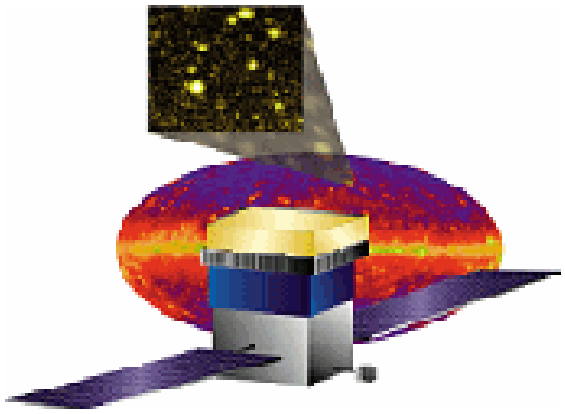
Monthly Progress Report

(Month Ending February 2004)

GLAST Large Area Telescope (LAT)



LAT-MR-03531-01

April 9, 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 February, 2004.

2.0 Recent Progress and Status

4.1.D Science Analysis Software

Some 50 collaborators participated in the project's first data challenge (DC1). The fundamental purpose of the LAT data challenges is to support readiness by launch time for science, with an emphasis on the first year. DC1 had modest goals, but contained most of the essential features of a data challenge with 1 simulated day all-sky survey. The first end-to-end test of the simulation, reconstruction and scientific analysis of LAT data was performed. The high-level analysis was performed with the first release of the Science Tools. A great deal was learned from the challenge, and users had their first look at the sky through GLAST's eyes.

4.1.4 Tracker

Multichip module (MCM) preproduction is nearing completion, with the last sets of boards delayed to incorporate process changes and version 7 of the readout controller ASIC into some of the preproduction. Twenty-eight preproduction boards have passed all the way through burn-in and final test. The MCM Production Readiness Review was conducted, and the procurement initiated. Much progress was made on flex-circuit cables design. An order was placed for non-flight flex-circuit cables for electrical ground support equipment. Specifications were defined for the sidewall prepreg, and preparations to order are underway. Procedures and drawings and reviews were completed for the mid-tray panel. Tray panel production has commenced. Bias circuits are being remade to address an alignment problem. Agreement was reached on all aspects of the Tracker/grid interface design and assembly. Vendor selection is underway for the titanium flexures and corner brackets. The engineering model thermal vacuum test readiness review was conducted.

4.1.5 Calorimeter

Over 1,000 fully-tested CsI crystals have been delivered to NRL. All 4,800 dual PIN photodiodes have been received from Hamamatsu, and over 1,400 flight PIN photodiode assemblies have been manufactured and tested. Over 450 crystal detector elements (CDEs) have been bonded. Of these, 25 have been wrapped and capped. Completion of the CDEs has been limited by availability of end caps, but production is on schedule. Prepreg inspection and handling issues on the first composite structure manufacture has been addressed. Vibration test procedures for the second composite structure have been revised. Manufacturing and metrology of the third composite structure was completed. All aluminum machined parts for the Calorimeter structures have been completed and plated. All flight ASICs have been received. Prototypes of flight analog front-end electronics boards have been received, assembled, and tested. Eight test stations have been qualified and are being used to test flight electronics parts. The contract for

improved humidity control in the Calorimeter integration & test clean room has been placed.

4.1.6 Anticoincidence Detector

Drawings for all tiles have been delivered to Fermilab. Thirty-eight tile detector assemblies were received (bringing the total received to 58), and 27 tested. All meet requirements. Successful vibration and thermal vacuum tests of the engineering test unit chassis were conducted. Flight front-end electronics cards (except ASICs) are being assembled. The composite shell's top panel was repaired after shipping damage. Composite tile detector assembly mounting flexures have been installed on all of the side panels, and the side panels were prepared for full assembly of the Composite Shell. The Base Frame was assembled. The high-voltage bias supply printed circuit board design and fabrication has been completed; and the printed circuit boards passed coupon testing. The flight-packaged digital ASIC was delivered. Both ASICs are being screened and qualified.

4.1.7 Electronics, Data Acquisition, and Flight Software

Layout of the flight schematics for the power distribution unit (PDU) was completed, and fabrication commenced. Tower electronics module and ACD events were assembled in the GASU event builder module and transmitted to the LAT Communications Board (LCB). The GASU is assembled and software is written; testing and debugging are the next steps. A GASU power supply was delivered to ACD to connect to front-end electronics. The bid package for the tower electronics module was released, and the procurement process has begun. Two additional crates for the test-bed were received. Forty-five front-end simulator boards were fabricated for the test-bed. The custom backplane is ready for fabrication. Layout of the LCB is complete, and the boards are being fabricated. Layout of the heater control box was completed, and the printed circuit board fabricated. Most of the parts for all 60 electronics ground support equipment (EGSE) test stands have been received.

Version 1 of the command and telemetry database tool has been released to production. The code management port to Windows is nearly complete. The Front-End (hardware) Simulation manual has been drafted. Work on the EEPROM file system has commenced. A watchdog timer facility for all platforms has been built. Plans for the monthly functional demonstrations were laid out for the rest of the year.

4.1.8 Mechanical Systems

Initial final machining operations on the first grid have been completed. Rough machining of the second grid billet has begun. The procurement change notice has been issued for the second grid and additional shields and shear plates. The mechanical assembly sequence has been re-aligned to match the integration plan.

Figure 1: Machining of the first grid.

4.1.9 Integration & Test (I&T)

Preparation for integration is well underway, with several discussions to address I&T LAT requirements flow. A review of mechanical ground support equipment design status was held. GASU code work commenced. Several bug fixes and enhancements were made to the LAT Test Executive, version 2.0. The I&T training mockup design is complete and all parts have been ordered. The nitrogen main line was connected to the LAT I&T facility. The Calorimeter mini-EM was received. The Van de Graaff generator was refurbished, reassembled, and pumped down.

