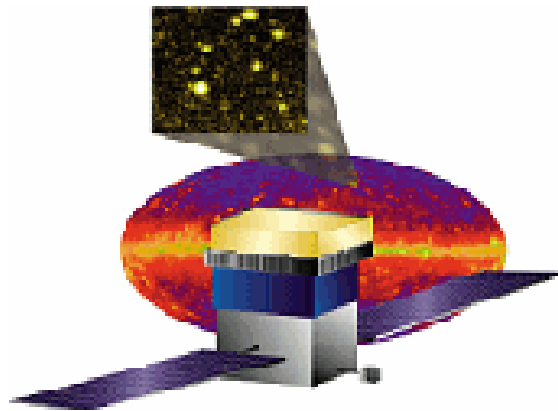


# **Monthly Progress Report**

**(Month Ending December 2004)**

## **GLAST Large Area Telescope (LAT)**



LAT-MR-05607-01

February 2, 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 December, 2004.

## 2.0 Recent Progress and Status

### 4.1.4 Tracker

Environmental testing on the first tower was completed. A cable design flaw was discovered and resolved, and the tower is expected to ship in mid-January. The second tower is in assembly, with all trays complete and tested. Environmental testing on the second tower will commence in mid-January. All trays are ready for installation into the third tower; tray assembly is underway for the fourth tower.

A materials review board (MRB) meeting in early January to resolve the multichip module (MCM) encapsulant delamination problem recommended that existing MCMs continue to be assembled on towers. The channel rate will be monitored during assembly and an MRB will be held if required. MCM production was initially restarted, but a problem with pitch adaptor cracking was discovered. Effort is underway to determine the root cause of the problem, assess the impacts, and evaluate process changes.

Three different ladders belonging to two trays in the first tower showed signal strips interrupted at half their length. It has been determined that this occurred during thermal cycling. Trays for the first tower will be used as they are, temperature ranges will be reviewed for the second tower, and ladders without encapsulation will be fabricated for the remaining towers.

Technical, workmanship, and schedule performance issues have occurred with the flight cable vendor. An MRB was held to determine the disposition of cables for the first two towers. A test program for the cables with bad coupons on the third tower is underway. Further action is pending MRB and LAT project management approval.

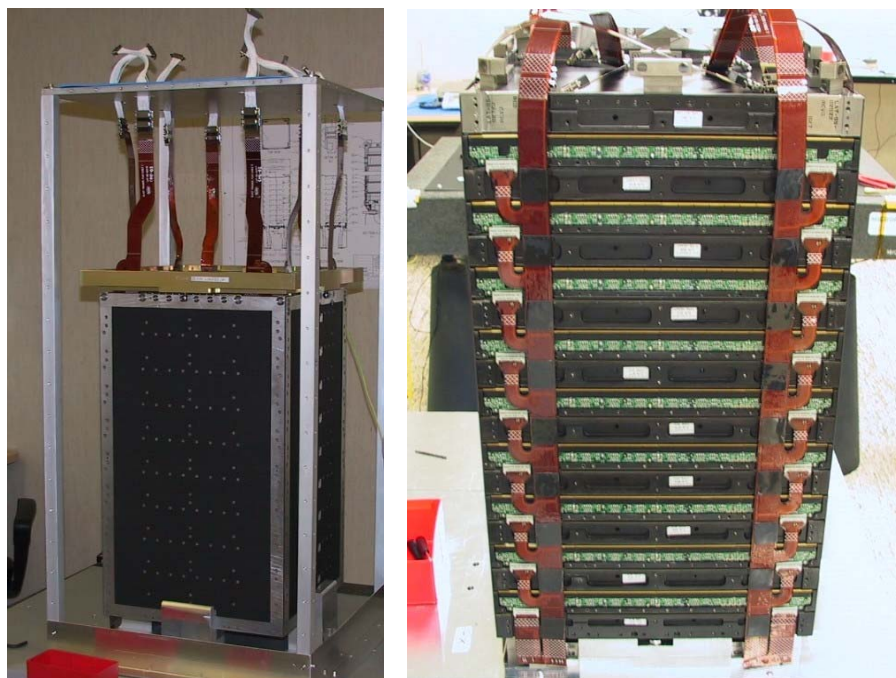


Figure 1: Two views of the first Tracker flight tower.

#### 4.1.5 Calorimeter

The first Calorimeter module has been shipped to SLAC. Four modules are ready for preship review, but shipment will be held until completion of LAT test executive issues (editor's note: this has been resolved and the modules have been shipped as of publication of this report). Two are in final calibration; two are ready for thermal-vacuum testing, and one is undergoing initial performance testing. All cesium iodide crystals have been bonded. Curing, wrapping, and acceptance testing will be completed in January. All flight composite structures have been delivered to NRL. Thirteen pre-electronics modules have been assembled and tested. All flight analog front-end electronics (AFEE) boards have been manufactured and assembled. Sixty-four AFEE boards have completed burn-in and temperature cycling; 56 have been conformal coated. Inspections show that cleaning of the boards continues to be a problem; several boards have been scrapped. Completion of burn-in and conformal coating is expected early in February.

#### 4.1.6 Anticoincidence Detector

Installation of the "crown" tile detector assemblies (TDAs) has been completed, and installation of the second side row has commenced. Issues with the availability and quality of the mechanical housings of the photomultiplier tubes have been resolved, and assembly is progressing. EMI testing of the qual/spare electronics chassis was completed. Hardware for thermal-vacuum testing the qual/spare chassis was prepared; final software preparations are in progress.



Figure 2: ACD with top and crown TDAs completed, working on second side row.

#### 4.1.7 Electronics, Data Acquisition, and Flight Software

The Tracker and Calorimeter cable controller tower electronics module (TEM) ASICs have passed all screening tests to date, and have begun the 1000-hour life-cycle test. A problem was discovered with the GLTC (GLAST low-voltage differential signal translation chip) tester board test sockets, which has been resolved by ordering new sockets, changing the layout of the test board, and refabricating the test boards. The three sets of FPGAs assembled on TEM flight boards were successfully tested. The FPGA bond lifting issue has been resolved; additional devices were obtained, and the existing devices are acceptable for use since the LAT electronics is a redundant system. The PDU flight boards are being refabricated, due to a coupon testing issue. The GASU printed circuit board has been received, as well as the power supply boards. A bug was found in the trigger algorithm on the test bed, using the front end simulator; logic has been corrected and testing is pending. A heat-sink issue was found on the RAD750 CPU boards, and these will have to be reworked.

The instrument-to-spacecraft interface simulator is on schedule to ship in mid-January. Testing of all front-end simulator boards is complete. Implementation of multiple boot code image selection is underway. Minor adjustments to the command and telemetry database formats were made to compensate for bugs in AstroRT. Spacecraft hardware states and their possible implications for mode control are being investigated. Time processing implementation is underway; test attitude data has been used to verify the accuracy of the transformation process.

#### 4.1.8 Mechanical Systems

The flight grid was delivered to SLAC. Procedures were released for operations in the integration & test facility. A revision to the grid box base assembly drawing was released. Panel bonding (face-sheets to honeycomb) was completed on both radiator panels, and discrepancies noted. All in-process testing of the cross-LAT heat pipes is completed.

#### 4.1.9 Integration & Test (I&T)

Interfaces between spacecraft and grid were checked. The first Calorimeter module was received. All integration stand hardware was received. The personnel access platform slides are assembled and functional. Version 4.6.3 of the LAT Test Executive (LATTE) was released for use by subsystems, test of single subsystem elements and partial LAT use (no flight software). LATTE 4.7 is being prepared for I&T to use on the LAT. A dry run of science analysis software code release was completed. The new muon telescope is ready for use.

