there was a delay in securing a replacement due to availability issues. A workaround plan for testing was implemented, and the sixth and seventh towers will be shipped in May.

4.1.6 Anticoincidence Detector

The ACD test scripts (1M1001000) milestone has been delayed due to the need for additional testing, and as more is learned about the performance of the ACD electronics. This milestone is not expected to be completed until the ACD is fully assembled and tested.

4.1.7 Electronics

The following milestones have been delayed at the assembly vendor. The LAT project continues to work with the vendor to improve the situation.

- Flight PDU Box (1M17942000)
- Flight GASU Box (1M7941070)
- LCB Flight Units (1M7R050)
- Flight Event Processor Units (1M7941090)
- Flight EPU/SIUs (1M7R040, 1M7R010, 1M7R020, 1M7R030, 1M7941080)

Performance issues have slowed the progress of the TEM and TEM/PS production. The third through fifth modules (1M79001030, 1M79002030, 1M79001040, 1M79002040,

1M79001050, and 1M79002050) were delayed while determining the required modifications to achieve performance, and to incorporate the modifications (caps). The sixth and seventh modules (1M179001060, 1M179002060, 1M179001070, and 1M179002070) have only been delayed by the modifications. As of publication of this report, the third and fourth modules have been delivered.

The scope of the intertask communications has been underestimated, resulting in a delay in the delivery of the final EGSE (1M7941440) and the mode control demonstration (1M79270).

The complexity of the charge injection calibration was underestimated, resulting in a delay to the demonstration milestone (1M79220), as well as the demonstration of diagnostics (1M79280).

The housekeeping alert telemetry (1M79230) was delayed due to conflicting priorities with the virtual spacecraft simulator interface.

Extensive testing of the filter on the front-end simulator revealed software and firmware errors that needed to be corrected before moving on to event integrity and delivery testing (1M79240). The developer working on this is also working on higher-priority preparations for the thermal test in June. The GRB detection and response demonstration (1M79260) will occur after completion of the event integrity and delivery testing demonstration.

The watchdog demonstration (1M79210) was completed in early May.

4.1.8 Mechanical Systems

In December 2004, SLAC directed Lockheed Martin to postpone work on test-related activities and focus on the completion of flight hardware. The test-related activities have restarted, however this resulted in delay to the completion of the X-LAT plate (1M941710).

It is expected that there will be no delay to the radiator delivery (milestone 1M941720). The schedule will be restored in the next reporting period

4.1.9 Integration & Test

Variances to the “Ready to Ship” and subsequent milestones are driven by the critical path for the project, as described above.

4.0 Financial Status

Attachment 3 depicts the costs, commitments, and performance through the end of the current reporting period.

Attachments 4 and 5 summarize the actual costs through the current period, by WBS level 3 and institution, respectively.

5.0 Performance Status (Comparison to Project Baseline)

Attachment 6 is a Cost Performance Report (CPR) for the end of the current reporting period, by WBS level 3. The CPR shows the time-phased budget to date (BCWS), the earned value (BCWP), and the actual costs through the end of the month (ACWP). Attachment 7 shows the same information for each participating DOE- and/or NASA-funded institution. The schedule variance is equal to the difference between the budget-to-date and the earned value and represents a measure of the ahead (positive) or behind (negative) schedule position. The cost variance is equal to the difference between the earned value and the actual costs.

Attachment 8 shows performance analysis (by WBS level 3), including trends in the schedule and cost variances from the previous period. Cumulative cost variances exceeding 10% of the BCWP and cumulative schedule variances exceeding 10% of BCWS (favorable and unfavorable) are discussed below.

4.1.C Education & Public Outreach

There are several projects nearly completed, for which final costs have not yet been recorded. This is not a concern at this time.

6.0 Change Control and Contingency Analysis

A summary of change requests approved and implemented during this period (Level 3 and above), including the impacts on the LAT contingency, is below.

Change Request No.	Description	Submitted By	Current Status	Contingency Impact ¹
LAT-XR-05639-01	Update to LAT Program Instrument Performance Verification Plan	R. Bright	Approved	N/A
LAT-XR-06112-01	Flight Software Specification Updates	M. DeKlotz	Approved	N/A
LAT-XR-06227-01	Lockheed Martin Cost Increase	M. Campell	Approved	\$868K
LAT-XR-06253-01	Changes to the LAT Integration & Test Subsystem Test Plan	E. Bloom	Approved	N/A
LAT-XR-06287-01	Tracker Cables Second Source	D. Rich	Approved	\$208K
LAT-XR-06423-01	Japan Funding Reduction	T. Boysen	Approved	\$176K
LAT-XR-06426-01	ACD Cost Increase	T. Johnson	Approved	\$727K
LAT-XR-06434-01	Tracker PWB Re-order	D. Rich	Approved	\$178K

¹ A positive number indicates a draw on contingency.

The cost baseline through FY05 is \$154,025K Funding applicable to that baseline is \$155,809K; the resulting contingency is \$1,784K.

7.0 Staffing

Attachment 9 demonstrates the staffing plan funded by DOE/NASA, and reports of actual manpower received. This report includes contracted labor which is bookkept as M&S.

