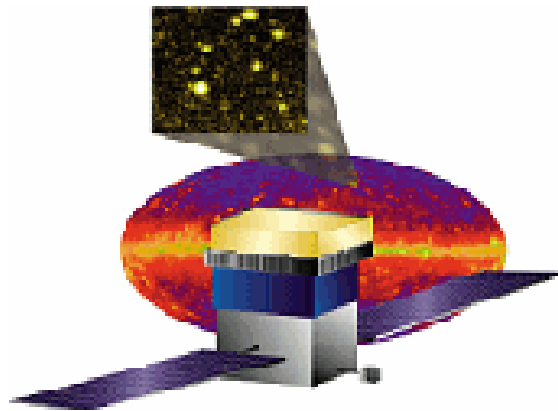


Monthly Progress Report

(Month Ending March 2004)

GLAST Large Area Telescope (LAT)



LAT-MR-03687-01

May 5, 2004

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 March, 2004.

2.0 Recent Progress and Status

A review was conducted by DOE and NASA March 31-April 1 to assess the technical, cost, and schedule status.

4.1.4 Tracker

Multichip module (MCM) preproduction was completed. All MCM flight production issues were resolved, and flight production commenced. A new engineer was hired at SLAC to oversee the MCM production. MCM/ASIC qualification tests began, and the engineering-model thermal-vacuum test was completed. Flight tray panel production proceeded, with closeouts and core-facesheet sandwiches assembled for the first several trays. Production of bias circuits was completed for one tower, and production of the remaining bias circuits began. Production of titanium parts and bottom-tray closeouts began. Drawings were completed for Tracker-Grid interface hardware, and orders were placed for engineering-evaluation parts. Flex-circuit cable mechanical layouts were completed, and two electrical layouts are nearly ready for production. Sidewall prepreg procurement began. Special tooling to install MCMs onto trays is being machined. Dummy trays for testing the process were built. Procedure documents were completed for enhanced speckle-pattern interferometry and vibration tray-panel testing. Procedures were drafted for assembly of ladders onto trays, for MCM incoming inspection, and for MCM pitch-adaptor screening. Progress was made on quality assurance procedures throughout the Italian collaboration. Work began on preparing the static-test fixture for operation in Italy. Designers were assigned to start work on grid simulators for static and vibration testing for the new interface design.

4.1.5 Calorimeter

Flight production is well underway. Over 50% of the PIN diode assemblies have been manufactured. Over 25% of the Crystal Detector Elements (CDE) have been manufactured. Three carbon composite structures have been manufactured and tested. Two of these have been delivered to NRL. Functional testing and screening has been performed on all flight ASICs (11,000 front-end ASICs version 9A, and 950 readout controller ASICs version 5). The first half of the ASICs are in burn-in. Assembly of the first Pre-Electronics Module has begun.

4.1.6 Anticoincidence Detector

Assembly of the flight front-end electronics cards continued, including installation of the analog ASICs as they are screened. Screening of the digital ASICs continues and the first parts will be ready for assembly in early April. Analysis of the photomultiplier tube anomaly was completed and reviewed; qualification of the new mounting design commenced. The flight composite shell that supports the detectors was completed, as was

the flight base frame assembly. Flight detector testing is underway, and performance is good. Assembly of the high-voltage bias supplies is partially completed; a capacitor replacement for a failed part was received and the screening process begun.

4.1.7 Electronics, Data Acquisition, and Flight Software

The tower electronics modules (TEMs), tower power supplies, and LAT Communication Boards for electrical ground support equipment stations were assembled and tested. The new version of the test-bed power distribution module was received. The schematic of the qualification unit version of the GASU was finalized, and board layout commenced. Seven tower electronics modules and tower power supplies were assembled on the test bed.

The file upload library has been integrated into the primary boot code and the file upload state machine has been finished and unit tested. Bitfield support for the command and telemetry database has been implemented and work on the housekeeping code has been restarted. Configuration file handling and packet creation/handling functionality has been implemented. Work on the thermal control software continued with the basic algorithm working on simulated data. The RAD750 can now be booted in a flight crate in ethernet mode, as well as serial mode. An official Windows build of flight software and all scripts and packages are available. The flight software requirements document was updated.

4.1.8 Mechanical Systems

Finish machining operations on the first grid are approximately 50% complete. The second grid has been rough-machined and heat treatment has been completed. The configuration control board has approved revisions to the Grid to accommodate the Tracker interface and Tracker cable chaseway modifications, the revised spacecraft interface, modifications to the grid wing to improve radiator installation and several minor producibility improvements. These changes have been implemented in the solid models, and check prints of the drawings have been created.

4.1.9 Integration & Test (I&T)

The Integration & Test training mockup has been completed and is ready for implementation. An integration kick-off meeting was held. Six of ten open positions have been filled. Version 3.0 of the LAT Test Executive (LATTE) was released; this is the initial online software for integration.



Figure 1: Integration & Test Training Mockup.

3.0 Schedule Status

There are two equal critical paths for the project, driven by the Tracker MCM production and the delay in the Calorimeter front-end ASIC delivery. The delay in front-end ASIC delivery to Calorimeter also determines the critical path to the integration of the first flight module. There is four weeks' variance to the baseline float of five weeks to the "ready for CD-4 review" milestone. Workaround plans to mitigate this delay are currently being assessed.

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. Attachment 2 shows the status of the Level 3 milestones planned to occur during the six months preceding and following the current month. Unfavorable variance projections greater than one week to the future milestones are discussed below.

The delivery of the full Tracker EM (milestone 1M1001430) has been delayed by the issues discovered with the interface during the EM vibration test. A workaround plan is underway, enabling integration planning to continue by supplying other hardware and drawings in the interim. Thermal vacuum testing was completed in March, and vibration testing will be repeated.

Variances to the following milestones are due to delayed receipt of Calorimeter ASICs and other flight EEE parts. This is the critical path for the project. Much of the schedule will be recovered by using parts before completion of screening and qualification. However, continuing problems with the delivery of tantalum capacitors are impacting the schedule. A sufficient number of alternate capacitors have been found to proceed with the first Calorimeter module electronic cards.

- Calorimeter Modules A through 6 RFI (1M1000210, 1M1500, 1M1000230, 1M1510, 1M1000400, 1M1520, 1M1000390 and 1M1530)
- EM2 TEM/PS for FM9 through FM16 (return FMA through FM6) from I&T to Calorimeter (1M1001790 through 1M1001860)

Variances to the following milestones are due to delays in drawing release driving procurement placement. The drawing release process has been improved, and additional staff has been hired.