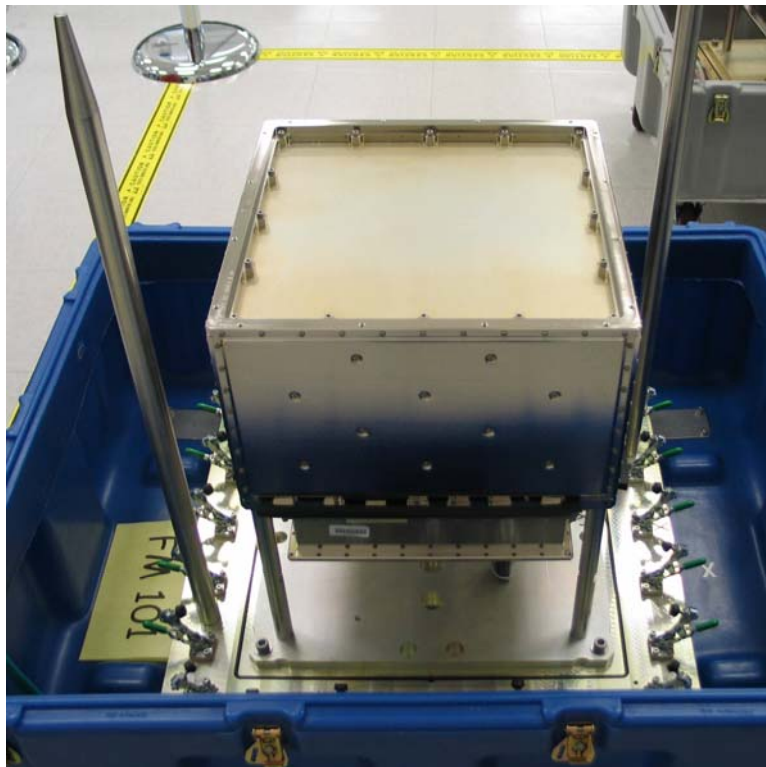


Figure 3: First Calorimeter module in the Integration & Test facility.

### **3.0 Schedule Status**

The critical path for the project is driven by Tracker MCM production. There is no float to the “ready for CD-4 review” milestone (baseline has five weeks’ float). Options are being aggressively pursued to speed up production and resolve technical issues. Project plan reprogramming is underway.

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 start of integration (level 2 milestone 1M1000740) is driven by the receipt of the first Tracker tower. The delays in the pre-environmental test review (level 2 milestone 1M1000700) and the instrument pre-ship review (level 2 milestone 1M1000120) are due to the delay in Tracker tray assembly, and is the project critical path. These issues are addressed elsewhere in this report.

Following is discussion of the level 3 milestone variances, by responsible subsystem.

#### 4.1.4 Tracker

Variances to the following milestones are due to technical problems related to in-process test failures and quality-control issues, which have required some design and process modifications and have led to delays in MCM and tray assembly.

- Tracker Modules (1M1000200, 1M1000201, 1M1000220, 1M1000221, 1M1000250, 1M1000251, 1M1000260, 1M1000261, 1M1000270, 1M1000271, 1M1000280, 1M1000281, 1M1000290, 1M1000291, 1M1000300, 1M1000301, 1M1000310, and 1M1000311)

#### 4.1.5 Calorimeter

Variances to the following milestones are due to delayed receipt of Calorimeter ASICs and other flight EEE parts. All parts are now in hand and AFEE boards have been manufactured. Module assembly and test rate has been accelerated to recover some of the variance.

- Calorimeter Modules B-16 (1M1500, 1M1000230, 1M1510, 1M1000400, 1M1520, 1M1000390, 1M1530, 1M1000380, 1M1540, 1M1000370, 1M1550, 1M1560, 1M1000360, 1M1000350, 1M1570, 1M1000340, and 1M1580)
- EM2 TEM/PS for FM9 through FM16 (return FMA through FM6) from I&T to Calorimeter (1M1001790 through 1M1001860)

#### 4.1.6 Anticoincidence Detector

There are several factors slowing the development of the ACD test scripts (1M1001000). The G3 test stands were delayed, the underlying LAT test executive software continues to evolve, and the translation of scientific requirements into test scripts has been more complex than planned. The test scripts are expected to be completed by late January.

Several technical issues have impacted the delivery date of the ACD (1M1000410). The most notable issues have been flaws in the photomultiplier tubes that cause the glass tube

to be much weaker than expected, the late delivery of ASICs, and the delay of the G3 test stands. The ACD team continues to mitigate these technical issues to minimize the overall schedule impact.

#### 4.1.7 Electronics

Variances to the following milestones are due to delays in drawing release driving procurement placement. Most of the drawings are now released. Changes in functional requirements with other subsystems, and the functional interface with the spacecraft, as well as flight performance requirements not being satisfied by engineering model testing have impacted the deliveries of these milestones, as well. Additional testing of the qualification and engineering model units has been required in response. There have been several weeks of vendor delays in the assembly of the TEM and TEM power supply boards.

- Flight TEM Power Supply Assemblies to I&T (1M79002010 through 1M79002180)
- Flight TEM Assemblies to I&T (1M79001010 through 1M79001180)
- Flight Cable Assemblies to I&T (1M79003010 through 1M79003180)

The variance to the final EGSE milestone (1M7941440) is due to delayed receipt and quality problems with connectors. Effort has been diverted to the installation of TEMs on the Test Bed.

Fabrication of the following items has been delayed in order to conduct additional system and unit tests, and complete drawing review:

- Flight SIU (1M7941080)
- Flight PDU Box (1M7942000)
- Flight Harness (1M7941110)
- Flight GASU Box (1M7941070)
- Flight Event Processor Units (1M7941090)

Scheduling of the following flight software demonstrations has been put on hold, due to problems with the ISIS initialization commanding processes.

- Demo: ISIS Flight Qualification Test (1M79110)
- Demo: File & Memory Management (1M79160)
- Demo: Inter-task Communications (1M79180)
- Demo: Command & Telemetry Data Dictionary (1M79190)
- Demo: Thermal Control (1M79200)
- Demo: Watchdog (1M79210)

The demonstration of command & telemetry (1M79090) was delayed due the Command and Telemetry/1553 Service software package (CTS) not being completed as planned. The overall schedule for flight software contained sufficient float that the delays to date

in completing CTS have not impacted the planned start date for Formal Qualification Test (FQT).

Work on the spacecraft interfaces (1M79170) has been slowed due to resources being diverted to address LAT Communication Board driver firmware changes. The engineer assigned to work on the charge injection calibration (1M79220) has accepted another position; this work has been re-assigned within the remaining group.

#### 4.1.8 Mechanical Systems

The flight grid (1M1000240) has been delayed due to the modifications made to the Tracker/grid interface, adding several weeks to the manufacturing effort. The schedule savings from adding a second shift to the grid machining has not compensated for the complexity of the machining operations. In addition, a machine failure resulted in a loss of eleven manufacturing days. Discrepancies were found during inspection, requiring resolution. A Materials Review Board was held and approval to proceed to the plating operations was given. The nickel plating operations took three weeks longer than planned and delayed the flight grid delivery. There was a missing feature discovered in the Grid. Due to a new requirement to route temperature sensor wiring in the Grid purge grooves, these missing features had to be incorporated. Tooling was developed and proved. This delayed bonding in the final heat pipe approximately three weeks.

The cross-LAT (X-LAT) thermal plate (1M941710) has been delayed due to issues with the electronics box to X-LAT plate interface, the ground cooling design implementation, and heat pipe bending. These have all been resolved; the source control drawing was released and the manufacturing readiness review was held. The vendor has started work. This delay is not expected to impact the LAT schedule.

Fabrication issues have resulted in a delay in the radiators (1M941720). Heat pipe fabrication took longer than planned, as these units were the highest-complexity units built to date in Lockheed Martin's newly re-established Heat Pipe Center. There were assembly weld and bending development problems that resulted in the replacement of two flight pipes. The panel fabrication experienced delays stemming from the tight tolerances and large size of the radiators. Program-specific tools were built for the radiators and there have been problems with these typical of any first use. There were discrepancies during the facesheet to honeycomb core bonding and during the panel drilling or the potted inserts. These anomalies have been evaluated, repairs developed and demonstrated. The final repair will occur in January. This caused several weeks of delay.