3.0 Schedule Status

The critical path for the project is driven by the receipt of the Tracker bottom tray materials. There is no variance to the baseline float of five weeks to the "ready for CD-4 review" milestone.

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 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 will be completed in March, and vibration testing will be repeated.

Variances to the following milestones are due to delayed receipt of Calorimeter ASICs. Much of the schedule will be recovered by using parts before completion of screening and qualification.

- Calorimeter Module A through 4 RFI (1M1000210, 1M1500, 1M1000230, 1M1510, 1M1000400, and 1M1520)
- EM2 TEM/PS for FM9 through FM14 (return FMA through FM4) from I&T to Calorimeter (1M1001790 through 1M1001840)

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 PS Assemblies A through 10 to I&T (1M79002010 through 1M79002120)
- Flight TEM Assemblies A through 5 to I&T (1M79001010 through 1M79001070)
- Flight Cable Assemblies A through 16 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. Delivery of the five test stations for analog front-end electronics (AFEE) from Electronics to Calorimeter is driving the critical path to integration of the first flight tower.

- 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)
- 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)
- ACD Test Scripts from ACD to I&T (1M1001000)
- EM2 TEM: Elec to Tracker (1M1000920)
- 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 delivery of the 1x4 grid from Mechanical Systems to I&T has been delayed for the resolution of the Tracker/grid interface design modifications. This can be accommodated with little impact to the I&T schedule, by using other equipment. The requirements for the 1x4 are being reevaluated in light of the redesign of the Tracker/grid interface.

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-02837-01	Calorimeter Contamination Control Plan	N. Virmani	Approved	N/A
LAT-XR-02999-01	CDE Manufacturing Development Cost Savings	N. Johnson	Approved	-$546K
LAT-XR-03000-01	Close out Suborbital Flight Test WBS	C. Rhoads	Approved	$4K
LAT-XR-03057-01	HEPL Indirect Cost for Subcontracts	T. Boysen	Approved	$29K
LAT-XR-03064-01	IFCT Engineer/Designer	E. Bloom	Approved	$284K
LAT-XR-03070-02	Tracker/Grid Interface Redesign	J. Martin	Approved	$351K
LAT-XR-03074-02	Grid Assembly & TCS Replan	M. Campell	Approved	$53K
LAT-XR-03076-01	SLAC Security Charge	T. Boysen	Approved	$150K
LAT-XR-03077-02	Stanford Benefits Rate Increase	T. Boysen	Approved	$614K

The fabrication phase cost baseline is $124.4M. Funding applicable to that baseline is $136.8M; the resulting contingency is $12.4M.

7.0 Staffing

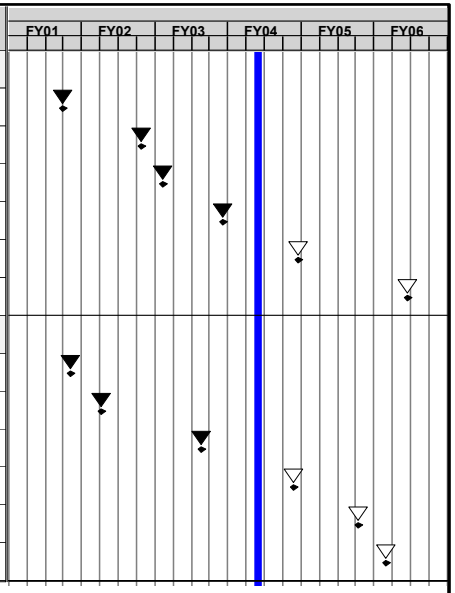
Attachments 9-10 demonstrate the staffing plan, and reports of actual manpower received. Note from Attachment 10 that not all participating organizations are providing manpower data.

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.

Attachment 1
Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date
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*



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GLAST LAT PROJECT
Project Milestones (Level 1 and 2)

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Attachment 2
Level 3 Milestones (One-Year View)
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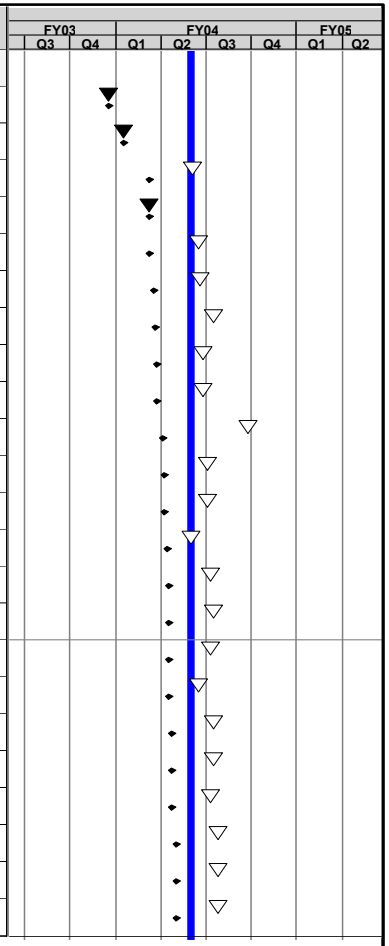
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date
Instrument Project Office (Level 3				
1M1000910	(36) MCM's for EM2 from Tracker to Elec	09/15/03A	0	09/15/03A
1M1001520	EM CAL Returned to NRL (arrives on dock)	10/16/03	-1	10/17/03A
1M74000010	Updated EGSE System 1: Elec to TKR	12/08/03	-55	03/05/04
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	-63	03/17/04
1M76000020	G3 Test Stand (test 2 FREE Cards): Elec to ACD	12/15/03	-60	03/19/04
1M1001380	Delivery of EM (1X4) Grid to I&T/MSGE	12/19/03	-75	04/15/04
1M74000020	Updated EGSE System 2: Elec to TKR	12/22/03	-60	03/26/04
1M7941150	EGSE TEM/TEM PS/CTS w/ FE Elec #2-Elec to I&T	12/22/03	-60	03/26/04
1M1001430	Delv of TKR EM to SLAC I&T/MGSE	01/02/04	-122	06/25/04
1M74000030	Updated EGSE System 3: Elec to TKR	01/07/04	-60	04/02/04
1M7941160	EGSE TEM/TEM PS/CTS w/ FE Elec #3-Elec to I&T	01/07/04	-60	04/02/04
1M1000920	EM2 TEM: Elec to Tracker	01/12/04	-33	03/01/04*
1M1001900	Test Stations (5) for AFEE: Elec to CAL	01/14/04	-60	04/09/04
1M74000040	EGSE System 4: Elec to TKR	01/14/04	-65	04/16/04
1M7941170	EGSE TEM/TEM PS/CTS/GASU FE Elec-Elec to I&T	01/14/04	-60	04/09/04
1M1001870	5 EM2 TEM/PS for AFEE brd ass & tst: Elec to CAL	01/15/04	-42	03/17/04
1M1001220	EM2 TEM/PS/CTS for FMA from Elec to CAL	01/22/04	-60	04/16/04
1M74000050	EGSE System 5: Elec to TKR	01/22/04	-60	04/16/04
1M7941180	EGSE Development Hrdw/FSW 1st Delivr-Elec to I&T	01/22/04	-55	04/09/04
1M1001260	EM2 TEM/PS/CTS for FMB from Elec to CAL	01/29/04	-60	04/23/04
1M74000060	EGSE System 6: Elec to TKR	01/29/04	-60	04/23/04
1M7941190	EGSE TEM/TEM PS/CTS #1 for Bldg 33-Elec to I&T	01/29/04	-60	04/23/04