More labor has been required in 4.1.7 Electronics than planned this month for documentation and thermal vacuum testing. More flight software labor was required than planned for the space-craft simulator software and thermal test software.

ACD labor was updated as a result of change request LAT-XR-06426-01, referenced above. Plan refinements are still in progress to correlate to reported hours.

Attachment 1 Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date																				
					FY01	FY02	FY03	FY04	FY05	FY06														
DOE/NASA Joint Oversight Group (Level 1)																								
1M1P000000	DOE Critical Decision (CD) 0 Approval	06/25/01A	0	06/25/01A	▼																			
1M1P000010	CD-1 Approval	07/23/02A	0	07/23/02A		▼																		
1M1P000020	CD-2 Approval	11/08/02A	0	11/08/02A			▼																	
1M1P000030	CD-3 Approval	09/03/03A	0	09/03/03A				▼																
1M1P000060	Flight GRID Complete	11/08/04A	0	11/08/04A					▼															
1M1P000040	CD-4 Approval	03/15/06*	0	03/15/06*						▼														
DOE/NASA Federal Project Managers (Level 2)																								
1M1BF00000	Launch Balloon Flight	08/01/01A	0	08/01/01A	▼																			
1M1000100	Instrument Preliminary Design Review	01/08/02A	0	01/08/02A		▼																		
1M1000110	I-CDR (Critical Design Review)	05/16/03A	0	05/16/03A			▼																	
1M1000740	Start LAT Integration	03/23/05	-5	03/30/05A					▼															
1M1000700	Pre Environmental Testing Review	12/20/05	-4	01/03/06						▼														
1M1000120	PSR-(Instrument Pre-Ship Review)	04/18/06	-6	04/26/06						▼														
Run Date					05/28/05 11:14					GLAST LAT PROJECT Project Milestones (Level 1 and 2)					0523 LT_MS1-2					Sheet 1 of 1				
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**Attachment 2
Future Level 3 Milestones
Page 1 of 4**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04		FY05				FY06	
					Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Instrument Project Office (Level 3)												
4.1.1 Instrument Management												
1M1001920	Pre-Environmental Test Review	12/20/05	-4	01/03/06								▽
4.1.4 Tracker												
1M1000220	Flight Tracker Tower 1 RFI	03/22/05	-35	05/10/05								▽
1M1000221	Flight Tracker Tower 2 RFI	04/20/05	-14	05/10/05								▽
1M1000250	Flight Tracker Tower 3 RFI	05/03/05	-5	05/10/05								▽
1M1000251	Flight Tracker Tower 4 RFI	05/16/05	-17	06/09/05								▽
1M1000260	Flight Tracker Tower 5 RFI	06/03/05	-6	06/13/05								▽
1M1000261	Flight Tracker Tower 6 RFI	06/16/05	-1	06/17/05								▽
1M1000270	Flight Tracker Tower 7 RFI	06/27/05	-3	06/30/05								▽
1M1000271	Flight Tracker Tower 8 RFI	07/06/05	-3	07/11/05								▽
1M1000280	Flight Tracker Tower 9 RFI	07/15/05	-3	07/20/05								▽
1M1000281	Flight Tracker Tower 10 RFI	07/26/05	-3	07/29/05								▽
1M1000290	Flight Tracker Tower 11 RFI	08/04/05	-3	08/09/05								▽
1M1000291	Flight Tracker Tower 12 RFI	08/15/05	-5	08/22/05								▽
1M1000300	Flight Tracker Tower 13 RFI	08/24/05	-5	08/31/05								▽
1M1000301	Flight Tracker Tower 14 RFI	09/02/05	-4	09/09/05								▽
1M1000310	Flight Tracker Tower 15 RFI	09/13/05	-5	09/20/05								▽
1M1000311	Flight Tracker Tower 16 RFI	09/22/05	-5	09/29/05								▽
4.1.5 Calorimeter												
1MRTS060	Flight Calorimeter Module 9 Ready to Ship	05/02/05	-9	05/13/05								▽
1MRTS070	Flight Calorimeter Module 10 Ready to Ship	05/10/05	-3	05/13/05								▽
1MRTS090	Flight Calorimeter Module 11 Ready to Ship	05/13/05	0	05/13/05								▽
1MRTS080	Flight Calorimeter Module 12 Ready to Ship	05/18/05	0	05/18/05								▽
1MRTS100	Flight Calorimeter Module 13 Ready to Ship	05/23/05	0	05/23/05								▽
1MRTS110	Flight Calorimeter Module 14 Ready to Ship	05/25/05	0	05/25/05								▽
1MRTS120	Flight Calorimeter Module 15 Ready to Ship Spare	05/31/05	0	05/31/05								▽
1MRTS130	Flight Calorimeter Module 16 Ready to Ship Spare	06/08/05	0	06/08/05								▽
4.1.6 ACD												
1M1001000	ACD Test Scripts (from ACD to I&T)	03/15/05*	-54	05/31/05								▽
1M1000410	ACD Flight Unit at SLAC, Tested/Inspected & RFI	07/15/05	0	07/15/05								▽
Run Date	05/28/05 11:16		GLAST LAT PROJECT Project Milestones (Level 3) Planned Milestones				0523 LTX2 - MS3 (planned) FLX1 - MS (L3)				Sheet 1 of 4	
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Attachment 2
Future Level 3 Milestones
Page 2 of 4