#### 4.1.B Instrument Science Operations Center

The dates for the Mission Operations Review (1M1000112), and the Ground System Interface Test Start (1M7941270) have been adjusted to align with the project level ground data system (GDS) preparation on which these reviews are dependent. Given the current GLAST GDS schedule, there is no impact due to the date change and no need for mitigation.



## **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.

### 4.1.7 Electronics

Delays in finalizing the printed-circuit flight boards lead to the late start of flight production. In addition, the flight production of some of the boards is taking much longer due to vendor delays and conflicting priorities at the assembly vendor. More documentation and analysis (e.g. vibration, qualification testing) was required than planned. These schedule delays have resulted in additional labor cost. Production assembly contracts for the electronics boards are costing much higher than anticipated.

### 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 the LAT fabrication phase contingency, is below.

Change Request No.	Description	Submitted By	Current Status	Contingency Impact <sup>1</sup>
LAT-XR-04717-01	Changes to the LAT Flight Software Test Plan	E. Hansen	Approved	N/A
LAT-XR-05145-01	Discrete Monitors – SIU Boot Status	R. Bielawski	Approved	N/A
LAT-XR-05157-01	Changes to the LAT Mechanical Systems Interface Definition Drawing CAL-LAT Interface	D. Plaza	Approved	N/A
LAT-XR-05240-01	Consolidate and Update ACD Center of Mass and Mass Requirements	R. Bright	Approved	N/A
LAT-XR-05295-01	Update Tracker-LAT Electrical ICD	R. Bielawski	Approved	N/A

The fabrication phase cost baseline is \$133.2M. Funding applicable to that baseline is \$136.0M; the resulting contingency is \$2.8M.

## 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.

Neither Goddard nor Stanford-HEPL manpower was reported in the month of August, 2004. The September, 2004, incremental FTE report includes a correction, so that the cumulative-to-date actual manpower is correct.

Goddard civil servant manpower was not reported for the months of October or November, 2004. The December, 2004, incremental FTE report includes a correction, so that the cumulative-to-date actual manpower is correct.

<sup>1</sup> A positive number indicates a draw on contingency.

## Attachment 1 Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date								
					FY01	FY02	FY03	FY04	FY05	FY06		
<b>DOE/NASA Joint Oversight Group (Level 1)</b>												
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*	-38	11/08/04A					▼			
1M1P000040	CD-4 Approval	03/15/06*	0	03/15/06*							▼	
<b>DOE/NASA Federal Project Managers (Level 2)</b>												
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*	-99	01/24/05					▼			
1M1000700	Pre Environmental Testing Review	07/14/05*	-85	11/11/05						▼		
1M1000120	PSR-(Instrument Pre-Ship Review)	12/01/05*	-60	03/07/06							▼	
Run Date					01/28/05 17:39		<b>GLAST LAT PROJECT Project Milestones (Level 1 and 2)</b>			0121 LT_MS1-2		Sheet 1 of 1
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**Attachment 2  
Level 3 Milestones (One-Year View)  
Page 1 of 6**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04			FY05			FY06
					Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Instrument Project Office (Level 3)</b>											
4.1.1 Instrument Management											
1M1001920	Pre-Environmental Test Review	06/07/05	-111	11/11/05							▽
4.1.4 Tracker											
1M1001430	Delv of TKR EM to SLAC I&T/MGSE	01/02/04	-200	10/15/04A				▲			
1M1000200	Tracker Modules A RFI	07/28/04	-114	01/18/05							
1M1000201	Tracker Modules B RFI	08/18/04	-122	02/18/05							
1M1000220	Tracker Modules 1 RFI	08/18/04	-133	03/08/05							
1M1000221	Tracker Modules 2 RFI	09/08/04	-124	03/15/05							
1M1000250	Flight Tracker Tower 3 RFI	09/08/04	-144	04/12/05							
1M1000251	Flight Tracker Tower 4 RFI	10/14/04	-123	04/19/05							
1M1000260	Flight Tracker Tower 5 RFI	10/14/04	-139	05/11/05							
1M1000261	Flight Tracker Tower 6 RFI	11/05/04	-126	05/16/05							
1M1000270	Flight Tracker Tower 7 RFI	11/05/04	-135	05/27/05							
1M1000271	Flight Tracker Tower 8 RFI	11/24/04	-126	06/03/05							
1M1000280	Flight Tracker Tower 9 RFI	11/24/04	-136	06/17/05							
1M1000281	Flight Tracker Tower 10 RFI	12/17/04	-125	06/23/05							
1M1000290	Flight Tracker Tower 11 RFI	12/17/04	-131	07/01/05							
1M1000291	Flight Tracker Tower 12 RFI	01/11/05	-125	07/11/05							
1M1000300	Flight Tracker Tower 13 RFI	01/11/05	-134	07/22/05							
1M1000301	Flight Tracker Tower 14 RFI	01/25/05	-130	07/29/05							
1M1000310	Flight Tracker Tower 15 RFI	01/25/05	-155	09/02/05							
1M1000311	Flight Tracker Tower 16 RFI	02/08/05	-151	09/13/05							
4.1.5 Calorimeter											
1M1000210	Calorimeter Modules A RFI	07/09/04	-105	12/08/04A				▲			
1M1500	Calorimeter Modules B RFI	07/09/04	-129	01/20/05							
1M1000230	Calorimeter Modules 1 RFI	07/30/04	-119	01/27/05							
1M1510	Calorimeter Modules 2 RFI	08/02/04	-118	01/27/05							
1M1000400	Flight Calorimeter Tower 3 RFI	08/17/04	-104	01/24/05							
1M1520	Flight Calorimeter Tower 4 RFI	08/17/04	-126	02/24/05							
1M1000390	Flight Calorimeter Tower 5 RFI	09/15/04	-106	02/24/05							
1M1530	Flight Calorimeter Tower 6 RFI	09/15/04	-125	03/23/05							
Run Date	01/28/05 17:40	<b>GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)</b>			0121 LTX1 - MS (L3) FLX1 - MS (L3)			Sheet 1 of 6			
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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	Timeline									
					FY04 Q2	FY04 Q3	FY04 Q4	FY05 Q1	FY05 Q2	FY05 Q3	FY05 Q4	FY06 Q1		
1M1000380	Flight Calorimeter Tower 7 RFI	10/11/04	-107	03/23/05										
1M1540	Flight Calorimeter Tower 8 RFI	10/11/04	-113	03/31/05										
1M1000370	Flight Calorimeter Tower 9 RFI	11/02/04	-97	03/31/05										
1M1550	Flight Calorimeter Tower 10 RFI	11/02/04	-107	04/14/05										
1M1560	Flight Calorimeter Tower 12 RFI	11/15/04	-104	04/22/05										
1M1000360	Flight Calorimeter Tower 11 RFI	11/16/04	-97	04/14/05										
1M1000350	Flight Calorimeter Tower 13 RFI	12/02/04	-93	04/22/05										
1M1570	Flight Calorimeter Tower 14 RFI	12/02/04	-98	04/29/05										
1M1000340	Flight Calorimeter Tower 15 RFI (Spare)	01/06/05	-79	04/29/05										
1M1580	Flight Calorimeter Tower 16 RFI (Spare)	01/06/05	-91	05/17/05										
<b>4.1.6 ACD</b>														
1M1001000	ACD Test Scripts (from ACD to I&T)	07/01/04	-131	01/14/05										
1M1000410	ACD Flight Unit at SLAC, Tested/Inspected & RFI	11/03/04	-138	05/31/05										
1M1000990	ACD Calibration Test Unit at SLAC, Tested & RFI	01/18/05	11	12/23/04A										
<b>4.1.7 Electronics</b>														
1M7941130	EGSE TEM/TEM PS/CTS w/ FE Elec #1-Elec to I&T	12/08/03	-158	07/30/04A										
1M7941150	EGSE TEM/TEM PS/CTS w/ FE Elec #2-Elec to I&T	12/22/03	-158	08/13/04A										
1M7941160	EGSE TEM/TEM PS/CTS w/ FE Elec #3-Elec to I&T	01/07/04	-153	08/13/04A										
1M7941170	EGSE TEM/TEM PS/CTS/GASU FE Elec-Elec to I&T	01/14/04	-138	07/30/04A										
1M7941180	EGSE Development Hrdw/FSW 1st Delivr-Elec to I&T	01/22/04	-154	08/30/04A										
1M1001260	EM2 TEM/PS/CTS for FMB from Elec to CAL	01/29/04	-128	07/30/04A										
1M74000060	EGSE System 6: Elec to TKR	01/29/04	-138	08/13/04A										
1M1001600	EM2 TEM/PS/CTS for FM1 from Elec to CAL	02/05/04	-141	08/25/04A										
1M7941420	EGSE TEM/TEM PS/CTS #2 for Bldg 33-Elec to I&T	02/05/04	-133	08/13/04A										
1M7941430	EGSE TEM/TEM PS/CTS w/ GASU for B33-Elec to	02/05/04	-181	10/21/04A										
1M1001650	EM2 TEM/PS/CTS for FM2 from Elec to CAL	02/12/04	-136	08/25/04A										
1M74000070	EGSE System 7: Elec to TKR	02/12/04	-128	08/13/04A										
1M74000080	EGSE System 8: Elec to TKR	02/12/04	-128	08/13/04A										
1M74000090	EGSE System 9: Elec to TKR	02/20/04	-162	10/08/04A										
1M74000100	EGSE System 10: Elec to TKR	02/20/04	-162	10/08/04A										
1M1001660	EM2 TEM/PS/CTS for FM3 from Elec to CAL	02/27/04	-126	08/25/04A										
1M1001680	EM2 TEM/PS/CTS for FM4 from Elec to CAL	02/27/04	-126	08/25/04A										
Run Date	01/28/05 17:40	<b>GLAST LAT PROJECT</b> Project Milestones (Level 3) 1 Year View (+/- 6mo)			0121 LTX1 - MS (L3) FLX1- MS (L3)	Sheet 2 of 6								
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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	FY04 FY05 FY06								
					Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	
1M1001720	EM2 TEM/PS/CTS for FM5 from Elec to CAL	02/27/04	-126	08/25/04A			▼						
1M1001760	EM2 TEM/PS/CTS for FM6 from Elec to CAL	03/05/04	-121	08/25/04A			▼						
1M1001770	EM2 TEM/PS/CTS for FM7 from Elec to CAL	03/05/04	-164	10/26/04A				▼					
1M1001780	EM2 TEM/PS/CTS for FM8 from Elec to CAL	03/05/04	-157	10/15/04A				▼					
1M79003010	Flight Cables Assy A: Elec to I&T	05/10/04	-198	03/01/05		•				▽			
1M79003020	Flight Cables Assy B: Elec to I&T	05/10/04	-200	03/03/05		•				▽			
1M79002010	Flight TEM PS Assy A: Elec to I&T	05/12/04	-184	02/10/05		•				▽			
1M79002020	Flight TEM PS Assy B: Elec to I&T	05/19/04	-179	02/10/05		•				▽			
1M79001010	Flight TEM Assy A: Elec to I&T	06/07/04	-167	02/10/05		•				▽			
1M79003030	Flight Cables Assy 1: Elec to I&T	06/10/04	-180	03/07/05		•				▽			
1M79003040	Flight Cables Assy 2: Elec to I&T	06/10/04	-182	03/09/05		•				▽			
1M79003050	Flight Cables Assy 3: Elec to I&T	06/10/04	-184	03/11/05		•				▽			
1M79003060	Flight Cables Assy 4: Elec to I&T	06/10/04	-186	03/15/05		•				▽			
1M79001020	Flight TEM Assy B: Elec to I&T	06/14/04	-162	02/10/05		•				▽			
1M79003070	Flight Cables Assy 5: Elec to I&T	06/28/04	-176	03/17/05		•				▽			
1M79003080	Flight Cables Assy 6: Elec to I&T	06/28/04	-178	03/21/05		•				▽			
1M79003090	Flight Cables Assy 7: Elec to I&T	06/28/04	-180	03/23/05		•				▽			
1M79003100	Flight Cables Assy 8: Elec to I&T	06/28/04	-182	03/25/05		•				▽			
1M79003110	Flight Cables Assy 9: Elec to I&T	06/28/04	-184	03/29/05		•				▽			
1M79003120	Flight Cables Assy 10: Elec to I&T	06/28/04	-186	03/31/05		•				▽			
1M79002030	Flight TEM PS Assy 1: Elec to I&T	07/01/04	-199	04/22/05		•				▽			
1M79002040	Flight TEM PS Assy 2: Elec to I&T	07/09/04	-198	04/28/05		•				▽			
1M79003130	Flight Cables Assy 11: Elec to I&T	07/15/04	-176	04/04/05		•				▽			
1M79003140	Flight Cables Assy 12: Elec to I&T	07/15/04	-178	04/06/05		•				▽			
1M79003150	Flight Cables Assy 13: Elec to I&T	07/15/04	-180	04/08/05		•				▽			
1M79003160	Flight Cables Assy 14: Elec to I&T	07/15/04	-182	04/12/05		•				▽			
1M79003170	Flight Cables Assy 15: Elec to I&T	07/15/04	-184	04/14/05		•				▽			
1M79003180	Flight Cables Assy 16: Elec to I&T	07/15/04	-186	04/18/05		•				▽			
1M79002050	Flight TEM PS Assy 3: Elec to I&T	07/16/04	-197	05/04/05		•				▽			
1M79002060	Flight TEM PS Assy 4: Elec to I&T	07/23/04	-196	05/10/05		•				▽			
1M79002070	Flight TEM PS Assy 5: Elec to I&T	07/30/04	-195	05/16/05		•				▽			
1M79020	Demo: Inter-task Communications	07/30/04	0	07/30/04A			▼						