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GLAST LAT PROJECT
Project Milestones (Level 3)
1 Year View (+/- 6mo)

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Attachment 2
Level 3 Milestones (One-Year View)
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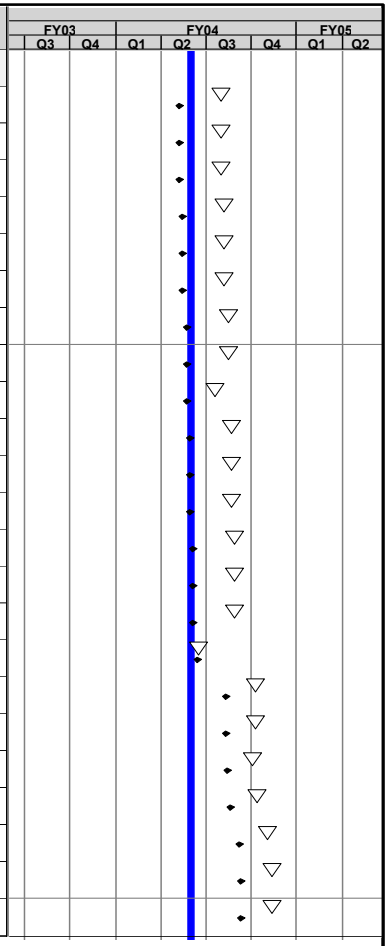
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date
Instrument Project Office (Level 3				
1M1001600	EM2 TEM/PS/CTS for FM1 from Elec to CAL	02/05/04	-60	04/30/04
1M7941420	EGSE TEM/TEM PS/CTS #2 for Bldg 33-Elec to I&T	02/05/04	-60	04/30/04
1M7941430	EGSE TEM/TEM PS/CTS w/ GASU for B33-Elec to	02/05/04	-60	04/30/04
1M1001650	EM2 TEM/PS/CTS for FM2 from Elec to CAL	02/12/04	-60	05/07/04
1M74000070	EGSE System 7: Elec to TKR	02/12/04	-60	05/07/04
1M74000080	EGSE System 8: Elec to TKR	02/12/04	-60	05/07/04
1M74000090	EGSE System 9: Elec to TKR	02/20/04	-60	05/14/04
1M74000100	EGSE System 10: Elec to TKR	02/20/04	-60	05/14/04
1M76000030	G3 Test Stand (Flt-like I/F): Elec to ACD	02/20/04	-41	04/19/04
1M1001660	EM2 TEM/PS/CTS for FM3 from Elec to CAL	02/27/04	-60	05/21/04
1M1001680	EM2 TEM/PS/CTS for FM4 from Elec to CAL	02/27/04	-60	05/21/04
1M1001720	EM2 TEM/PS/CTS for FM5 from Elec to CAL	02/27/04	-60	05/21/04
1M1001760	EM2 TEM/PS/CTS for FM6 from Elec to CAL	03/05/04	-60	05/28/04
1M1001770	EM2 TEM/PS/CTS for FM7 from Elec to CAL	03/05/04	-60	05/28/04
1M1001780	EM2 TEM/PS/CTS for FM8 from Elec to CAL	03/05/04	-60	05/28/04
1M005480	IOC CDR	03/12/04	-1	03/15/04
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



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GLAST LAT PROJECT
Project Milestones (Level 3)
1 Year View (+/- 6mo)

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LTX1 - MS (L3)
FLX1- MS (L3)

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Attachment 2
Level 3 Milestones (One-Year View)
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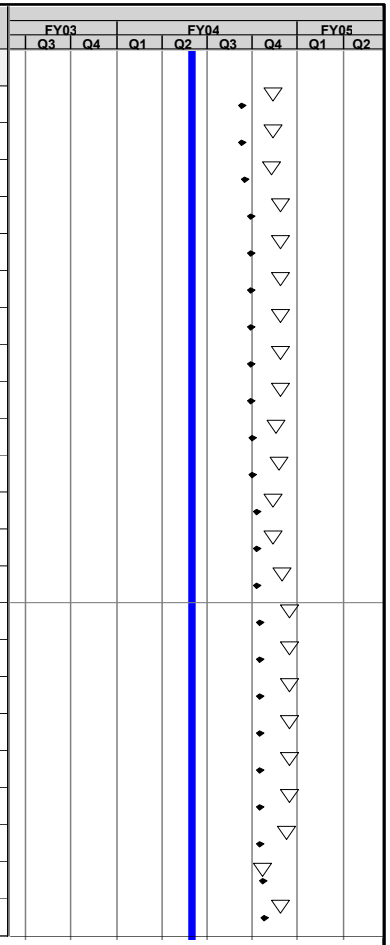
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date
Instrument Project Office (Level 3				
1M79003050	Flight Cables Assy 3: Elec to I&T	06/10/04	-42	08/10/04
1M79003060	Flight Cables Assy 4: Elec to I&T	06/10/04	-42	08/10/04
1M79001020	Flight TEM Assy B: Elec to I&T	06/14/04	-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	-33	08/18/04
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	-24	08/12/04
1M1500	Calorimeter Modules B RFI	07/09/04	-24	08/12/04
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	-24	08/26/04