- Flight TEM Power Supply Assemblies to I&T (1M79002010 through 1M79002180)
- Flight TEM Assemblies A through 9 to I&T (1M79001010 through 1M79001110)
- Flight Cable Assemblies to I&T (1M79003010 through 1M79003180)

Variances to the following electronics ground support equipment (EGSE) milestones are due to delayed receipt and quality problems with connectors. Effort has been diverted to the installation of Tower Electronics Modules (TEMs) on the Test Bed.

- Updated EGSE Systems (#1-10) to Tracker (1M74000010 through 1M740000100)
- EGSE TEM/TEM PS/CTS w/ FE Electronics #1-3 to I&T (1M7941130, 1M7941150, and 1M7941160)
- G3 Test Stands to ACD (1M76000020 and 1M76000030) – (Note that the first of these was delivered in April.)
- Test Stations (5) for AFEE to Calorimeter (1M1001900)
- EGSE TEM/TEM PS/CTS/GASU FE Electronics to I&T (1M7941170)
- EGSE Development H/W/FSW 1st Delivery to I&T (1M7941180)
- EGSE TEM/TEM PS/CTS #1-2 for Bldg. 33 to I&T (1M7941190 and 1M7941420)
- EGSE TEM/TEM PS/CTS w/ GASU for Bldg. 33 to I&T (1M7941430)
- 5 EM2 TEM/PS for AFEE board assy & test: Elec to Cal (1M1001870)

Variances to the following milestones are due to a delay in completion of the Tracker/Calorimeter tower electronics module (TEM) ASIC qualification and screening plan. This is not considered critical path at this time.

- EM2 TEM/PS/CTS for Flight Models A-8 to Calorimeter (1M1001220, 1M1001600, 1M1001660, 1M1001680, 1M1001720, 1M1001760, 1M1001770, 1M1001780)

The schedule for the ACD Test Scripts (1M1001000) will be restored in the next reporting period.

The ISOC CDR date (1M005480) was delayed from March to August. This was a recommendation of the ISOC Peer Review held this month, and aligns the review date with the documentation availability. This has been coordinated with the GLAST project office at Goddard to minimize the impact on LAT ground system readiness.

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. The hours worked/FTE lines include only DOE/NASA-funded labor.

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.A Performance & Safety Assurance

The favorable cost variance is due to delayed subcontractor invoice payments, and is not a concern at this time.

4.1.C Education & Public Outreach

The favorable cost variance is due to delayed subcontractor invoice payments, and is not a concern at this time.

6.0 Change Control and Contingency Analysis

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

Change Request No.	Description	Submitted By	Current Status	Contingency Impact
LAT-XR-03019-01	ACD Phototube Helium Requirements	D. Thompson	Approved	N/A
LAT-XR-03066-01	GSFC MPS Tax Budget Reduction	T. Boysen	Approved	N/A ¹
LAT-XR-03191-01	Voltage Monitors	G. Haller/ R. Bielawski	Approved	N/A
LAT-XR-03192-01	Flight Temp Sensor Placement & Distribution	R. Bielawski	Approved	N/A
LAT-XR-03306-01	ACD Mechanical Materials & Support	T. Johnson	Approved	N/A ²
LAT-XR-03307-01	ACD PMT Anomaly Resolution	T. Johnson	Approved	N/A ³
LAT-XR-03308-01	ACD BEA Changes	T. Johnson	Approved	N/A ⁴
LAT-XR-03445-01	ISIS Upgrade	G. Haller	Approved	N/A ⁵

The fabrication phase cost baseline is \$124.1M. Funding applicable to that baseline is \$136.6M; the resulting contingency is \$12.4M.

7.0 Staffing

Attachments 9-10 demonstrate the staffing plan, and reports of actual manpower received. Note from Attachment 10 that not all participating organizations are providing manpower data.

The monthly planned FTEs reflect adjustments made so that the cumulative-to-date manpower plan corresponds to the approved changes in that month.

Goddard manpower was not reported in the months of October, November, and December. The January and February incremental FTE report includes the actual manpower for those months, so that the cumulative-to-date actual manpower is correct.

¹ Budget reduction of \$1,051K is directly offset by corresponding NASA funding decrease.

² Budget increase of \$195K is directly offset by corresponding NASA funding increase.

³ Budget increase of \$299K is directly offset by corresponding NASA funding increase.

⁴ Budget increase of \$222K is directly offset by corresponding NASA funding increase.

⁵ Budget increase of \$94K is directly offset by corresponding NASA funding increase.