Run Date 01/28/05 17:40

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

0121  
LTX1 - MS (L3)  
FLX1 - MS (L3)

Sheet 3 of 6

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**Attachment 2**  
**Level 3 Milestones (One-Year View)**  
**Page 4 of 6**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04 FY05 FY06									
					Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1		
1M79001030	Flight TEM Assy 1: Elec to I&T	08/03/04	-177	04/22/05										
1M79002080	Flight TEM PS Assy 6: Elec to I&T	08/06/04	-194	05/20/05										
1M79001040	Flight TEM Assy 2: Elec to I&T	08/10/04	-176	04/28/05										
1M79002090	Flight TEM PS Assy 7: Elec to I&T	08/13/04	-193	05/26/05										
1M79001050	Flight TEM Assy 3: Elec to I&T	08/17/04	-175	05/04/05										
1M79002100	Flight TEM PS Assy 8: Elec to I&T	08/20/04	-192	06/02/05										
1M79001060	Flight TEM Assy 4: Elec to I&T	08/24/04	-174	05/10/05										
1M79002110	Flight TEM PS Assy 9: Elec to I&T	08/25/04	-193	06/08/05										
1M79002120	Flight TEM PS Assy 10: Elec to I&T	08/30/04	-194	06/14/05										
1M79001070	Flight TEM Assy 5: Elec to I&T	08/31/04	-173	05/16/05										
1M79030	Demo: Preliminary ISIS	09/01/04	-2	09/03/04A										
1M79002130	Flight TEM PS Assy 11: Elec to I&T	09/02/04	-195	06/20/05										
1M79001080	Flight TEM Assy 6: Elec to I&T	09/08/04	-172	05/20/05										
1M79002140	Flight TEM PS Assy 12: Elec to I&T	09/08/04	-196	06/24/05										
1M79002150	Flight TEM PS Assy 13: Elec to I&T	09/13/04	-197	06/30/05										
1M79001090	Flight TEM Assy 7: Elec to I&T	09/15/04	-171	05/26/05										
1M79002160	Flight TEM PS Assy 14: Elec to I&T	09/16/04	-198	07/07/05										
1M79002170	Flight TEM PS Assy 15: Elec to I&T	09/21/04	-199	07/13/05										
1M79001100	Flight TEM Assy 8: Elec to I&T	09/22/04	-170	06/02/05										
1M79002180	Flight TEM PS Assy 16: Elec to I&T	09/24/04	-200	07/19/05										
1M79001110	Flight TEM Assy 9: Elec to I&T	09/29/04	-169	06/08/05										
1M79080	Demo: LAT Communication Board Driver	10/01/04	0	10/01/04A										
1M79090	Demo: Command and Telemetry	10/01/04	-81	02/04/05										
1M79100	Demo: 1553 Service	10/01/04	-43	12/03/04A										
1M79001120	Flight TEM Assy 10: Elec to I&T	10/06/04	-168	06/14/05										
1M79110	Demo: ISIS FQT	10/08/04	-57	01/07/05										
1M79001130	Flight TEM Assy 11: Elec to I&T	10/13/04	-167	06/20/05										
1M7941080	Flight SIU-Elec to I&T	10/13/04	-197	08/02/05										
1M7942000	Flight PDU Box-Elec to I&T	10/13/04	-176	07/01/05										
1M79001140	Flight TEM Assy 12: Elec to I&T	10/20/04	-166	06/24/05										
1M7941110	Flight Harness-Elec to I&T	10/20/04	-149	06/01/05										
1M79001150	Flight TEM Assy 13: Elec to I&T	10/27/04	-165	06/30/05										