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GLAST LAT PROJECT
Project Milestones (Level 3)
1 Year View (+/- 6mo)

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LTX1 - MS (L3)
FLX1- MS (L3)

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Attachment 2
Level 3 Milestones (One-Year View)
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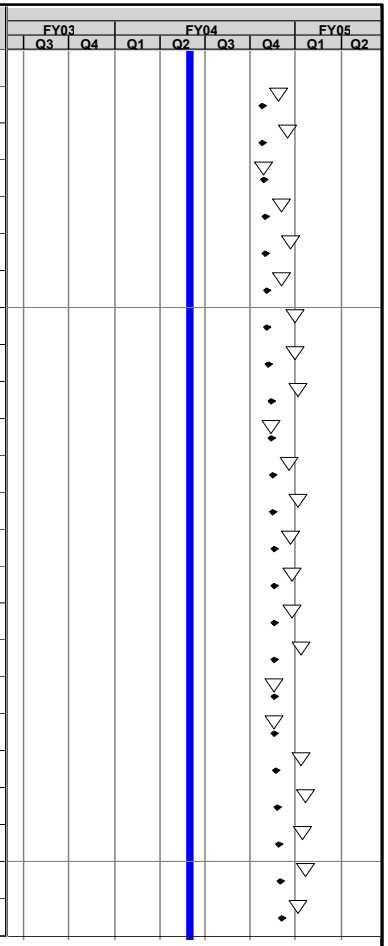
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date
Instrument Project Office (Level 3				
1M1001800	EM2 TEM/PS for FM10 (return FMB)from I&T to CAL	07/23/04	-24	08/26/04
1M79002060	Flight TEM PS Assy 4: Elec to I&T	07/23/04	-36	09/14/04
1M1000200	Tracker Modules A RFI	07/28/04	0	07/28/04
1M1000230	Calorimeter Modules 1 RFI	07/30/04	-24	09/02/04
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	-24	09/03/04
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	-24	09/17/04
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	-24	09/20/04
1M1000400	Flight Calorimeter Tower 3 RFI	08/17/04	-25	09/22/04
1M1520	Flight Calorimeter Tower 4 RFI	08/17/04	-25	09/22/04
1M79001050	Flight TEM Assy 3: Elec to I&T	08/17/04	-39	10/12/04
1M1000201	Tracker Modules B RFI	08/18/04	0	08/18/04
1M1000220	Tracker Modules 1 RFI	08/18/04	0	08/18/04
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	-25	10/06/04



Run Date 04/05/04 09:57

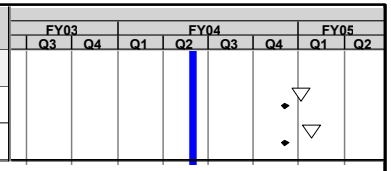
GLAST LAT PROJECT
Project Milestones (Level 3)
1 Year View (+/- 6mo)

0318
LTX1 - MS (L3)
FLX1- MS (L3)

Sheet 4 of 5

Attachment 2
Level 3 Milestones (One-Year View)
Page 5 of 5

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date
Instrument Project Office (Level 3				
1M1001840	EM2 TEM/PS for FM14 (return FM4) from I&T to CAL	08/31/04	-25	10/06/04
1M79001070	Flight TEM Assy 5: Elec to I&T	08/31/04	-39	10/26/04