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04		FY05		FY06	
					Q3	Q4	Q1	Q2	Q3	Q4
4.1.7 Electronics										
1M79230	Demo: Housekeeping	03/18/05	-37	05/10/05						
1M7941440	Final EGSE incl S/C Sim, FSW-Elec to I&T	04/01/05	-41	05/31/05						
1M79210	Demo: Watchdog	04/15/05	-15	05/06/05						
1M79001030	Flight TEM Assy 1: Elec to I&T	04/22/05	-17	05/17/05						
1M79002030	Flight TEM PS Assy 1: Elec to I&T	04/22/05	-17	05/17/05						
1M79270	Demo: Mode Control	04/22/05	-29	06/03/05						
1M79001040	Flight TEM Assy 2: Elec to I&T	04/29/05	-12	05/17/05						
1M79002040	Flight TEM PS Assy 2: Elec to I&T	04/29/05	-12	05/17/05						
1M79220	Demo: Charge Injection Calibration	04/29/05	-29	06/10/05						
1M79001050	Flight TEM Assy 3: Elec to I&T	05/06/05	-12	05/24/05						
1M79002050	Flight TEM PS Assy 3: Elec to I&T	05/06/05	-12	05/24/05						
1M79240	Demo: Event Integrity and Delivery	05/06/05	-29	06/17/05						
1M79280	Demo: Diagnostics	05/06/05	-29	06/17/05						
1M79001060	Flight TEM Assy 4: Elec to I&T	05/13/05	-7	05/24/05						
1M79002060	Flight TEM PS Assy 4: Elec to I&T	05/13/05	-7	05/24/05						
1M79001070	Flight TEM Assy 5: Elec to I&T	05/20/05	-7	06/01/05						
1M79002070	Flight TEM PS Assy 5: Elec to I&T	05/20/05	-7	06/01/05						
1M79260	Demo: GRB Detection and Response	05/20/05	-48	07/29/05						
1M79001080	Flight TEM Assy 6: Elec to I&T	05/27/05	-2	06/01/05						
1M79002080	Flight TEM PS Assy 6: Elec to I&T	05/27/05	-2	06/01/05						
1M79001090	Flight TEM Assy 7: Elec to I&T	06/06/05	-2	06/08/05						
1M79002090	Flight TEM PS Assy 7: Elec to I&T	06/06/05	-2	06/08/05						
1M79001100	Flight TEM Assy 8: Elec to I&T	06/13/05	3	06/08/05						
1M79002100	Flight TEM PS Assy 8: Elec to I&T	06/13/05	3	06/08/05						
1M79001110	Flight TEM Assy 9: Elec to I&T	06/20/05	3	06/15/05						
1M79002110	Flight TEM PS Assy 9: Elec to I&T	06/20/05	3	06/15/05						
1M79001120	Flight TEM Assy 10: Elec to I&T	06/27/05	8	06/15/05						
1M79002120	Flight TEM PS Assy 10: Elec to I&T	06/27/05	8	06/15/05						
1M7942000	Flight PDU Box-Elec to I&T	07/01/05	-36	08/23/05						
1M79001130	Flight TEM Assy 11: Elec to I&T	07/05/05	8	06/22/05						
1M79002130	Flight TEM PS Assy 11: Elec to I&T	07/05/05	8	06/22/05						
Run Date	05/28/05 11:16	GLAST LAT PROJECT Project Milestones (Level 3) Planned Milestones			0523 LTX2 - MS3 (planned) FLX1 - MS (L3)	Sheet 2 of 4				
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**Attachment 2
Future Level 3 Milestones
Page 3 of 4**