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	09/15/04*	0	09/15/04*					▼		
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	08/24/04*	0	08/24/04*				▼			
1M1000700	Pre Environmental Testing Review	07/14/05*	0	07/14/05*					▼		
1M1000120	PSR-(Instrument Pre-Ship Review)	12/01/05*	0	12/01/05*						▼	
Run Date	04/27/04 11:10	GLAST LAT PROJECT Project Milestones (Level 1 and 2)			0421 LT_MS1-2	Sheet 1 of 1					
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Attachment 2
Level 3 Milestones (One-Year View)
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Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY03		FY04				FY05	
					Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Instrument Project Office (Level 3)												
1M1001520	EM CAL Returned to NRL (arrives on dock)	10/16/03	-1	10/17/03A			▼					
1M74000010	Updated EGSE System 1: Elec to TKR	12/08/03	-80	04/09/04			•		▼			
1M76000010	3rd G2 Test Stand: Elec to ACD	12/08/03	0	12/08/03A			▼					
1M7941130	EGSE TEM/TEM PS/CTS w/ FE Elec #1-Elec to I&T	12/08/03	-87	04/20/04			•		▼			
1M76000020	G3 Test Stand (test 2 FREE Cards): Elec to ACD	12/15/03	-84	04/22/04			•		▼			
1M1001380	Delivery of EM (1X4) Grid to I&T/MSGE	12/19/03	-64	03/31/04A			•		▼			
1M74000020	Updated EGSE System 2: Elec to TKR	12/22/03	-82	04/27/04			•		▼			
1M7941150	EGSE TEM/TEM PS/CTS w/ FE Elec #2-Elec to I&T	12/22/03	-82	04/27/04			•		▼			
1M1001430	Delv of TKR EM to SLAC I&T/MSGE	01/02/04	-122	06/25/04			•		▼			
1M74000030	Updated EGSE System 3: Elec to TKR	01/07/04	-82	05/04/04			•		▼			
1M7941160	EGSE TEM/TEM PS/CTS w/ FE Elec #3-Elec to I&T	01/07/04	-82	05/04/04			•		▼			
1M1000920	EM2 TEM: Elec to Tracker	01/12/04	-55	03/31/04A			•		▼			
1M1001900	Test Stations (5) for AFEE: Elec to CAL	01/14/04	-82	05/11/04			•		▼			
1M74000040	EGSE System 4: Elec to TKR	01/14/04	-87	05/18/04			•		▼			
1M7941170	EGSE TEM/TEM PS/CTS/GASU FE Elec-Elec to I&T	01/14/04	-82	05/11/04			•		▼			
1M1001870	5 EM2 TEM/PS for AFEE brd ass & tst: Elec to CAL	01/15/04	-59	04/09/04			•		▼			
1M1001220	EM2 TEM/PS/CTS for FMA from Elec to CAL	01/22/04	-82	05/18/04			•		▼			
1M74000050	EGSE System 5: Elec to TKR	01/22/04	-82	05/18/04			•		▼			
1M7941180	EGSE Development Hrdw/FSW 1st Delivr-Elec to I&T	01/22/04	-77	05/11/04			•		▼			
1M1001260	EM2 TEM/PS/CTS for FMB from Elec to CAL	01/29/04	-82	05/25/04			•		▼			
1M74000060	EGSE System 6: Elec to TKR	01/29/04	-82	05/25/04			•		▼			
1M7941190	EGSE TEM/TEM PS/CTS #1 for Bldg 33-Elec to I&T	01/29/04	-82	05/25/04			•		▼			
1M1001600	EM2 TEM/PS/CTS for FM1 from Elec to CAL	02/05/04	-82	06/02/04			•		▼			
Run Date	04/27/04 11:11	GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)			0421 LTX1 - MS (L3) FLX1- MS (L3)	Sheet 1 of 5						
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Attachment 2
Level 3 Milestones (One-Year View)
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Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY03		FY04				FY05	
					Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Instrument Project Office (Level 3)												
1M7941420	EGSE TEM/TEM PS/CTS #2 for Bldg 33-Elec to I&T	02/05/04	-82	06/02/04				•	▽			
1M7941430	EGSE TEM/TEM PS/CTS w/ GASU for B33-Elec to	02/05/04	-82	06/02/04				•	▽			
1M1001650	EM2 TEM/PS/CTS for FM2 from Elec to CAL	02/12/04	-82	06/09/04				•	▽			
1M74000070	EGSE System 7: Elec to TKR	02/12/04	-82	06/09/04				•	▽			
1M74000080	EGSE System 8: Elec to TKR	02/12/04	-82	06/09/04				•	▽			
1M74000090	EGSE System 9: Elec to TKR	02/20/04	-82	06/16/04				•	▽			
1M74000100	EGSE System 10: Elec to TKR	02/20/04	-82	06/16/04				•	▽			
1M76000030	G3 Test Stand (Flt-like I/F): Elec to ACD	02/20/04	-64	05/20/04				•	▽			
1M1001660	EM2 TEM/PS/CTS for FM3 from Elec to CAL	02/27/04	-82	06/23/04				•	▽			
1M1001680	EM2 TEM/PS/CTS for FM4 from Elec to CAL	02/27/04	-82	06/23/04				•	▽			
1M1001720	EM2 TEM/PS/CTS for FM5 from Elec to CAL	02/27/04	-82	06/23/04				•	▽			
1M1001760	EM2 TEM/PS/CTS for FM6 from Elec to CAL	03/05/04	-82	06/30/04				•	▽			
1M1001770	EM2 TEM/PS/CTS for FM7 from Elec to CAL	03/05/04	-82	06/30/04				•	▽			
1M1001780	EM2 TEM/PS/CTS for FM8 from Elec to CAL	03/05/04	-82	06/30/04				•	▽			
1M005480	ISOC CDR	03/12/04	-109	08/16/04				•	▽			
1M79003010	Flight Cables Assy A: Elec to I&T	05/10/04	-42	07/09/04				•	▽			
1M79003020	Flight Cables Assy B: Elec to I&T	05/10/04	-42	07/09/04				•	▽			
1M79002010	Flight TEM PS Assy A: Elec to I&T	05/12/04	-36	07/02/04				•	▽			
1M79002020	Flight TEM PS Assy B: Elec to I&T	05/19/04	-36	07/12/04				•	▽			
1M79001010	Flight TEM Assy A: Elec to I&T	06/07/04	-39	08/02/04				•	▽			
1M79003030	Flight Cables Assy 1: Elec to I&T	06/10/04	-42	08/10/04				•	▽			
1M79003040	Flight Cables Assy 2: Elec to I&T	06/10/04	-42	08/10/04				•	▽			
1M79003050	Flight Cables Assy 3: Elec to I&T	06/10/04	-42	08/10/04				•	▽			
Run Date	04/27/04 11:11	GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)			0421 LTX1 - MS (L3) FLX1 - MS (L3)	Sheet 2 of 5						
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Attachment 2
Level 3 Milestones (One-Year View)
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Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY03		FY04				FY05	
					Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Instrument Project Office (Level 3)												
1M79003060	Flight Cables Assy 4: Elec to I&T	06/10/04	-42	08/10/04								• ▽
1M79001020	Flight TEM Assy B: Elec to I&T	06/14/04	-39	08/09/04								• ▽
1M79003070	Flight Cables Assy 5: Elec to I&T	06/28/04	-43	08/27/04								• ▽
1M79003080	Flight Cables Assy 6: Elec to I&T	06/28/04	-43	08/27/04								• ▽
1M79003090	Flight Cables Assy 7: Elec to I&T	06/28/04	-43	08/27/04								• ▽
1M79003100	Flight Cables Assy 8: Elec to I&T	06/28/04	-43	08/27/04								• ▽
1M79003110	Flight Cables Assy 9: Elec to I&T	06/28/04	-43	08/27/04								• ▽
1M79003120	Flight Cables Assy 10: Elec to I&T	06/28/04	-43	08/27/04								• ▽
1M1001000	ACD Test Scripts (from ACD to I&T)	07/01/04	-64	10/01/04								• ▽
1M79002030	Flight TEM PS Assy 1: Elec to I&T	07/01/04	-36	08/23/04								• ▽
1M1000210	Calorimeter Modules A RFI	07/09/04	-50	09/20/04								• ▽
1M1500	Calorimeter Modules B RFI	07/09/04	-50	09/20/04								• ▽
1M79002040	Flight TEM PS Assy 2: Elec to I&T	07/09/04	-36	08/30/04								• ▽
1M79003130	Flight Cables Assy 11: Elec to I&T	07/15/04	-43	09/15/04								• ▽
1M79003140	Flight Cables Assy 12: Elec to I&T	07/15/04	-43	09/15/04								• ▽
1M79003150	Flight Cables Assy 13: Elec to I&T	07/15/04	-43	09/15/04								• ▽
1M79003160	Flight Cables Assy 14: Elec to I&T	07/15/04	-43	09/15/04								• ▽
1M79003170	Flight Cables Assy 15: Elec to I&T	07/15/04	-43	09/15/04								• ▽
1M79003180	Flight Cables Assy 16: Elec to I&T	07/15/04	-43	09/15/04								• ▽
1M79002050	Flight TEM PS Assy 3: Elec to I&T	07/16/04	-36	09/07/04								• ▽
1M1000240	Flight Grid RFI-Mech to I&T	07/22/04	0	07/22/04								• ▽
1M1001790	EM2 TEM/PS for FM9 (return FMA) from I&T to CAL	07/23/04	-50	10/04/04								• ▽
1M1001800	EM2 TEM/PS for FM10 (return FMB)from I&T to CAL	07/23/04	-50	10/04/04								• ▽
Run Date	04/27/04 11:11	GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)			0421 LTX1 - MS (L3) FLX1 - MS (L3)	Sheet 3 of 5						
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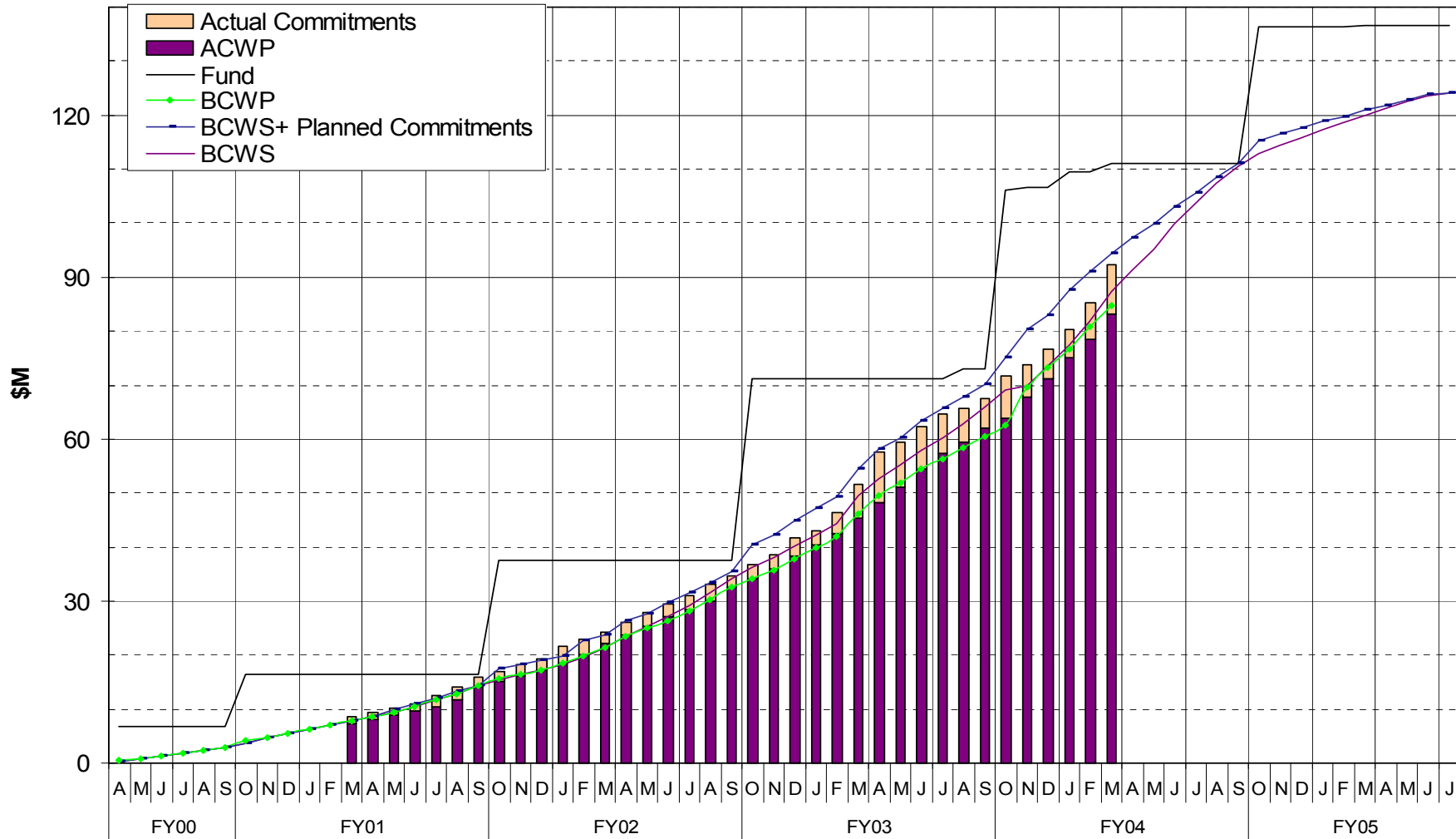
Attachment 2
Level 3 Milestones (One-Year View)
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Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY03		FY04		FY05	
					Q3	Q4	Q1	Q2	Q3	Q4
Instrument Project Office (Level 3)										
1M79002060	Flight TEM PS Assy 4: Elec to I&T	07/23/04	-36	09/14/04						▼
1M1000200	Tracker Modules A RFI	07/28/04	-15	08/18/04						▼
1M1000230	Calorimeter Modules 1 RFI	07/30/04	-48	10/07/04						▼
1M79002070	Flight TEM PS Assy 5: Elec to I&T	07/30/04	-36	09/21/04						▼
1M1510	Calorimeter Modules 2 RFI	08/02/04	-48	10/08/04						▼
1M79001030	Flight TEM Assy 1: Elec to I&T	08/03/04	-39	09/28/04						▼
1M79002080	Flight TEM PS Assy 6: Elec to I&T	08/06/04	-36	09/28/04						▼
1M79001040	Flight TEM Assy 2: Elec to I&T	08/10/04	-39	10/05/04						▼
1M941710	X-LAT Thermal Plate RFI from Mech to I&T	08/12/04	0	08/12/04						▼
1M1001810	EM2 TEM/PS for FM11 (return FM1) from I&T to CAL	08/13/04	-48	10/21/04						▼
1M79002090	Flight TEM PS Assy 7: Elec to I&T	08/13/04	-36	10/05/04						▼
1M1001820	EM2 TEM/PS for FM12 (return FM2) from I&T to CAL	08/16/04	-48	10/22/04						▼
1M1000400	Flight Calorimeter Tower 3 RFI	08/17/04	-49	10/26/04						▼
1M1520	Flight Calorimeter Tower 4 RFI	08/17/04	-49	10/26/04						▼
1M79001050	Flight TEM Assy 3: Elec to I&T	08/17/04	-39	10/12/04						▼
1M1000201	Tracker Modules B RFI	08/18/04	-19	09/15/04						▼
1M1000220	Tracker Modules 1 RFI	08/18/04	-19	09/15/04						▼
1M79002100	Flight TEM PS Assy 8: Elec to I&T	08/20/04	-36	10/12/04						▼
1M79001060	Flight TEM Assy 4: Elec to I&T	08/24/04	-39	10/19/04						▼
1M79002110	Flight TEM PS Assy 9: Elec to I&T	08/25/04	-36	10/15/04						▼
1M79002120	Flight TEM PS Assy 10: Elec to I&T	08/30/04	-36	10/20/04						▼
1M1001830	EM2 TEM/PS for FM13 (return FM3) from I&T to CAL	08/31/04	-49	11/09/04						▼
1M1001840	EM2 TEM/PS for FM14 (return FM4) from I&T to CAL	08/31/04	-49	11/09/04						▼
Run Date	04/27/04 11:11	GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)			0421 LTX1 - MS (L3) FLX1 - MS (L3)	Sheet 4 of 5				
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Attachment 2
Level 3 Milestones (One-Year View)
Page 5 of 5