Run Date 01/28/05 17:40

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

0121  
LTX1 - MS (L3)  
FLX1 - MS (L3)

Sheet 4 of 6

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**Attachment 2**  
**Level 3 Milestones (One-Year View)**  
**Page 5 of 6**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	Gantt Chart								
					FY04 Q2	FY04 Q3	FY04 Q4	FY05 Q1	FY05 Q2	FY05 Q3	FY05 Q4	FY06 Q1	
1M79120	Demo: Primary Boot	10/29/04	-3	11/03/04A				▼					
1M79130	Demo: Secondary Boot	10/29/04	-3	11/03/04A				▼					
1M79140	Demo: LCB Service	10/29/04	-3	11/03/04A				▼					
1M79150	Demo: Power/Initialize GASU	10/29/04	-3	11/03/04A				▼					
1M7941070	Flight GASU Box-Elec to I&T	11/01/04*	-163	07/01/05				•				▽	
1M7941090	Flight Event Processor Units-Elec to I&T	11/01/04	-184	08/02/05				•				▽	
1M79001160	Flight TEM Assy 14: Elec to I&T	11/03/04	-164	07/07/05				•				▽	
1M79001170	Flight TEM Assy 15: Elec to I&T	11/10/04	-163	07/13/05				•				▽	
1M79001180	Flight TEM Assy 16: Elec to I&T	11/17/04	-162	07/19/05				•				▽	
1M79160	Demo: File and Memory Management	12/03/04	-38	02/04/05				•	▽				
1M79170	Demo: Spacecraft Interfaces	12/03/04	-38	02/04/05				•	▽				
1M79180	Demo: Inter-task Communications	12/03/04	-38	02/04/05				•	▽				
1M7941440	Final EGSE incl S/C Sim, FSW-Elec to I&T	12/13/04	-68	03/29/05				•	▽				
1M79190	Demo: Command and Telemetry Data Dictionary	01/07/05	-19	02/04/05				•	▽				
1M79200	Demo: Thermal Control	01/07/05	-19	02/04/05				•	▽				
1M79210	Demo: Watchdog	01/07/05	-19	02/04/05				•	▽				
1M79220	Demo: Charge Injection Calibration	01/07/05	-19	02/04/05				•	▽				
1M79230	Demo: Housekeeping	01/28/05	0	01/28/05				•	▽				
1M79240	Demo: Event Integrity and Delivery	01/28/05	0	01/28/05				•	▽				
1M79250	Demo: Event Filtering	01/28/05	0	01/28/05				•	▽				
1M79260	Demo: GRB Detection and Response	01/28/05	0	01/28/05				•	▽				
1M79270	Demo: Mode Control	02/25/05	0	02/25/05				•	▽				
1M79280	Demo: Diagnostics	02/25/05	0	02/25/05				•	▽				
<b>4.1.8 Mechanical</b>													
1M1000240	Flight Grid RFI-Mech to I&T	07/22/04	-122	01/24/05			•		▽				
1M941710	X-LAT Thermal Plate RFI from Mech to I&T	08/12/04	-119	02/09/05			•		▽				
1M941720	Radiators ready for I&T (from Mech to I&T)	03/17/05	-25	04/21/05					•			▽	
<b>4.1.9 I&amp;T</b>													
1M1001790	EM2 TEM/PS (return FMA) from I&T to CAL	07/23/04	-130	02/04/05*			•		▽				
1M1001800	EM2 TEM/PS (return FMB) from I&T to CAL	07/23/04	-135	02/11/05*			•		▽				
1M1001810	EM2 TEM/PS (return FM1) from I&T to CAL	08/13/04	-125	02/18/05*			•		▽				
1M1001820	EM2 TEM/PS (return FM2) from I&T to CAL	08/16/04	-118	02/10/05*			•		▽				

Run Date 01/28/05 17:40

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

0121  
LTX1 - MS (L3)  
FLX1 - MS (L3)

Sheet 5 of 6

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**Attachment 2**  
**Level 3 Milestones (One-Year View)**  
**Page 6 of 6**

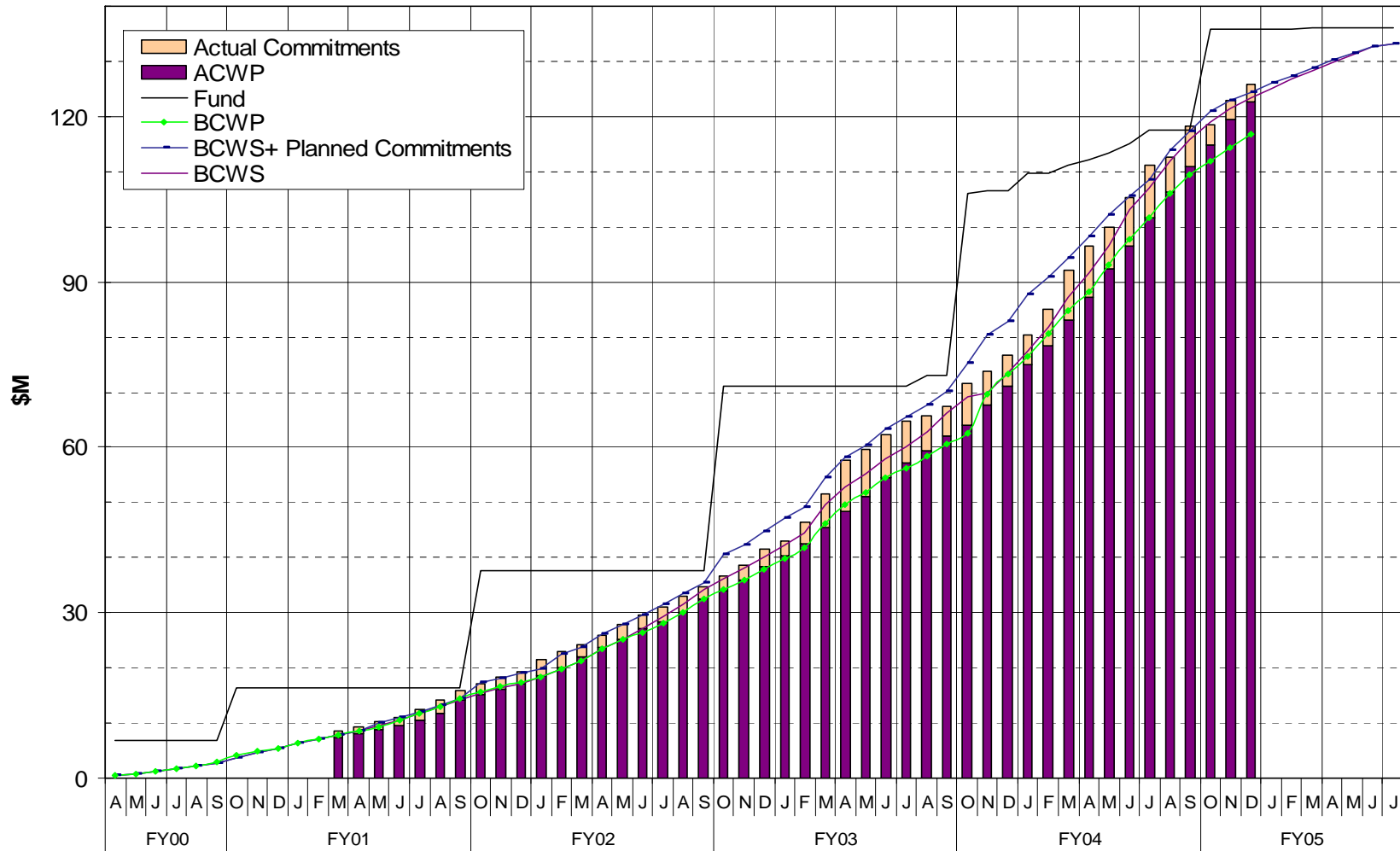
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	Gantt Chart									
					FY04 Q2	FY04 Q3	FY04 Q4	FY05 Q1	FY05 Q2	FY05 Q3	FY05 Q4	FY06 Q1		
1M1001830	EM2 TEM/PS (return FM3) from I&T to CAL	08/31/04	-108	02/11/05*										
1M1001840	EM2 TEM/PS (return FM4) from I&T to CAL	08/31/04	-126	03/10/05*										
1M1001850	EM2 TEM/PS (return FM5) from I&T to CAL	09/29/04	-106	03/10/05*										
1M1001860	EM2 TEM/PS (return FM6) from I&T to CAL	09/29/04	-125	04/06/05*										
1M1000130	LAT Ready to Ship to NRL for Env Test	06/08/05	-110	11/11/05										
<b>4.1.B ISOC</b>														
1M005480	ISOC CDR	03/12/04	-101	08/04/04A										
1M1000112	Mission Operations Review (L-21mo.)	11/10/04	-157	07/05/05										
1M7941270	Ground System Interface Test start	11/10/04	-157	07/05/05										