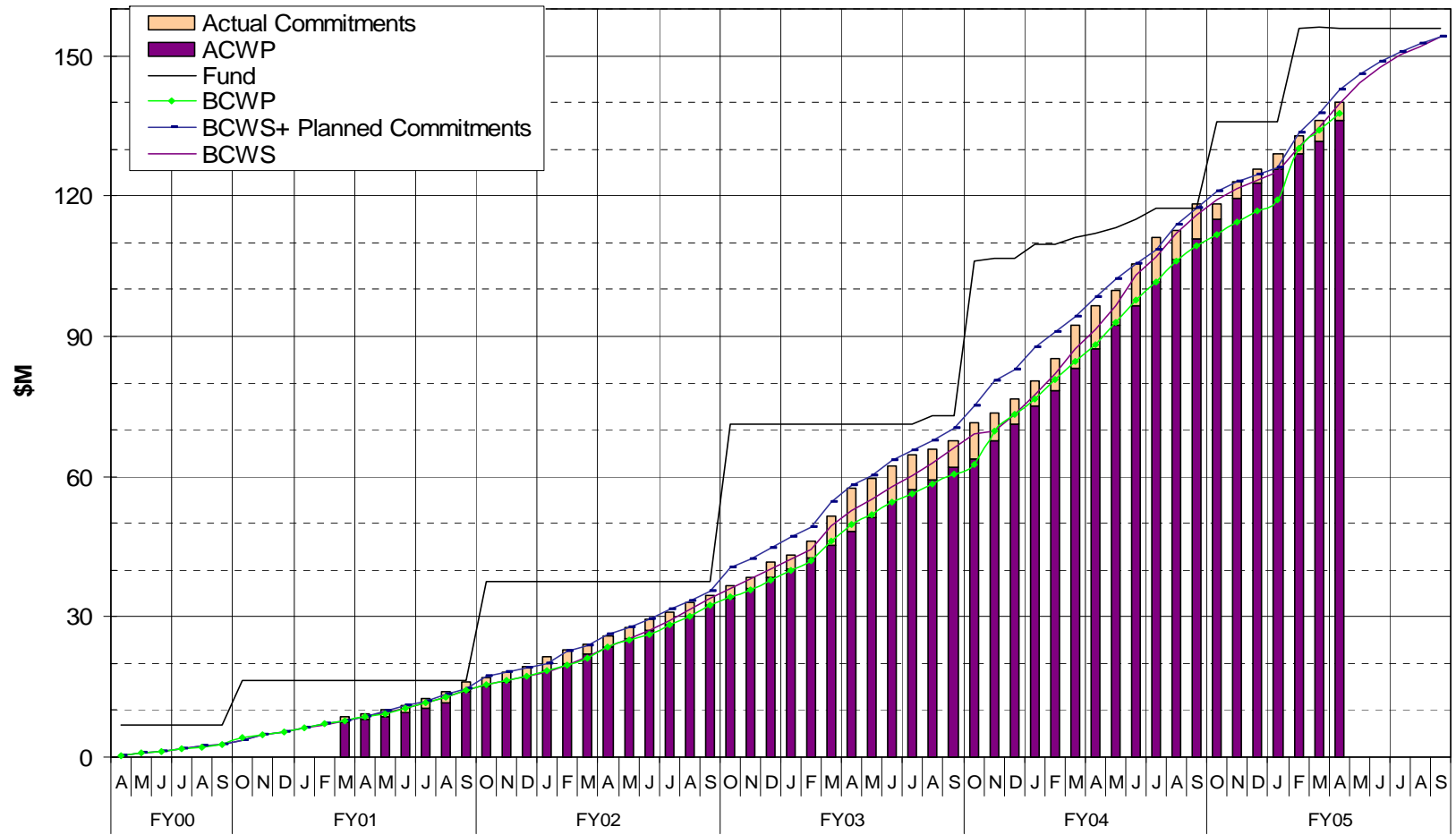
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04		FY05				FY06	
					Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1M7941110	Flight Harness-Elec to I&T	07/05/05	0	07/05/05								
1M79001140	Flight TEM Assy 12: Elec to I&T	07/12/05	13	06/22/05								
1M79002140	Flight TEM PS Assy 12: Elec to I&T	07/12/05	13	06/22/05								
1M79001150	Flight TEM Assy 13: Elec to I&T	07/19/05	13	06/29/05								
1M79002150	Flight TEM PS Assy 13: Elec to I&T	07/19/05	13	06/29/05								
1M7941070	Flight GASU Box-Elec to I&T	07/19/05	-36	09/08/05								
1M7R050	LCB Flight Units - Elec to Elec	07/20/05	-18	08/15/05								
1M79001160	Flight TEM Assy 14: Elec to I&T	07/26/05	18	06/29/05								
1M79002160	Flight TEM PS Assy 14: Elec to I&T	07/26/05	18	06/29/05								
1M79001170	Flight TEM Assy 15: Elec to I&T	08/02/05	18	07/07/05								
1M79002170	Flight TEM PS Assy 15: Elec to I&T	08/02/05	18	07/07/05								
1M79001180	Flight TEM Assy 16: Elec to I&T	08/09/05	23	07/07/05								
1M79002180	Flight TEM PS Assy 16: Elec to I&T	08/09/05	23	07/07/05								
1M7941090	Flight Event Processor Units-Elec to I&T	08/19/05	-11	09/06/05								
1M7R040	1st Flight EPU/SIU-Elec to I&T	08/19/05	-11	09/06/05								
1M7R010	2nd Flight EPU/SIU-Elec to I&T	08/24/05	-11	09/09/05								
1M7R020	3rd Flight EPU/SIU-Elec to I&T	08/26/05	-10	09/12/05								
1M7R030	4th Flight EPU/SIU-Elec to I&T	08/30/05	-11	09/15/05								
1M7941080	5th Flight EPU/SIU-Elec to I&T	09/02/05	-9	09/16/05								
4.1.8 Mechanical												
1M941710	X-LAT Thermal Plate RFI from Mech to I&T	04/20/05	-29	06/01/05								
1M941720	Radiators ready for I&T (from Mech to I&T)	07/22/05	-13	08/10/05								
4.1.9 I&T												
1M99020	Start 4 Tower Comprehensive Performance Test	05/12/05	-7	05/23/05								
1M99030	Start 8 Tower Comprehensive Performance Test	06/20/05	-5	06/27/05								
1M1001740	Online FU S/W Final Release-I&T to IOC	07/14/05	0	07/14/05								
1M99040	Start 16 Tower Comprehensive Performance Test	09/07/05	-4	09/13/05								
1M1000130	LAT Ready to Ship to NRL for Env Test	12/20/05	-4	01/03/06								
1M19010	Ship LAT to NRL for Env Test	01/03/06	-6	01/09/06								
1M19020	LAT EMI/EMC Test	02/01/06	-8	02/09/06								
1M19030	LAT Sine Vibe	02/14/06	-8	02/22/06								
1M19040	LAT Acoustic Test	02/24/06	-10	03/06/06								
Run Date	05/28/05 11:16	GLAST LAT PROJECT Project Milestones (Level 3) Planned Milestones			0523 LTX2 - MS3 (planned) FLX1 - MS (L3)	Sheet 3 of 4						
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Attachment 2
Future Level 3 Milestones
Page 4 of 4