Run Date 04/05/04 09:57	**GLAST LAT PROJECT**	0318 Sheet 5 of 5
	Project Milestones (Level 3)	LTX1 - MS (L3)
	1 Year View (+/- 6mo)	FLX1- MS (L3)
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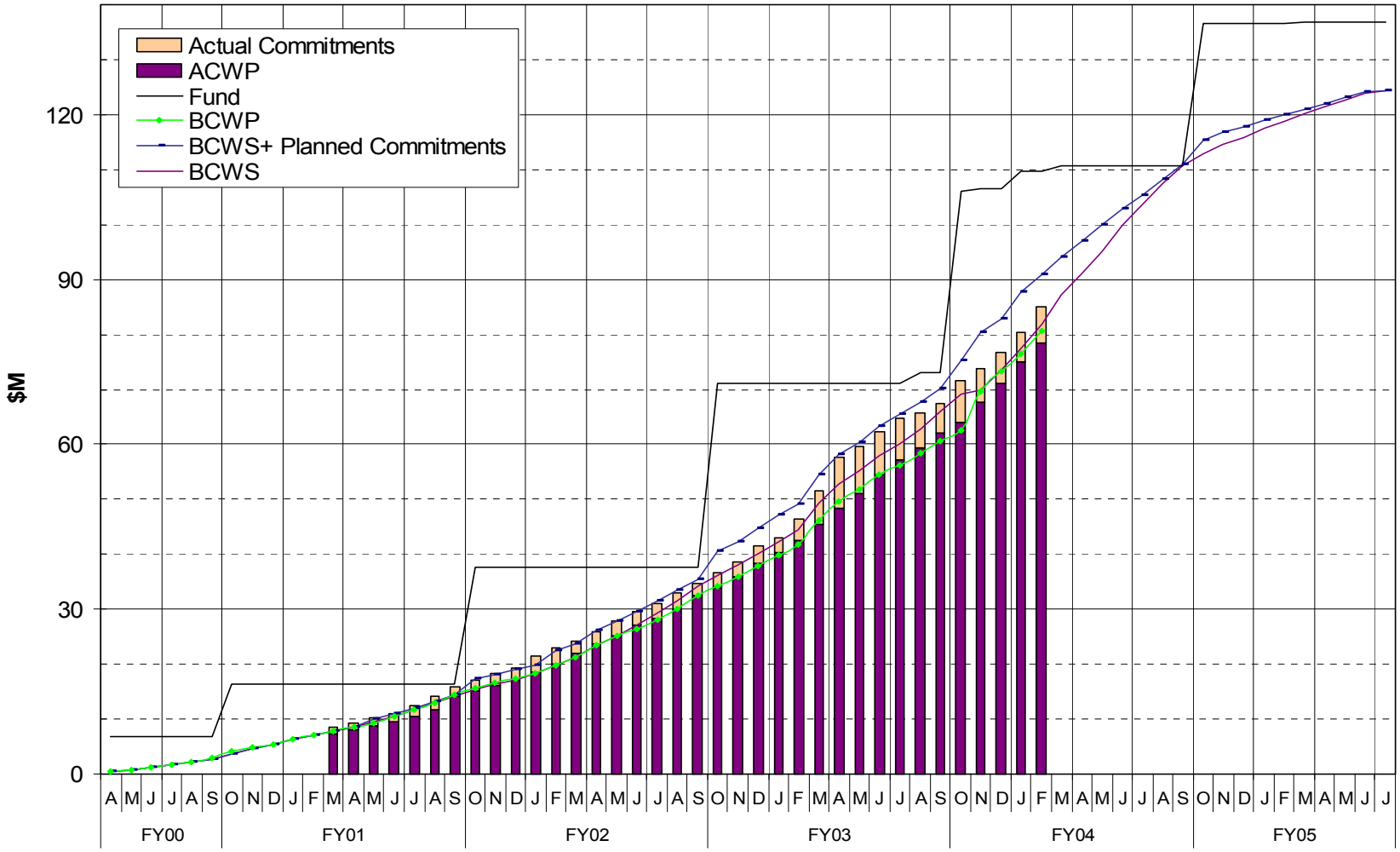
Attachment 3

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



Attachment 4
LAT Costs, through February 2004, by WBS

Monthly Contractor Financial Management Report								Report for Month Ending: 2/29/2004		
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 Estimated Final Cost	Billing	Unfilled Orders Outstanding
	During Month		Cum. to Date		Detail		Balance of	Project	Budget	
	Actual	Planned	Actual	Planned	MAR04	APR04	Budget	Estimate	Value	
4.1.1 INSTRUMENT MANAGEMENT	545	442	11,071	11,020	370	354	5,598	15,945	15,945	
4.1.2 SYSTEM ENGINEERING	179	139	4,426	4,532	170	151	2,496	6,601	6,601	
4.1.4 TRACKER	278	516	11,143	11,386	640	501	4,696	14,698	14,698	
4.1.5 CALORIMETER	753	95	13,531	14,632	798	727	10,097	22,103	22,103	
4.1.6 ANTICOINCIDENCE DETECTOR	322	347	10,799	11,750	445	168	3,836	14,022	14,022	
4.1.7 ELECTRONICS	757	2,072	11,352	11,472	1,688	939	11,625	20,350	20,350	
4.1.8 MECHANICAL SYSTEMS	290	395	7,335	7,625	502	473	7,118	13,478	13,478	
4.1.9 INTEGRATION & TEST	210	240	3,037	3,125	376	362	5,075	7,373	7,373	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	73	133	1,140	1,447	160	123	1,612	2,469	2,469	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	17	3	295	272	4	4	40	328	328	
4.1.C EDUCATION AND PUBLIC OUTREACH	61	64	1,260	1,438	87	101	1,377	2,448	2,448	
4.1.D SCIENCE ANALYSIS SOFTWARE	-12	71	1,747	1,892	80	82	1,657	3,243	3,243	
4.1.E SUBORBITAL FLIGHT TEST	0	4	1,325	1,325	0	0	0	1,325	1,325	
Gen. and Admin.	0	0	0	0	0	0	0	0	0	
Total	3,471	4,522	78,460	81,916	5,320	3,985	36,617	124,383	124,383	

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

Monthly Contractor Financial Management Report			Report for Month Ending: 2/29/2004
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	MAR04	APR04		Project Estimate	Budget Value	
DG *** GSFC	455	409	11,921	13,218	502	217	5,078	16,280	16,280	
DH *** HEPL	37	248	4,602	4,841	231	191	2,989	7,168	7,168	
DL *** SLAC	2,027	3,560	42,181	42,560	3,551	2,582	32,845	68,893	68,893	
DN *** NRL	849	170	16,340	17,580	897	849	11,991	26,585	26,585	
DO *** Financial Plan Transfer/Sub Ou	0	8	38	54	0	0	16	54	54	
DS *** SSU	61	62	1,255	1,420	84	98	1,328	2,401	2,401	
DT *** Texas A&M	0	0	15	16	0	0	0	16	16	
DU *** UCSC	30	57	2,006	2,112	46	38	804	2,726	2,726	
DW *** UW	12	8	102	116	9	9	176	260	260	
Total	3,471	4,522	78,460	81,916	5,320	3,984	55,226	124,383	124,383	