Run Date	01/28/05 17:40	<b>GLAST LAT PROJECT</b> Project Milestones (Level 3) 1 Year View (+/- 6mo)	0121 LTX1 - MS (L3) FLX1 - MS (L3)	Sheet 6 of 6
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### Attachment 3

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



**Attachment 4**  
**LAT Costs, through December 2004, by WBS**

Monthly Contractor Financial Management Report								Report for Month Ending: 12/31/2004		
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		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	JAN05	FEB05		Project Estimate	Budget Value	
4.1.1 INSTRUMENT MANAGEMENT	227	280	14,781	14,885	329	303	1,498	16,911	16,911	
4.1.2 SYSTEM ENGINEERING	76	129	5,983	6,093	152	154	758	7,047	7,047	
4.1.4 TRACKER	193	109	16,610	16,393	129	100	286	17,126	17,126	
4.1.5 CALORIMETER	543	204	19,426	20,963	215	159	2,222	22,022	22,022	
4.1.6 ANTICOINCIDENCE DETECTOR	479	114	15,583	15,351	103	23	-114	15,595	15,595	
4.1.7 ELECTRONICS	496	398	22,364	21,406	220	193	-539	22,238	22,238	
4.1.8 MECHANICAL SYSTEMS	476	147	13,509	13,050	163	152	354	14,179	14,179	
4.1.9 INTEGRATION & TEST	382	200	5,958	6,144	254	400	1,401	8,013	8,013	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	164	115	2,697	2,715	135	14	89	2,935	2,935	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	1	3	300	306	3	3	22	328	328	
4.1.C EDUCATION AND PUBLIC OUTREACH	73	36	1,760	2,115	43	41	604	2,448	2,448	
4.1.D SCIENCE ANALYSIS SOFTWARE	58	63	2,316	2,525	74	71	559	3,019	3,019	
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	
<b>Total</b>	<b>3,167</b>	<b>1,799</b>	<b>122,613</b>	<b>123,269</b>	<b>1,820</b>	<b>1,613</b>	<b>7,140</b>	<b>133,187</b>	<b>133,187</b>	

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

Monthly Contractor Financial Management Report								Report for Month Ending: 12/31/2004	
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	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	JAN05	FEB05			
DG *** GSFC	513	144	16,948	17,058	139	57	397	17,541	17,541
DH *** HEPL	83	161	6,475	6,838	191	192	1,236	8,094	8,094
DL *** SLAC	1,833	1,127	71,445	69,463	1,089	1,034	1,848	75,416	75,416
DN *** NRL	663	293	23,437	25,083	316	248	2,679	26,679	26,679
DO *** Financial Plan Transfer/Sub Out	0	0	59	54	0	0	-5	54	54
DS *** SSU	73	35	1,746	2,072	42	40	573	2,401	2,401
DT *** Texas A&M	0	0	15	16	0	0	0	16	16
DU *** UCSC	3	31	2,308	2,482	36	34	348	2,726	2,726
DW *** UW	0	7	179	203	8	8	65	260	260
<b>Total</b>	<b>3,167</b>	<b>1,799</b>	<b>122,613</b>	<b>123,269</b>	<b>1,820</b>	<b>1,613</b>	<b>7,140</b>	<b>133,187</b>	<b>133,187</b>

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	JAN05	FEB05				
RL LABOR	1,504	979	59,431	59,197	1,084	940	3,861	65,316	65,316	
<i>FTE (DOE/NASA)</i>	<i>224.3</i>	<i>94.4</i>	<i>5,497.3</i>	<i>5,056.8</i>	<i>86.0</i>	<i>80.0</i>	<i>-126.9</i>	<i>5,536.4</i>	<i>5,536.4</i>	
<i>HOURS (DOE/NASA)</i>	<i>30,505</i>	<i>12,836</i>	<i>909,358</i>	<i>837,104</i>	<i>13,724</i>	<i>12,219</i>	<i>-18,105.6</i>	<i>917,195</i>	<i>917,195</i>	
RT TRAVEL	34	45	1,485	2,113	53	50	894	2,481	2,481	
RM MATERIAL & SERVICES	1,615	772	59,327	59,464	601	620	2,242	62,790	62,790	
RX MPS & LAB TAX	14	3	2,371	2,496	82	3	143	2,599	2,599	
<b>Total (not incl FTE/Hours)</b>	<b>3,167</b>	<b>1,799</b>	<b>122,613</b>	<b>123,269</b>	<b>1,820</b>	<b>1,613</b>	<b>7,140</b>	<b>133,187</b>	<b>133,187</b>	

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

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:				Contract Type/No:				Project Name/No: GLAST LAT Project		Report Period: 11/30/2004 12/31/2004			
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 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			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.1.1 INSTRUMENT MANAGEMENT	280	280	227	0	53	14,885	14,885	14,781	0	104	16,911	16,911	0
4.1.2 SYSTEM ENGINEERING	129	129	76	0	54	6,093	6,093	5,983	0	109	7,047	7,047	0
4.1.4 TRACKER	109	155	193	46	-38	16,393	15,338	16,610	-1,056	-1,273	17,126	17,126	0
4.1.5 CALORIMETER	204	525	543	321	-18	20,963	19,677	19,426	-1,285	251	22,022	22,022	0
4.1.6 ANTICOINCIDENCE DETECTOR	114	190	479	76	-289	15,351	14,890	15,583	-462	-694	15,595	15,595	0
4.1.7 ELECTRONICS	398	396	496	-2	-100	21,406	18,865	22,364	-2,541	-3,500	22,238	22,238	0
4.1.8 MECHANICAL SYSTEMS	147	166	476	19	-310	13,050	12,323	13,509	-727	-1,186	14,179	14,179	0
4.1.9 INTEGRATION & TEST	200	331	382	131	-51	6,144	5,661	5,958	-483	-297	8,013	8,013	0
4.1.A PERFORMANCE AND SAFETY AS	115	115	164	0	-50	2,715	2,715	2,697	0	18	2,935	2,935	0
4.1.B LAT INSTRUMENT OPERATIONS (	3	3	1	0	1	306	306	300	0	6	328	328	0
4.1.C EDUCATION AND PUBLIC OUTRE	36	40	73	4	-33	2,115	2,115	1,760	0	355	2,448	2,448	0
4.1.D SCIENCE ANALYSIS SOFTWARE	63	63	58	0	5	2,525	2,525	2,316	0	209	3,019	3,019	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	1,799	2,393	3,167	594	-774	123,269	116,715	122,613	-6,554	-5,898	133,187	133,187	0
Contingency											2,798	2,798	0
Total	1,799	2,393	3,167	594	-774	123,269	116,715	122,613	-6,554	-5,898	135,985	135,985	0