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY03		FY04			FY05	
					Q3	Q4	Q1	Q2	Q3	Q4	Q1
Instrument Project Office (Level 3)											
1M79001070	Flight TEM Assy 5: Elec to I&T	08/31/04	-39	10/26/04							▽
1M79002130	Flight TEM PS Assy 11: Elec to I&T	09/02/04	-36	10/25/04							▽
1M1000221	Tracker Modules 2 RFI	09/08/04	-20	10/06/04							▽
1M1000250	Flight Tracker Tower 3 RFI	09/08/04	-20	10/06/04							▽
1M79001080	Flight TEM Assy 6: Elec to I&T	09/08/04	-39	11/02/04							▽
1M79002140	Flight TEM PS Assy 12: Elec to I&T	09/08/04	-36	10/28/04							▽
1M79002150	Flight TEM PS Assy 13: Elec to I&T	09/13/04	-36	11/02/04							▽
1M1000390	Flight Calorimeter Tower 5 RFI	09/15/04	-49	11/23/04							▽
1M1530	Flight Calorimeter Tower 6 RFI	09/15/04	-49	11/23/04							▽
1M79001090	Flight TEM Assy 7: Elec to I&T	09/15/04	-39	11/09/04							▽
1M79002160	Flight TEM PS Assy 14: Elec to I&T	09/16/04	-36	11/05/04							▽
1M79002170	Flight TEM PS Assy 15: Elec to I&T	09/21/04	-36	11/10/04							▽
1M79001100	Flight TEM Assy 8: Elec to I&T	09/22/04	-39	11/16/04							▽
1M79002180	Flight TEM PS Assy 16: Elec to I&T	09/24/04	-36	11/15/04							▽
1M1001850	EM2 TEM/PS for FM15 (return FM5) from I&T to CAL	09/29/04	-49	12/09/04							▽
1M1001860	EM2 TEM/PS for FM16 (return FM6) from I&T to CAL	09/29/04	-49	12/09/04							▽
1M79001110	Flight TEM Assy 9: Elec to I&T	09/29/04	-39	11/23/04							▽
Run Date					04/27/04 11:11		GLAST LAT PROJECT				0421
							Project Milestones (Level 3)				LTX1 - MS (L3)
							1 Year View (+/- 6mo)				FLX1 - MS (L3)
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Attachment 3
Budget vs Actuals vs Performance
DOE + NASA Project Expenditures
4.1 LAT