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	1,697	1,231	41,125	41,156	1,850	1,901	25,774	63,149	63,149	
FTE (DOE/NASA)	*261.7*	*125.7*	*3,773.8*	*3,553.5*	*146.0*	*153.0*	*2,010.9*	*5,485.7*	*5,485.7*	
HOURS (DOE/NASA)	*39,781*	*19,110*	*623,063*	*583,733*	*26,931*	*26,847*	*340,425.2*	*909,710*	*909,710*	
RT TRAVEL	39	51	1,071	1,692	65	57	1,760	2,709	2,709	
RM MATERIAL & SERVICES	1,921	3,152	33,957	36,284	3,295	2,011	26,194	54,845	54,845	
RX MPS & LAB TAX	-186	88	2,307	2,785	110	15	1,498	3,680	3,680	
Total (not incl FTE/Hours)	3,471	4,522	78,460	81,916	5,320	3,984	55,226	124,383	124,383	

Attachment 6
LAT Performance, through February 2004, by WBS

Cost Performance Report - Work Breakdown Structure														
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 1/31/2004	2/29/2004			
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	0			
CAPW[3]	Current Period					Cumulative to Date					At Completion			
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance					
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Latest Revised Estimate	Variance	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
4.1.1 INSTRUMENT MANAGEMENT	442	442	545	0	-103	11,020	11,020	11,071	0	-51	15,945	15,945	0	
4.1.2 SYSTEM ENGINEERING	139	139	179	0	-40	4,532	4,532	4,426	0	106	6,601	6,601	0	
4.1.4 TRACKER	516	405	278	-112	127	11,386	10,952	11,143	-434	-190	14,698	14,698	0	
4.1.5 CALORIMETER	95	131	753	36	-622	14,632	14,171	13,531	-462	640	22,103	22,103	0	
4.1.6 ANTICOINCIDENCE DETECTOR	347	208	322	-139	-114	11,750	11,235	10,799	-515	435	14,022	14,022	0	
4.1.7 ELECTRONICS	2,072	1,915	757	-157	1,158	11,472	11,912	11,352	440	560	20,350	20,350	0	
4.1.8 MECHANICAL SYSTEMS	395	422	290	27	132	7,625	7,436	7,335	-189	101	13,478	13,478	0	
4.1.9 INTEGRATION & TEST	240	234	210	-6	25	3,125	3,111	3,037	-14	74	7,373	7,373	0	
4.1.A PERFORMANCE AND SAFETY AS	133	133	73	0	61	1,447	1,447	1,140	0	307	2,469	2,469	0	
4.1.B LAT INSTRUMENT OPERATIONS C	3	3	17	0	-14	272	272	295	0	-24	328	328	0	
4.1.C EDUCATION AND PUBLIC OUTRE	64	60	61	-4	-1	1,438	1,437	1,260	-2	177	2,448	2,448	0	
4.1.D SCIENCE ANALYSIS SOFTWARE	71	71	-12	0	84	1,892	1,892	1,747	0	145	3,243	3,243	0	
4.1.E SUBORBITAL FLIGHT TEST	4	4	0	0	4	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	4,522	4,167	3,471	-355	696	81,916	80,742	78,460	-1,175	2,281	124,383	124,383	0	
Contingency											12,447	12,447	0	
Total	4,522	4,167	3,471	-355	696	81,916	80,742	78,460	-1,175	2,281	136,830	136,830	0	

Attachment 7
LAT Performance, through February 2004, by Organization

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 1/31/2004	2/29/2004		
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	0		
OBS[1]	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DG *** GSFC	409	253	455	-156	-202	13,218	12,669	11,921	-549	748	16,280	16,280	0
DH *** HEPL	248	251	37	3	215	4,841	4,834	4,602	-6	233	7,168	7,168	0
DL *** SLAC	3,560	3,292	2,027	-268	1,264	42,560	42,429	42,181	-131	248	68,893	68,893	0
DN *** NRL	170	258	849	88	-591	17,580	17,112	16,340	-467	772	26,585	26,585	0
DO *** Financial Plan	8	8	0	0	8	54	54	38	0	16	54	54	0
DS *** SSU	62	57	61	-4	-4	1,420	1,418	1,255	-2	163	2,401	2,401	0
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0
DU *** UCSC	57	40	30	-18	9	2,112	2,093	2,006	-19	87	2,726	2,726	0
DW *** UW	8	8	12	0	-4	116	116	102	0	13	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	4,522	4,167	3,471	-355	696	81,916	80,742	78,460	-1,175	2,281	124,383	124,383	0
Contingency											12,447	12,447	0
Total	4,522	4,167	3,471	-355	696	81,916	80,742	78,460	-1,175	2,281	136,830	136,830	0

Attachment 8
LAT Performance Analysis, February 2004

	WBS	BAC	BCWS	BCWP	ACWP	SV $	CV $	% BCWS	% BCWP	% ACWP	SPI Trend	CPI Trend	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	124,383	81,916	80,742	78,460	-1,175	2,281	65.86	64.91	63.08	↓	↑	0.986	1.029	120,869	121,486
2	4.1.1	15,945	11,020	11,020	11,071	0	-51	69.12	69.12	69.43	↔	↓	1.000	0.995	16,018	16,018
3	4.1.2	6,601	4,532	4,532	4,426	0	105	68.65	68.65	67.06	↔	↓	1.000	1.024	6,448	6,448
4	4.1.4	14,698	11,386	10,952	11,143	-434	-190	77.47	74.52	75.81	↓	↑	0.962	0.983	14,953	15,104
5	4.1.5	22,103	14,632	14,171	13,531	-462	640	66.20	64.11	61.22	↔	↓	0.968	1.047	21,105	21,351
6	4.1.6	14,022	11,750	11,235	10,799	-515	435	83.79	80.12	77.01	↓	↓	0.956	1.040	13,479	13,602
7	4.1.7	20,350	11,472	11,912	11,352	440	560	56.37	58.54	55.78	↓	↑	1.038	1.049	19,392	19,095
8	4.1.8	13,478	7,625	7,436	7,335	-189	101	56.57	55.17	54.42	↑	↑	0.975	1.014	13,295	13,446
9	4.1.9	7,373	3,125	3,111	3,037	-14	74	42.38	42.19	41.18	↓	↑	0.995	1.024	7,197	7,216
10	4.1.A	2,469	1,447	1,447	1,140	0	307	58.62	58.62	46.18	↔	↑	1.000	1.269	1,946	1,946
11	4.1.B	328	272	272	295	0	-24	82.91	82.91	90.14	↔	↓	1.000	0.920	356	356
12	4.1.C	2,448	1,438	1,437	1,260	-2	177	58.75	58.68	51.44	↓	↔	0.999	1.141	2,146	2,148
13	4.1.D	3,243	1,892	1,892	1,747	0	145	58.36	58.36	53.89	↔	↑	1.000	1.083	2,994	2,994
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)