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

Cost Performance Report - Work Breakdown Structure															
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 11/30/2004				#####	
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	Variance		Budgeted Cost		Actual Cost Work	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	144	220	513	76	-293	17,058	16,596	16,948	-462	-352	17,541	17,541	0		
DH *** HEPL	161	168	83	7	85	6,838	6,832	6,475	-6	357	8,094	8,094	0		
DL *** SLAC	1,127	1,331	1,833	203	-502	69,463	64,852	71,445	-4,611	-6,593	75,416	75,416	0		
DN *** NRL	293	596	663	304	-66	25,083	23,624	23,437	-1,459	187	26,679	26,679	0		
DO *** Financial Plan	0	0	0	0	0	54	54	59	0	-5	54	54	0		
DS *** SSU	35	39	73	4	-34	2,072	2,072	1,746	0	326	2,401	2,401	0		
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0		
DU *** UCSC	31	32	3	1	28	2,482	2,466	2,308	-16	158	2,726	2,726	0		
DW *** UW	7	7	0	0	7	203	203	179	0	24	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	1,799	2,393	3,167	594	-774	123,269	116,715	122,613	-6,554	-5,898	133,187	133,187	0		
Contingency											2,798	2,798	0		
Total	1,799	2,393	3,167	594	-774	123,269	116,715	122,613	-6,554	-5,898	135,985	135,985	0		

## Attachment 8 LAT Performance Analysis, December 2004

	WBS	Description	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	%BCWS	%BCWP	%ACWP	SPI	CPI	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	LAT	133,187	123,269	116,715	122,613	-6,554	-5,898	92.55	87.63	92.06	↔	↓	0.947	0.952	139,917	140,889
2	4.1.1	Instr Mgmt	16,911	14,885	14,885	14,781	0	104	88.02	88.02	87.41	↔	↑	1.000	1.007	16,793	16,793
3	4.1.2	System Engr	7,047	6,093	6,093	5,983	0	109	86.45	86.45	84.90	↔	↑	1.000	1.018	6,921	6,921
4	4.1.4	Tracker	17,126	16,393	15,338	16,610	-1,056	-1,273	95.72	89.56	96.99	↔	↔	0.936	0.923	18,547	18,681
5	4.1.5	Calorimeter	22,022	20,963	19,677	19,426	-1,285	251	95.19	89.36	88.21	↑	↔	0.939	1.013	21,740	21,891
6	4.1.6	ACD	15,595	15,351	14,890	15,583	-462	-694	98.43	95.47	99.92	↑	↓	0.970	0.955	16,322	16,345
7	4.1.7	Electronics	22,238	21,406	18,865	22,364	-2,541	-3,500	96.26	84.83	100.57	↔	↔	0.881	0.844	26,364	26,902
8	4.1.8	Mechanical	14,179	13,050	12,323	13,509	-727	-1,186	92.04	86.92	95.28	↔	↓	0.944	0.912	15,543	15,663
9	4.1.9	I&T	8,013	6,144	5,661	5,958	-483	-297	76.68	70.64	74.35	↑	↓	0.921	0.950	8,434	8,645
10	4.1.A	PSA	2,935	2,715	2,715	2,697	0	18	92.50	92.50	91.89	↔	↓	1.000	1.007	2,916	2,916
11	4.1.B	ISOC	328	306	306	300	0	6	93.10	93.10	91.39	↔	↑	1.000	1.019	322	322
12	4.1.C	EPO	2,448	2,115	2,115	1,760	0	355	86.37	86.37	71.89	↑	↓	1.000	1.202	2,038	2,038
13	4.1.D	SAS	3,019	2,525	2,525	2,316	0	209	83.61	83.61	76.69	↔	↔	1.000	1.090	2,770	2,770
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