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04		FY05		FY06				
					Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
1M19050	LAT TVAC	04/14/06	-9	04/23/06									
1M19060	LAT Weight & CG	04/17/06	-8	04/25/06									
1M19070	Ship LAT to Spectrum Astro	04/21/06	-10	05/01/06									
4.1.B ISOC													
1M7941270	Ground System Interface Test start	06/15/05*	0	06/15/05*									
1M1000112	Mission Operations Review	01/17/06*	0	01/17/06*									
Run Date					05/28/05 11:16		GLAST LAT PROJECT Project Milestones (Level 3) Planned Milestones				0523 LTX2 - MS3 (planned) FLX1- MS (L3)		Sheet 4 of 4
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Attachment 3

Budget vs Actuals vs Performance DOE + NASA Project Expenditures 4.1 LAT



Attachment 4
LAT Costs, through April 2005, by WBS

Monthly Contractor Financial Management Report								Report for Month Ending: 4/30/2005		
To: Kevin Grady, GLAST Project Manager (NASA) Ev Valle, LAT Project Manager (DOE)					From: Tanya Boysen, LAT Project Controls Manager			Budget Value		
								Cost:	Fee:	
								0	0	
LAT3		Type:							Fund Limitation:	
GLAST LAT Project									0	
Reporting Category	Cost Incurred				Estimated Cost			4/3/2000	Billing	
	During Month		Cum. to Date		Detail		Balance of Budget	Estimated Final Cost		Unfilled Orders Outstanding
	Actual	Planned	Actual	Planned	MAY05	JUN05		Project Estimate	Budget Value	
4.1.1 INSTRUMENT MANAGEMENT	201	327	15,833	16,129	327	342	1,143	17,645	17,645	
4.1.2 SYSTEM ENGINEERING	174	181	6,808	6,884	166	163	510	7,647	7,647	
4.1.4 TRACKER	597	819	18,731	19,175	983	768	1,220	21,702	21,702	
4.1.5 CALORIMETER	406	495	20,979	21,557	275	226	1,115	22,594	22,594	
4.1.6 ANTICOINCIDENCE DETECTOR	523	649	16,918	17,183	363	216	471	17,968	17,968	
4.1.7 ELECTRONICS	804	961	25,551	25,958	1,137	767	1,439	28,894	28,894	
4.1.8 MECHANICAL SYSTEMS	1,081	653	14,651	15,178	613	406	1,196	16,866	16,866	
4.1.9 INTEGRATION & TEST	290	486	7,214	7,531	327	314	1,597	9,451	9,451	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	176	179	3,320	3,374	103	111	312	3,846	3,846	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	2	5	306	312	5	5	18	334	334	
4.1.C EDUCATION AND PUBLIC OUTREACH	103	98	2,066	2,329	70	73	475	2,684	2,684	
4.1.D SCIENCE ANALYSIS SOFTWARE	68	77	2,532	2,690	75	80	382	3,069	3,069	
4.1.E SUBORBITAL FLIGHT TEST	0	0	1,325	1,325	0	0	0	1,325	1,325	
Gen. and Admin.	0	0	0	0	0	0		0	0	
Total	4,425	4,931	136,232	139,624	4,444	3,471	9,878	154,025	154,025	