Attachment 4
LAT Costs, through March 2004, by WBS

Monthly Contractor Financial Management Report								Report for Month Ending: 3/31/2004		
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	APR04	MAY04		Project Estimate	Budget Value	
4.1.1 INSTRUMENT MANAGEMENT	386	341	11,457	11,361	348	304	3,731	15,840	15,840	
4.1.2 SYSTEM ENGINEERING	128	170	4,555	4,702	151	140	1,755	6,601	6,601	
4.1.4 TRACKER	236	640	11,378	12,027	501	471	2,347	14,698	14,698	
4.1.5 CALORIMETER	665	798	14,196	15,430	727	749	6,431	22,103	22,103	
4.1.6 ANTICOINCIDENCE DETECTOR	545	624	11,344	12,373	237	153	2,184	13,918	13,918	
4.1.7 ELECTRONICS	1,443	1,696	12,794	13,168	950	918	5,781	20,443	20,443	
4.1.8 MECHANICAL SYSTEMS	843	502	8,177	8,127	473	518	4,310	13,478	13,478	
4.1.9 INTEGRATION & TEST	285	293	3,322	3,418	377	262	3,413	7,373	7,373	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	94	160	1,234	1,608	123	112	1,000	2,469	2,469	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	0	4	295	275	4	3	25	328	328	
4.1.C EDUCATION AND PUBLIC OUTREACH	26	87	1,286	1,526	101	67	995	2,448	2,448	
4.1.D SCIENCE ANALYSIS SOFTWARE	73	45	1,820	1,937	76	65	1,155	3,117	3,117	
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	0	
Total	4,723	5,361	83,184	87,277	4,068	3,762	33,127	124,141	124,141	