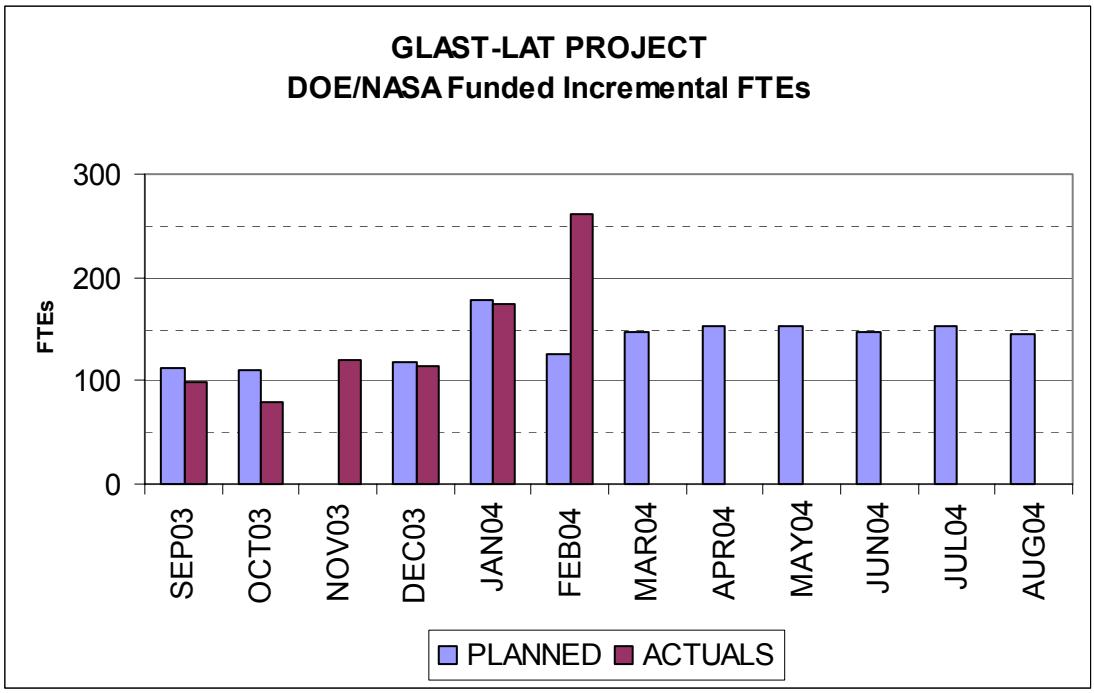
SV $: Schedule Variance = BCWP - BCWS
CV $: Cost Variance = BCWP - ACWP
SPI: Schedule Performance Index = BCWP/BCWS
CPI: Cost Performance Index = BCWP/ACWP

% BCWS: Percent Scheduled = BCWS/BAC
% BCWP: Percent Complete = BCWP/BAC
% ACWP: Percent Spent = ACWP/BAC

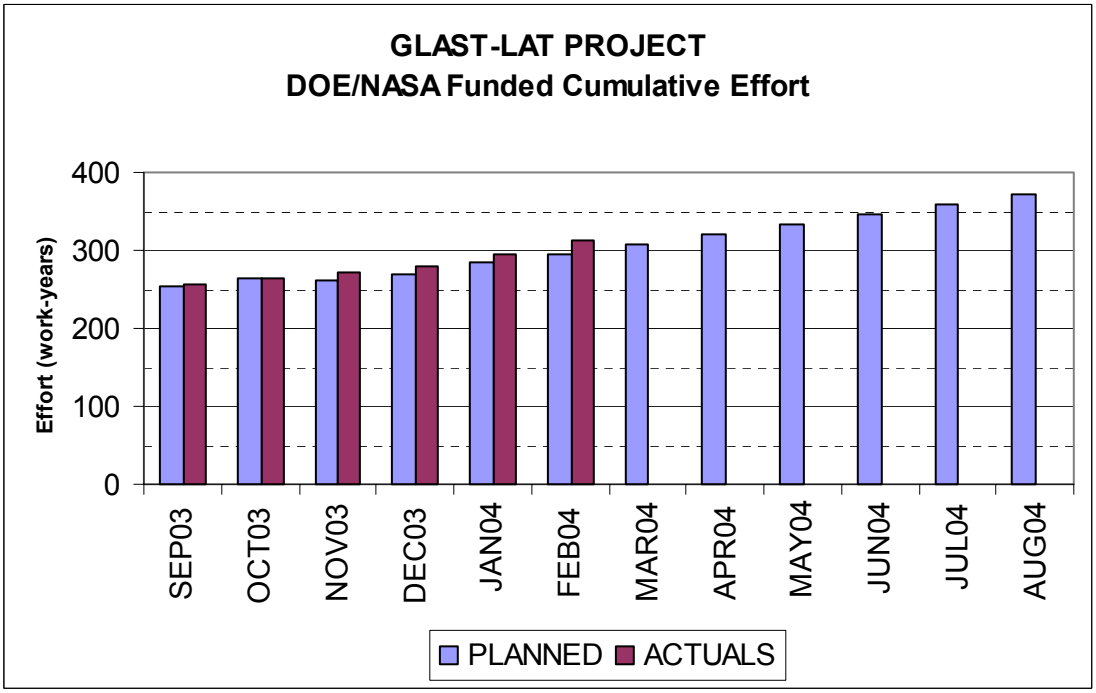
Cpi_Fcst: CPI (to date) EAC Forecast = BAC / CPI
CpiSpi_Fcst: Combination CPI and SPI EAC Forecast = ACWP + (BAC - BCWP) / (CPI *SPI)