Attachment 5
LAT Costs, through April 2005, by Organization and Cost Code

Monthly Contractor Financial Management Report								Report for Month Ending: 4/30/2005		
To: Kevin Grady, GLAST Project Manager (NASA) Ev Valle, LAT Project Manager (DOE)				From: Tanya Boysen, LAT Project Controls Manager				Budget Value		
								Cost: 0	Fee: 0	
LAT3 GLAST LAT Project		Type:						Fund Limitation: 0		
Reporting Category	Cost Incurred				Estimated Cost			4/3/2000	Billing	
	During Month		Cum. to Date		Detail		Balance of Budget	Estimated Final Cost		Unfilled Orders Outstanding
	Actual	Planned	Actual	Planned	MAY05	JUN05		Project Estimate	Budget Value	
DG *** GSFC	544	686	18,358	18,884	400	254	844	19,856	19,856	
DH *** HEPL	74	257	7,231	7,462	240	241	962	8,674	8,674	
DL *** SLAC	3,163	3,112	80,597	82,247	3,284	2,506	5,881	92,267	92,267	
DN *** NRL	530	740	25,400	26,041	428	387	1,610	27,825	27,825	
DO *** Financial Plan Transfer/Sub Ou	0	0	59	59	0	0	0	59	59	
DS *** SSU	103	97	2,052	2,303	69	72	461	2,654	2,654	
DT *** Texas A&M	0	0	15	15	0	0	0	15	15	
DU *** UCSC	10	31	2,325	2,379	14	1	56	2,396	2,396	
DW *** UW	2	9	196	234	9	9	66	279	279	
Total	4,425	4,931	136,232	139,624	4,444	3,471	9,878	154,025	154,025	

Reporting Category	Cost Incurred/Hours Worked				Estimated Cost/Hours to Complete			Estimated Final Cost/Hours		Unfilled Orders Outstanding
	During Month		Cum. to Date		Detail		Balance of Budget	Project Estimate		
	Actual	Planned	Actual	Planned	MAY05	JUN05		Budget Value		
RL LABOR	1,751	1,520	65,730	66,083	1,434	1,280	3,420	71,863	71,863	
RT TRAVEL	40	76	1,627	2,153	71	71	755	2,525	2,525	
RM MATERIAL & SERVICES	2,627	3,276	66,490	68,853	2,935	2,115	5,491	77,030	77,030	
RX MPS & LAB TAX	7	59	2,386	2,536	4	4	213	2,607	2,607	
Total	4,425	4,931	136,232	139,624	4,444	3,471	9,878	154,025	154,025	

**Attachment 6
LAT Performance, through April 2005, by WBS**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:				Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 3/31/2005 4/30/2005				
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %	Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	0		0		0	0	0		0	0			
CAPW[3]	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost Work Performed	Variance		Budgeted Cost		Actual Cost Work Performed	Variance		Budgeted	Latest Revised Estimate	Variance
	Work Scheduled	Work Performed		Schedule	Cost	Work Scheduled	Work Performed		Schedule	Cost			
Item	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.1.1 INSTRUMENT MANAGEMENT	327	327	201	0	126	16,129	16,129	15,833	0	297	17,645	17,645	0
4.1.2 SYSTEM ENGINEERING	181	181	174	0	7	6,884	6,884	6,808	0	76	7,647	7,647	0
4.1.4 TRACKER	819	615	597	-204	18	19,175	18,913	18,731	-263	181	21,702	21,702	0
4.1.5 CALORIMETER	495	532	406	37	126	21,557	21,544	20,979	-12	565	22,594	22,594	0
4.1.6 ANTICOINCIDENCE DETECTOR	649	743	523	95	220	17,183	17,057	16,918	-126	139	17,968	17,968	0
4.1.7 ELECTRONICS	961	466	804	-494	-338	25,958	25,238	25,551	-720	-313	28,894	28,894	0
4.1.8 MECHANICAL SYSTEMS	653	260	1,081	-394	-822	15,178	14,736	14,651	-443	85	16,866	16,866	0
4.1.9 INTEGRATION & TEST	486	261	290	-225	-29	7,531	7,214	7,214	-318	0	9,451	9,451	0
4.1.A PERFORMANCE AND SAFETY AS	179	179	176	0	3	3,374	3,374	3,320	0	54	3,846	3,846	0
4.1.B LAT INSTRUMENT OPERATIONS C	5	5	2	0	3	312	312	306	0	6	334	334	0
4.1.C EDUCATION AND PUBLIC OUTRE	98	105	103	6	2	2,329	2,329	2,066	0	263	2,684	2,684	0
4.1.D SCIENCE ANALYSIS SOFTWARE	77	77	68	0	10	2,690	2,690	2,532	0	157	3,069	3,069	0
4.1.E SUBORBITAL FLIGHT TEST	0	0	0	0	0	1,325	1,325	1,325	0	0	1,325	1,325	0
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0	0	0
Sub Total	4,931	3,752	4,425	-1,179	-673	139,624	137,743	136,232	-1,881	1,511	154,025	154,025	0
Contingency											1,784	1,784	0
Total	4,931	3,752	4,425	-1,179	-673	139,624	137,743	136,232	-1,881	1,511	155,809	155,809	0