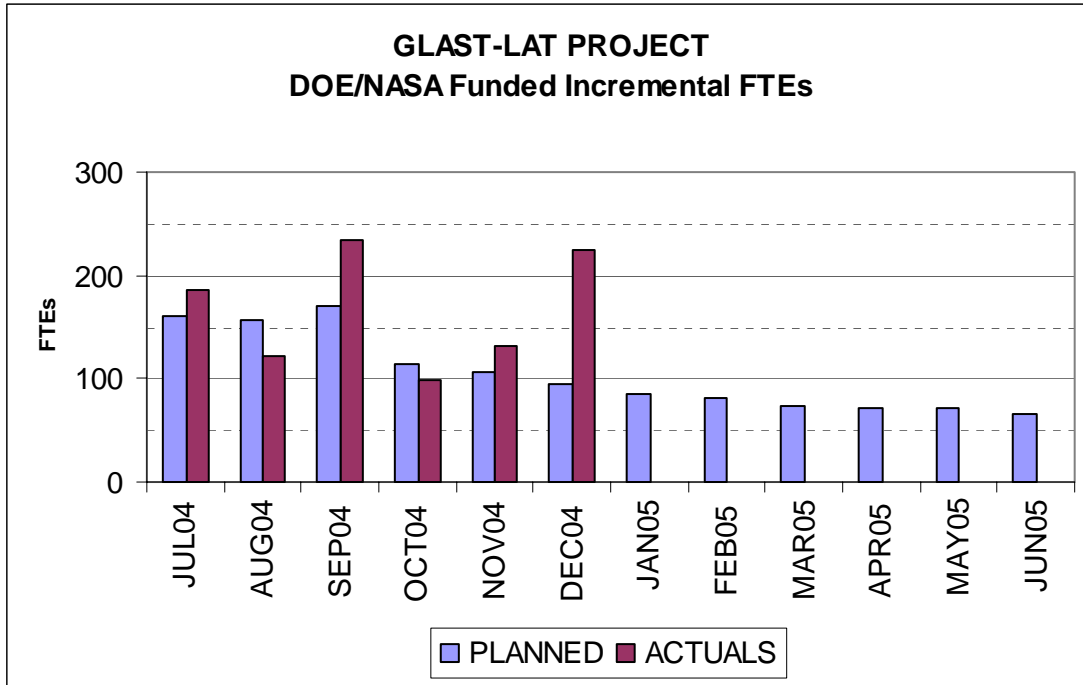
% ACWP: Percent Spent = ACWP/BAC

Cpi\_Fcst: CPI (to date) EAC Forecast = BAC / CPI

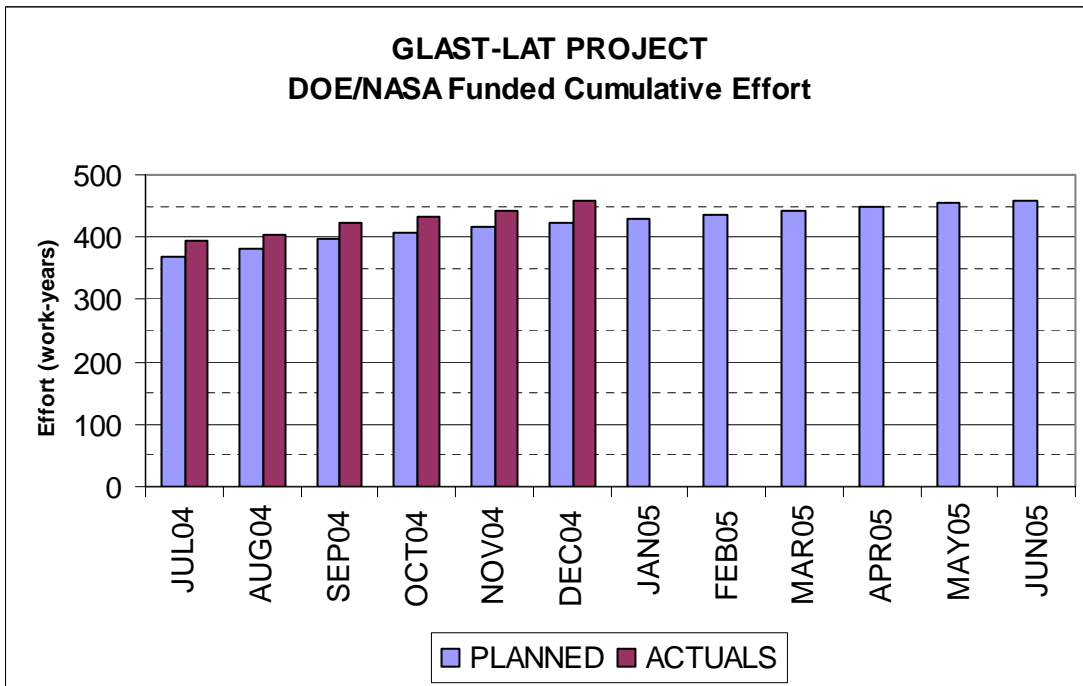
CpiSpi\_Fcst: Combination CPI and SPI EAC Forecast = ACWP + (BAC - BCWP) / (CPI \* SPI)

	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 (DOE/NASA-Funded)**



*Note: Neither Goddard nor Stanford-HEPL manpower was reported in the month of August, 2004, and Goddard civil servant manpower was not reported in the months of October and November, 2004. . The September and December, 2004, incremental FTE reports include corrections, so that the cumulative-to-date actual manpower is correct.*





**Attachment 10**  
**LAT Manpower Data, through December 2004, by Organization**

Program: LAT3		Description: GLAST LAT Project		Approval: Program Manager Functional Manager Cost Account Manager												
Run Date: 1/28/2005		Status Date: 12/31/2004														
			PRIOR	JUL04	AUG04	SEP04	OCT04	NOV04	DEC04	Cum-to- Date	JAN05	FEB05	MAR05	APR05	MAY05	JUN05
OBS																
DG *** GSFC																
FTE	PLANNED	961.5	31.6	54.1	55.3	13.3	17.8	13.0	<b>1146.6</b>	7.7	7.7	7.7	7.7	7.7	7.7	
	ACTUALS	1116.4	46.2	0.0	69.7	0.0	16.4	100.6	<b>1349.4</b>	0.0	0.0	0.0	0.0	0.0	0.0	
DH *** HEPL																
FTE	PLANNED	269.3	4.9	-0.9	2.0	3.8	3.8	3.7	<b>286.7</b>	3.8	3.8	3.8	3.7	3.6	3.7	
	ACTUALS	266.4	1.5	0.0	5.9	2.4	4.8	1.6	<b>282.6</b>	0.0	0.0	0.0	0.0	0.0	0.0	
DL *** SLAC																
FTE	PLANNED	2282.7	89.4	85.4	94.3	80.2	77.3	77.5	<b>2786.8</b>	70.7	66.0	63.4	60.9	60.7	56.8	
	ACTUALS	2124.9	105.0	105.6	124.1	70.9	93.6	82.8	<b>2706.9</b>	0.0	0.0	0.0	0.0	0.0	0.0	
DN *** NRL																
FTE	PLANNED	1008.2	44.2	41.4	31.9	29.4	21.0	17.6	<b>1193.7</b>	15.9	12.8	10.7	11.1	11.2	9.8	
	ACTUALS	1019.8	36.4	31.8	41.1	36.1	29.4	47.5	<b>1242.1</b>	0.0	0.0	0.0	0.0	0.0	0.0	
DS *** SSU																
FTE	PLANNED	99.5	3.2	3.2	3.2	2.0	2.0	1.9	<b>114.7</b>	1.9	1.9	1.9	1.9	1.9	1.9	
	ACTUALS	117.1	3.4	4.6	4.9	3.2	3.9	4.1	<b>141.1</b>	0.0	0.0	0.0	0.0	0.0	0.0	
DU *** UCSC																
FTE	PLANNED	257.8	4.4	4.4	4.4	4.4	4.4	4.4	<b>284.3</b>	4.4	4.4	4.4	4.4	4.4	4.4	
	ACTUALS	307.3	5.0	5.0	4.7	2.4	0.0	0.2	<b>324.4</b>	0.0	0.0	0.0	0.0	0.0	0.0	
DW *** UW																
FTE	PLANNED	40.5	0.4	0.4	0.4	0.4	0.4	0.4	<b>42.9</b>	0.4	0.4	0.4	0.4	0.4	0.4	
	ACTUALS	16.2	1.1	1.0	1.1	1.0	0.1	1.2	<b>21.5</b>	0.0	0.0	0.0	0.0	0.0	0.0	
FF *** France																
FTE	PLANNED	1153.2	15.2	15.2	15.2	14.2	13.9	10.8	<b>1237.6</b>	6.4	6.7	6.7	6.7	6.7	6.7	
	ACTUALS								<b>0.0</b>							
FI *** Italy																
FTE	PLANNED	444.9	12.8	14.6	15.2	9.1	9.1	7.1	<b>512.8</b>	1.5	1.5	1.5	1.5	1.5	1.5	
	ACTUALS	397.4	10.9	21.2	0.0	10.9	0.0	0.0	<b>440.4</b>	0.0	0.0	0.0	0.0	0.0	0.0	
FJ *** Japan																
FTE	PLANNED	100.6	0.5	0.5	0.5	0.5	0.5	0.5	<b>103.3</b>	0.5	0.5	0.5	0.5	0.5	0.5	
	ACTUALS	86.0	1.8	3.4	0.0	1.8	0.0	0.0	<b>92.9</b>	0.0	0.0	0.0	0.0	0.0	0.0	
FK *** Sweden																
FTE	PLANNED	134.8	3.6	3.6	3.6	3.6	3.6	2.7	<b>155.3</b>	3.4	3.6	3.6	3.6	3.6	3.6	
	ACTUALS								<b>0.0</b>							
Grand Totals:																
	PLANNED	6753.2	210.0	221.7	225.8	160.8	153.8	139.5	<b>7864.8</b>	116.4	109.2	104.5	102.3	102.1	96.8	
	ACTUALS	5451.6	211.1	172.6	251.4	128.5	148.2	237.9	<b>6601.2</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1 GLAST LAT																
Contributed	PLANNED	2497.1	49.7	65.6	55.3	47.2	47.9	45.1	<b>2807.9</b>	30.6	28.8	30.5	30.5	30.3	30.5	
	ACTUALS	951.6	25.3	50.8	16.5	29.6	16.5	13.6	<b>1103.9</b>	0.0	0.0	0.0	0.0	0.0	0.0	
Funded	PLANNED	4256.0	160.3	156.1	170.5	113.6	106.0	94.4	<b>5056.9</b>	85.8	80.4	74.0	71.8	71.8	66.3	
	ACTUALS	4500.0	185.8	121.8	234.9	98.8	131.7	224.3	<b>5497.3</b>	0.0	0.0	0.0	0.0	0.0	0.0	
Grand Totals:																
	PLANNED	6753.2	210.0	221.7	225.8	160.8	153.8	139.5	<b>7864.7</b>	116.4	109.2	104.5	102.3	102.1	96.8	
	ACTUALS	5451.6	211.1	172.6	251.4	128.5	148.2	237.9	<b>6601.2</b>	0.0	0.0	0.0	0.0	0.0	0.0	