Worse than .85
Between .85 and .95
Between .95 and 1.10
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 February 2004, by Organization

Program: LAT3	Description: GLAST LAT Project	Approval: Program Manager
Run Date: 2/23/2004	Status Date: 2/29/2004	Functional Manager Cost Account Manager

OBS		PRIOR	SEP03	OCT03	NOV03	DEC03	JAN04	FEB04	**Cum-to-Date**	MAR04	APR04	MAY04	JUN04	JUL04	AUG04
DG *** GSFC															
FTE	PLANNED	660.5	22.0	22.2	-8.1	21.2	27.8	29.9	**775.4**	33.7	27.7	28.6	21.4	23.6	25.8
	ACTUALS	671.3	23.6	0.0	0.0	0.0	65.6	153.4	**914.0**	0.0	0.0	0.0	0.0	0.0	0.0
DH *** HEPL															
FTE	PLANNED	287.5	8.8	7.2	-56.1	5.3	0.0	3.2	**255.9**	3.2	3.2	3.4	4.5	4.9	4.9
	ACTUALS	223.3	0.0	0.0	6.1	13.6	11.7	-2.5	**252.3**	0.0	0.0	0.0	0.0	0.0	0.0
DL *** SLAC															
FTE	PLANNED	1459.1	64.7	62.7	23.1	64.2	117.4	77.1	**1868.3**	85.1	93.1	91.2	88.5	90.1	81.2
	ACTUALS	1357.5	55.0	64.3	66.4	63.0	69.1	77.5	**1752.7**	0.0	0.0	0.0	0.0	0.0	0.0
DN *** NRL															
FTE	PLANNED	660.1	25.8	32.5	37.9	36.5	37.6	22.2	**852.6**	36.9	46.6	49.4	51.0	44.3	41.9
	ACTUALS	677.6	30.1	20.7	35.4	38.3	30.1	34.8	**867.1**	0.0	0.0	0.0	0.0	0.0	0.0
DS *** SSU															
FTE	PLANNED	68.7	2.9	2.3	2.7	2.4	4.8	3.2	**86.9**	3.2	3.2	3.2	3.2	3.2	3.2
	ACTUALS	80.1	3.7	2.4	4.0	3.5	5.1	3.3	**102.0**	0.0	0.0	0.0	0.0	0.0	0.0
DU *** UCSC															
FTE	PLANNED	203.2	4.5	4.5	10.0	4.6	6.3	6.9	**239.9**	4.7	4.4	4.4	4.4	4.4	4.4
	ACTUALS	256.6	-5.2	4.3	19.4	5.8	4.7	5.2	**290.7**	0.0	0.0	0.0	0.0	0.0	0.0
DW *** UW															
FTE	PLANNED	36.5	0.4	0.4	0.4	0.4	0.4	0.4	**38.9**	0.4	0.4	0.4	0.4	0.4	0.4
	ACTUALS	7.0	2.0	0.0	0.6	1.0	0.0	1.7	**12.2**	0.0	0.0	0.0	0.0	0.0	0.0
FF *** France															
FTE	PLANNED	1004.9	31.0	31.4	-15.5	10.9	14.8	15.2	**1092.7**	15.2	15.2	15.2	15.2	15.2	15.2
	ACTUALS								**0.0**						
FI *** Italy															
FTE	PLANNED	403.3	14.1	14.8	-69.7	9.1	9.1	9.1	**389.8**	9.4	15.6	15.2	14.9	12.8	14.6
	ACTUALS	288.9	10.9	10.9	10.9	10.9	10.9	10.9	**354.0**	0.0	0.0	0.0	0.0	0.0	0.0
FJ *** Japan															
FTE	PLANNED	92.3	1.0	1.0	0.9	1.2	1.0	1.0	**98.4**	0.9	0.5	0.5	0.5	0.5	0.5
	ACTUALS	68.5	1.8	1.8	1.8	1.8	1.8	1.8	**79.0**	0.0	0.0	0.0	0.0	0.0	0.0
FK *** Sweden															
FTE	PLANNED	94.4	5.1	5.1	5.1	3.8	3.5	3.6	**120.5**	3.6	3.6	3.6	3.6	3.6	3.6
	ACTUALS								**0.0**						
Grand Totals:															
	PLANNED	4970.5	180.1	184.2	-69.4	159.7	222.6	171.6	**5819.3**	196.1	213.3	214.9	207.4	202.8	195.6
	ACTUALS	3630.8	121.9	104.2	144.5	137.8	198.9	286.0	**4624.0**	0.0	0.0	0.0	0.0	0.0	0.0

4.1 GLAST LAT															
Contributed	PLANNED	2051.3	67.7	73.0	-59.5	42.4	45.1	45.9	**2265.8**	49.8	60.8	61.1	60.2	50.2	49.5
	ACTUALS	706.5	22.8	24.3	24.4	23.8	24.1	24.3	**850.2**	0.0	0.0	0.0	0.0	0.0	0.0
Funded	PLANNED	2919.2	112.4	111.2	-9.9	117.4	177.5	125.7	**3553.5**	146.4	152.6	153.8	147.1	152.6	146.1
	ACTUALS	2924.3	99.1	80.0	120.1	114.0	174.8	261.7	**3773.8**	0.0	0.0	0.0	0.0	0.0	0.0
Grand Totals:	PLANNED	4970.5	180.1	184.1	-69.4	159.7	222.6	171.6	**5819.3**	196.1	213.3	214.9	207.4	202.8	195.6
	ACTUALS	3630.8	121.9	104.2	144.4	137.8	198.9	286.0	**4624.0**	0.0	0.0	0.0	0.0	0.0	0.0