**Attachment 7
LAT Performance, through April 2005, by Organization**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:				Contract Type/No:				Project Name/No: GLAST LAT Project		Report Period: 3/31/2005 4/30/2005			
Quantity 1	Negotiated Cost 0		Est. Cost Authorized Unpriced Work 0		Tgt. Profit/ Fee % 0		Tgt. Price 0	Est Price 0	Share Ratio	Contract Ceiling 0	Estimated Contract Ceiling 0		
OBS[1] Item	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost Work	Variance		Budgeted Cost		Actual Cost Work	Variance		Budgeted	Latest Revised Estimate	Variance
	Work Scheduled	Work Performed		Schedule	Cost	Work Scheduled	Work Performed		Schedule	Cost			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DG *** GSFC	686	780	544	95	237	18,884	18,758	18,358	-126	400	19,856	19,856	0
DH *** HEPL	257	257	74	0	182	7,462	7,462	7,231	0	232	8,674	8,674	0
DL *** SLAC	3,112	1,919	3,163	-1,192	-1,243	82,247	80,647	80,597	-1,600	51	92,267	92,267	0
DN *** NRL	740	643	530	-97	113	26,041	25,885	25,400	-155	485	27,825	27,825	0
DO *** Financial Plan	0	0	0	0	0	59	59	59	0	0	59	59	0
DS *** SSU	97	104	103	6	1	2,303	2,303	2,052	0	251	2,654	2,654	0
DT *** Texas A&M	0	0	0	0	0	15	15	15	0	0	15	15	0
DU *** UCSC	31	40	10	9	30	2,379	2,379	2,325	0	54	2,396	2,396	0
DW *** UW	9	9	2	0	7	234	234	196	0	38	279	279	0
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0	0	0
Sub Total	4,931	3,752	4,425	-1,179	-673	139,624	137,743	136,232	-1,881	1,511	154,025	154,025	0
Contingency											1,784	1,784	0
Total	4,931	3,752	4,425	-1,179	-673	139,624	137,743	136,232	-1,881	1,511	155,809	155,809	0

Attachment 8 LAT Performance Analysis, April 2005

	WBS	Description	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	%BCWS	%BCWP	%ACWP	SPI	CPI	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	LAT	154,025	139,624	137,743	136,232	-1,881	1,511	90.65	89.43	88.45	↓	↓	0.987	1.011	152,336	152,556
2	4.1.1	Instr Mgmt	17,645	16,129	16,129	15,833	0	297	91.41	91.41	89.73	↔	↑	1.000	1.019	17,320	17,320
3	4.1.2	System Engr	7,647	6,884	6,884	6,808	0	76	90.03	90.03	89.03	↔	↔	1.000	1.011	7,563	7,563
4	4.1.4	Tracker	21,702	19,175	18,913	18,731	-263	181	88.36	87.15	86.31	↓	↔	0.986	1.010	21,494	21,532
5	4.1.5	Calorimeter	22,594	21,557	21,544	20,979	-12	565	95.41	95.35	92.85	↑	↑	0.999	1.027	22,001	22,002
6	4.1.6	ACD	17,968	17,183	17,057	16,918	-126	139	95.63	94.93	94.16	↑	↑	0.993	1.008	17,821	17,828
7	4.1.7	Electronics	28,894	25,958	25,238	25,551	-720	-313	89.84	87.35	88.43	↓	↓	0.972	0.988	29,252	29,358
8	4.1.8	Mechanical	16,866	15,178	14,736	14,651	-443	85	89.99	87.37	86.87	↓	↓	0.971	1.006	16,769	16,832
9	4.1.9	I&T	9,451	7,531	7,214	7,214	-318	0	79.68	76.32	76.32	↓	↓	0.958	1.000	9,451	9,550
10	4.1.A	PSA	3,846	3,374	3,374	3,320	0	54	87.72	87.72	86.32	↔	↔	1.000	1.016	3,785	3,785
11	4.1.B	ISOC	334	312	312	306	0	6	93.41	93.41	91.54	↔	↑	1.000	1.020	327	327
12	4.1.C	EPO	2,684	2,329	2,329	2,066	0	263	86.77	86.77	76.96	↑	↔	1.000	1.127	2,381	2,381
13	4.1.D	SAS	3,069	2,690	2,690	2,532	0	157	87.62	87.62	82.50	↔	↔	1.000	1.062	2,890	2,890
14	4.1.E	Balloon Flight	1,325	1,325	1,325	1,325	0	0	100.00	100.00	99.98	↔	↔	1.000	1.000	1,325	1,325

LEGEND

BAC: Budget At Complete

BCWS: Budgeted Cost of Work Scheduled (to date)

BCWP: Budgeted Cost of Work Performed (to date)

ACWP: Actual Cost of Work Performed (to date)