Attachment 5
LAT Costs, through March 2004, by Organization and Cost Code

Monthly Contractor Financial Management Report								Report for Month Ending: 3/31/2004	
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	APR04	MAY04			
DG *** GSFC	564	618	12,485	13,836	275	188	2,996	15,944	15,944
DH *** HEPL	100	231	4,701	5,072	191	177	2,099	7,168	7,168
DL *** SLAC	3,178	3,476	45,359	46,037	2,607	2,430	18,591	68,987	68,987
DN *** NRL	790	897	17,131	18,477	849	861	7,745	26,585	26,585
DO *** Financial Plan Transfer/Sub Ou	21	0	59	54	0	0	-5	54	54
DS *** SSU	26	84	1,281	1,504	98	65	957	2,401	2,401
DT *** Texas A&M	0	0	15	16	0	0	0	16	16
DU *** UCSC	32	46	2,038	2,157	38	34	616	2,726	2,726
DW *** UW	12	9	114	125	9	8	129	260	260
Total	4,723	5,361	83,184	87,277	4,068	3,762	33,127	124,141	124,141

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	Budget Value	
	Actual	Planned	Actual	Planned	MAR04	APR04				
RL LABOR	1,949	2,099	43,075	43,254	1,943	1,777	16,724	63,518	63,518	
<i>FTE (DOE/NASA)</i>	<i>165.8</i>	<i>168.3</i>	<i>3,939.6</i>	<i>3,721.8</i>	<i>156.0</i>	<i>155.0</i>	<i>1,267.0</i>	<i>5,517.5</i>	<i>5,517.5</i>	
<i>HOURS (DOE/NASA)</i>	<i>30,502</i>	<i>30,968</i>	<i>653,565</i>	<i>614,701</i>	<i>27,533</i>	<i>24,803</i>	<i>209,528.8</i>	<i>915,430</i>	<i>915,430</i>	
RT TRAVEL	28	65	1,099	1,757	57	50	1,503	2,709	2,709	
RM MATERIAL & SERVICES	2,746	3,487	36,703	39,771	2,064	1,933	14,584	55,284	55,284	
RX MPS & LAB TAX	0	-290	2,307	2,494	4	3	315	2,629	2,629	
Total (not incl FTE/Hours)	4,723	5,361	83,184	87,277	4,068	3,762	33,127	124,141	124,141	

**Attachment 6
LAT Performance, through March 2004, by WBS**

Cost Performance Report - Work Breakdown Structure													
Contractor:					Contract Type/No:			Project Name/No:		Report Period:			
Location:								GLAST LAT Project		2/29/2004		3/31/2004	
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	Variance		Budgeted Cost		Actual Cost	Variance		Budgeted	Latest Revised Estimate	Variance
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost			
Item	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.1.1 INSTRUMENT MANAGEMENT	341	341	386	0	-44	11,361	11,361	11,457	0	-95	15,840	15,840	0
4.1.2 SYSTEM ENGINEERING	170	140	128	-30	12	4,702	4,672	4,555	-30	118	6,601	6,601	0
4.1.4 TRACKER	640	535	236	-106	299	12,027	11,487	11,378	-540	108	14,698	14,698	0
4.1.5 CALORIMETER	798	776	665	-22	111	15,430	14,947	14,196	-483	751	22,103	22,103	0
4.1.6 ANTICOINCIDENCE DETECTOR	624	463	545	-161	-82	12,373	11,697	11,344	-676	353	13,918	13,918	0
4.1.7 ELECTRONICS	1,696	694	1,443	-1,002	-748	13,168	12,606	12,794	-561	-188	20,443	20,443	0
4.1.8 MECHANICAL SYSTEMS	502	466	843	-37	-377	8,127	7,902	8,177	-225	-276	13,478	13,478	0
4.1.9 INTEGRATION & TEST	293	237	285	-56	-48	3,418	3,348	3,322	-71	26	7,373	7,373	0
4.1.A PERFORMANCE AND SAFETY ASSESSMENT	160	160	94	0	66	1,608	1,608	1,234	0	374	2,469	2,469	0
4.1.B LAT INSTRUMENT OPERATIONS CONTROL	4	4	0	0	4	275	275	295	0	-20	328	328	0
4.1.C EDUCATION AND PUBLIC OUTREACH	87	84	26	-3	58	1,526	1,521	1,286	-5	235	2,448	2,448	0
4.1.D SCIENCE ANALYSIS SOFTWARE	45	45	73	0	-28	1,937	1,937	1,820	0	117	3,117	3,117	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	5,361	3,945	4,723	-1,416	-778	87,277	84,687	83,184	-2,590	1,503	124,141	124,141	0
Contingency											12,448	12,448	0
Total	5,361	3,945	4,723	-1,416	-778	87,277	84,687	83,184	-2,590	1,503	136,589	136,589	0

**Attachment 7
LAT Performance, through March 2004, by Organization**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 2/29/2004 3/31/2004			
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			
OBS[1]	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)
DG *** GSFC	618	471	564	-146	-92	13,836	13,140	12,485	-696	656	15,944	15,944	0
DH *** HEPL	231	231	100	0	131	5,072	5,065	4,701	-6	364	7,168	7,168	0
DL *** SLAC	3,476	2,212	3,178	-1,264	-966	46,037	44,641	45,359	-1,395	-718	68,987	68,987	0
DN *** NRL	897	895	790	-2	104	18,477	18,007	17,131	-469	877	26,585	26,585	0
DO *** Financial Plan	0	0	21	0	-21	54	54	59	0	-5	54	54	0
DS *** SSU	84	81	26	-3	55	1,504	1,499	1,281	-5	218	2,401	2,401	0
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0
DU *** UCSC	46	46	32	0	14	2,157	2,138	2,038	-19	100	2,726	2,726	0
DW *** UW	9	9	12	0	-2	125	125	114	0	11	260	260	0
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0	0	0
Sub Total	5,361	3,945	4,723	-1,416	-778	87,277	84,687	83,184	-2,590	1,503	124,141	124,141	0
Contingency											12,448	12,448	0
Total	5,361	3,945	4,723	-1,416	-778	87,277	84,687	83,184	-2,590	1,503	136,589	136,589	0

Attachment 8 LAT Performance Analysis, March 2004

	WBS	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	% BCWS	% BCWP	% ACWP	SPI Trend	CPI Trend	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	124,141	87,277	84,687	83,184	-2,590	1,503	70.30	68.22	67.01	↓	↓	0.970	1.018	121,937	123,123
2	4.1.1	15,840	11,361	11,361	11,457	0	-95	71.73	71.73	72.33	↔	↓	1.000	0.992	15,973	15,973
3	4.1.2	6,601	4,702	4,672	4,555	-30	117	71.23	70.78	69.00	↔	↔	0.994	1.026	6,435	6,447
4	4.1.4	14,698	12,027	11,487	11,378	-540	108	81.82	78.15	77.42	↓	↑	0.955	1.010	14,559	14,709
5	4.1.5	22,103	15,430	14,947	14,196	-483	751	69.81	67.62	64.23	↔	↑	0.969	1.053	20,993	21,212
6	4.1.6	13,918	12,373	11,697	11,344	-676	353	88.90	84.05	81.51	↓	↓	0.945	1.031	13,497	13,621
7	4.1.7	20,443	13,168	12,606	12,794	-561	-188	64.41	61.67	62.58	↓	↓	0.957	0.985	20,748	21,102
8	4.1.8	13,478	8,127	7,902	8,177	-225	-276	60.30	58.63	60.67	↓	↓	0.972	0.966	13,948	14,113
9	4.1.9	7,373	3,418	3,348	3,322	-71	26	46.36	45.40	45.05	↓	↓	0.979	1.008	7,316	7,400
10	4.1.A	2,469	1,608	1,608	1,234	0	374	65.12	65.12	49.99	↔	↑	1.000	1.303	1,896	1,896
11	4.1.B	328	275	275	295	0	-20	84.02	84.02	90.14	↔	↑	1.000	0.932	352	352
12	4.1.C	2,448	1,526	1,521	1,286	-5	235	62.31	62.12	52.51	↓	↑	0.997	1.183	2,070	2,072
13	4.1.D	3,117	1,937	1,937	1,820	0	117	62.16	62.16	58.40	↔	↓	1.000	1.064	2,928	2,928
14	4.1.E	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

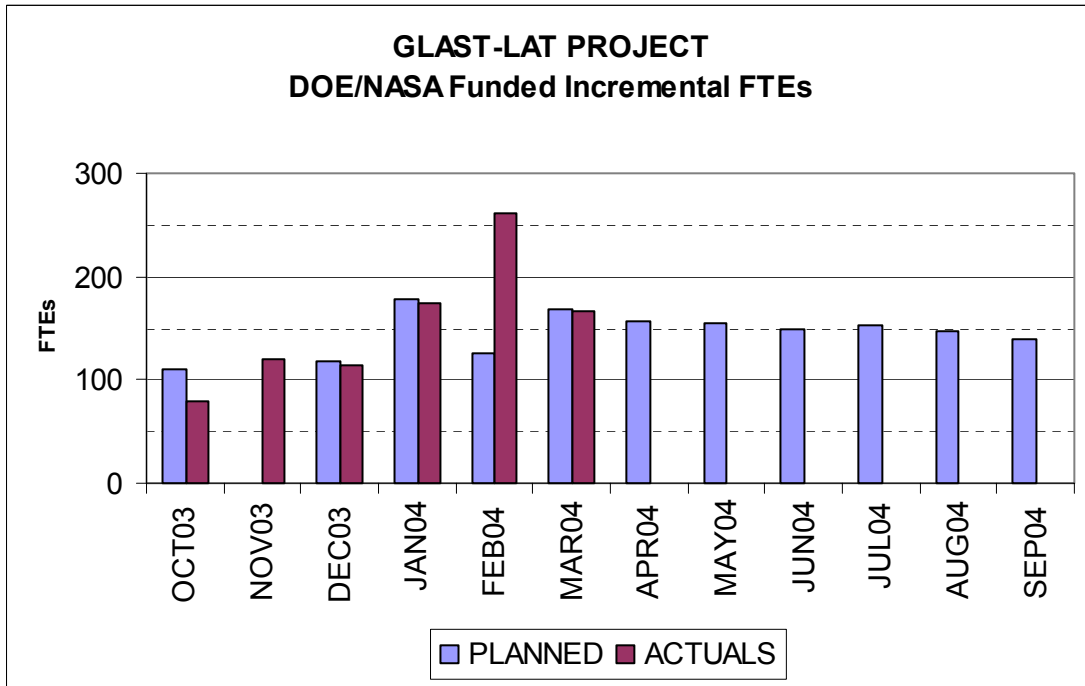
% ACWP: Percent Spent = ACWP/BAC

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

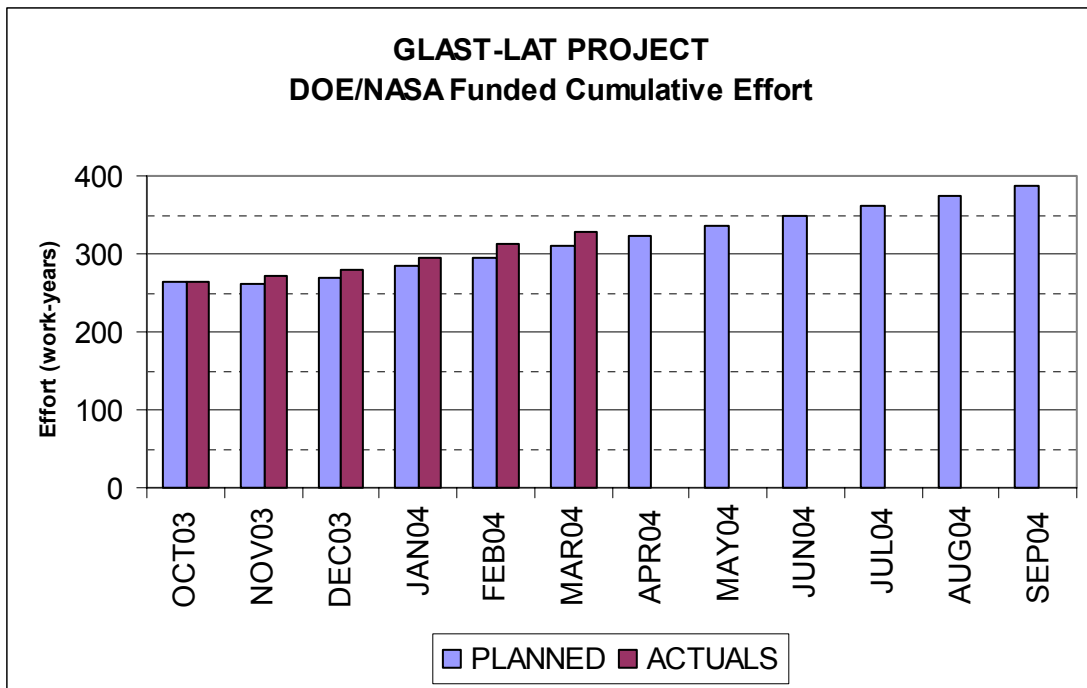
CpiSpi_Fcst: Combination CPI and SPI EAC Forecast = ACWP + (BAC - BCWP) / (CPI * SPI)