SV \$: Schedule Variance = BCWP - BCWS

CV \$: Cost Variance = BCWP - ACWP

SPI: Schedule Performance Index = BCWP/BCWS

CPI: Cost Performance Index = BCWP/ACWP

% BCWS: Percent Scheduled = BCWS/BAC

% BCWP: Percent Complete = BCWP/BAC

% ACWP: Percent Spent = ACWP/BAC

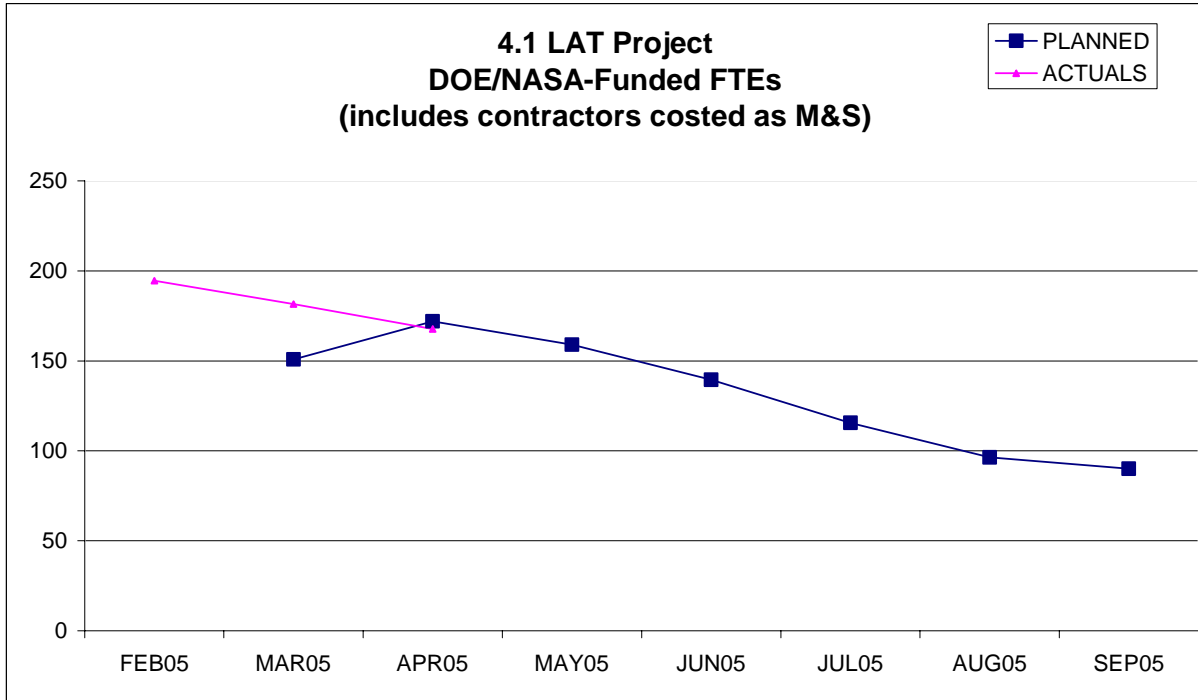
Cpi_Fcst: CPI (to date) EAC Forecast = BAC / CPI

CpiSpi_Fcst: Combination CPI and SPI EAC Forecast = ACWP + (BAC - BCWP) / (CPI * SPI)

	Worse than .85		Between .95 and 1.10
	Between .85 and .95		Better than 1.10

SPI and CPI Change Thresholds

Attachment 9 LAT Manpower



FEB05 MAR05 APR05 MAY05 JUN05 JUL05 AUG05 SEP05

4.1.1 INSTRUMENT MANAGEMENT	PLANNED		19.2	19.2	19.2	19.2	19.4	16.0	16.0
	ACTUALS	19.7	23.4	19.2					
4.1.2 SYSTEM ENGINEERING	PLANNED		10.2	10.3	10.3	10.3	10.3	9.2	8.2
	ACTUALS	10.5	10.1	9.8					
4.1.4 TRACKER	PLANNED		16.8	16.6	12.7	10.7	9.9	9.2	9.2
	ACTUALS	17.0	15.4	15.9					
4.1.5 CALORIMETER	PLANNED		18.7	19.6	13.4	9.9	7.6	8.1	7.4
	ACTUALS	23.8	19.8	21.6					
4.1.6 ANTICOINCIDENCE DETECTOR	PLANNED		16.4	39.0	32.8	29.2	14.3	4.0	4.0
	ACTUALS	36.2	33.1	29.8					
4.1.7 ELECTRONICS	PLANNED		28.8	23.9	26.9	22.4	18.0	15.5	13.5
	ACTUALS	36.7	35.2	32.5					
4.1.8 MECHANICAL SYSTEMS	PLANNED		6.0	6.4	9.9	4.9	4.1	3.4	2.5
	ACTUALS	3.7	3.2	3.9					
4.1.9 INTEGRATION & TEST	PLANNED		15.3	17.2	16.2	16.3	16.4	16.5	15.9
	ACTUALS	20.5	23.0	19.1					
4.1.A PERFORMANCE AND SAFETY ASSURANCE	PLANNED		12.5	12.3	9.9	8.9	7.9	6.9	5.9
	ACTUALS	12.6	12.4	12.1					
4.1.B LAT INSTRUMENT SCIENCE OPERATIONS CENTER	PLANNED		0.2	0.2	0.2	0.2	0.2	0.2	0.1
	ACTUALS	0.1	0.1	0.1					
4.1.C EDUCATION AND PUBLIC OUTREACH	PLANNED		1.5	2.0	2.3	2.3	2.3	2.4	2.3
	ACTUALS	10.1	3.3	0.0					
4.1.D SCIENCE ANALYSIS SOFTWARE	PLANNED		5.3	5.3	5.1	5.2	5.2	5.1	5.1
	ACTUALS	3.8	2.6	3.7					
Grand Totals:	PLANNED		150.8	172.1	159.0	139.6	115.5	96.5	90.1
	ACTUALS	194.5	181.6	167.7					