■	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 (DOE/NASA-Funded)**



Note: Monthly planned manpower reflects adjustments so that the cumulative-to-date plan corresponds to the approved changes for that month.



Attachment 10
LAT Manpower Data, through March 2004, by Organization

Program: LAT3		Description: GLAST LAT Project		Approval: Program Manager Functional Manager Cost Account Manager												
Run Date: 4/27/2004		Status Date: 3/31/2004														
			PRIOR	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	Cum-to- Date	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
OBS																
DG *** GSFC																
FTE	PLANNED	682.5	22.2	-8.1	21.2	27.8	29.9	61.0	836.4	30.4	28.6	21.4	23.6	25.8	27.8	
	ACTUALS	694.9	0.0	0.0	0.0	65.6	153.4	48.7	962.6	0.0	0.0	0.0	0.0	0.0	0.0	
DH *** HEPL																
FTE	PLANNED	296.3	7.2	-56.1	5.3	0.0	3.2	3.2	259.2	3.2	3.4	4.5	4.9	4.9	4.9	
	ACTUALS	223.3	0.0	6.1	13.6	11.7	-2.5	4.0	256.3	0.0	0.0	0.0	0.0	0.0	0.0	
DL *** SLAC																
FTE	PLANNED	1523.8	62.7	23.1	64.2	117.4	77.1	79.7	1948.0	94.3	92.5	89.7	91.4	82.3	81.3	
	ACTUALS	1412.5	64.3	66.4	63.0	69.1	77.5	84.7	1837.4	0.0	0.0	0.0	0.0	0.0	0.0	
DN *** NRL																
FTE	PLANNED	685.9	32.5	37.9	36.5	37.6	22.2	36.9	889.6	46.6	49.4	51.0	44.3	41.9	32.5	
	ACTUALS	707.7	20.7	35.4	38.3	30.1	34.8	35.0	902.0	0.0	0.0	0.0	0.0	0.0	0.0	
DS *** SSU																
FTE	PLANNED	71.5	2.3	2.7	2.4	4.8	3.2	3.2	90.1	3.2	3.2	3.2	3.2	3.2	3.2	
	ACTUALS	83.8	2.4	4.0	3.5	5.1	3.3	3.0	105.0	0.0	0.0	0.0	0.0	0.0	0.0	
DU *** UCSC																
FTE	PLANNED	207.6	4.5	10.0	4.6	6.3	6.9	4.7	244.6	4.4	4.4	4.4	4.4	4.4	4.4	
	ACTUALS	251.4	4.3	19.4	5.8	4.7	5.2	3.3	294.1	0.0	0.0	0.0	0.0	0.0	0.0	
DW *** UW																
FTE	PLANNED	36.9	0.4	0.4	0.4	0.4	0.4	0.4	39.3	0.4	0.4	0.4	0.4	0.4	0.4	
	ACTUALS	9.0	0.0	0.6	1.0	0.0	1.7	0.9	13.1	0.0	0.0	0.0	0.0	0.0	0.0	
FF *** France																
FTE	PLANNED	1035.9	31.4	-15.5	10.9	14.8	15.2	15.2	1107.8	15.2	15.2	15.2	15.2	15.2	15.2	
	ACTUALS								0.0							
FI *** Italy																
FTE	PLANNED	417.4	14.8	-69.7	9.1	9.1	9.1	9.4	399.2	15.6	15.2	14.9	12.8	14.6	15.2	
	ACTUALS	299.8	10.9	10.9	10.9	10.9	10.9	10.9	364.9	0.0	0.0	0.0	0.0	0.0	0.0	
FJ *** Japan																
FTE	PLANNED	93.3	1.0	0.9	1.2	1.0	1.0	0.9	99.2	0.5	0.5	0.5	0.5	0.5	0.5	
	ACTUALS	70.2	1.8	1.8	1.8	1.8	1.8	1.8	80.7	0.0	0.0	0.0	0.0	0.0	0.0	
FK *** Sweden																
FTE	PLANNED	99.5	5.1	5.1	3.8	3.5	3.6	3.6	124.1	3.6	3.6	3.6	3.6	3.6	3.6	
	ACTUALS								0.0							
Grand Totals:																
	PLANNED	5150.6	184.2	-69.4	159.7	222.6	171.6	218.1	6037.4	217.2	216.2	208.6	204.1	196.7	188.9	
	ACTUALS	3752.6	104.2	144.5	137.8	198.9	286.0	192.2	4816.1	0.0	0.0	0.0	0.0	0.0	0.0	
4.1 GLAST LAT																
Contributed	PLANNED	2119.0	73.0	-59.5	42.4	45.1	45.9	49.8	2315.6	60.8	61.1	60.2	50.2	49.5	50.1	
	ACTUALS	729.3	24.3	24.4	23.8	24.1	24.3	26.4	876.5	0.0	0.0	0.0	0.0	0.0	0.0	
Funded	PLANNED	3031.6	111.2	-9.9	117.4	177.5	125.7	168.3	3721.8	156.4	155.0	148.4	153.8	147.2	138.8	
	ACTUALS	3023.3	80.0	120.1	114.0	174.8	261.7	165.8	3939.6	0.0	0.0	0.0	0.0	0.0	0.0	
Grand Totals:																
	PLANNED	5150.6	184.1	-69.4	159.7	222.6	171.6	218.1	6037.4	217.2	216.2	208.6	204.1	196.7	188.9	
	ACTUALS	3752.6	104.2	144.4	137.8	198.9	286.0	192.2	4816.1	0.0	0.0	0.0	0.0	0.0	0.0	