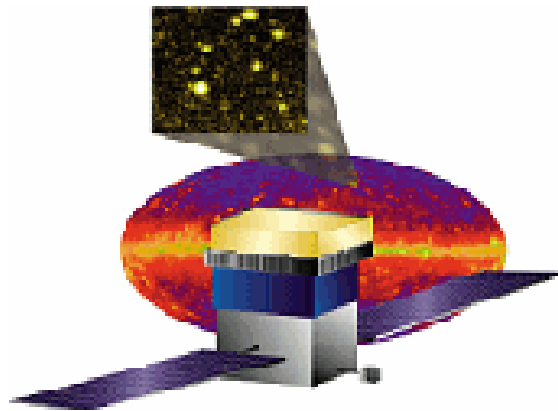


# **Monthly Progress Report**

**(Month Ending October 2004)**

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



LAT-MR-05215-01

December 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 October, 2004.

## 2.0 Recent Progress and Status

### 4.1.4 Tracker

The tray bias circuit bonding problem has been resolved. Over 90 bare trays have been produced. A decision was made to etch and prime the remaining converter tiles at Goddard. Twenty one trays have been completed with converter and bias circuits, and thermal-vacuum tested. Four trays indicated delamination, one of which involved the primer, the other three being from trapped air. This is now under investigation. An anomaly was found in the assembly of Tower A trays - missing multichip module (MCM) connections to the pitch adapter. Work was temporarily stopped pending investigation. SLAC is shipping MCMs now with 100% testing of those connections, partly using a new fixture. More separations between barrel plating and internal layers of the flight cables were discovered, as well as bubbles in the adhesive holding the connector to the cable; investigation is underway. Two alternate sources are being developed for the full-length cables. An option to use two short cables with a "rigid-flex" joint is under consideration. The other option is a second vendor with capability to build full-length cables. Over 325 MCMs are through burn-in and final test. Eight boards have developed low resistance between layers during burn-in. Testing of one of those found a contaminating metal particle in the insulating layer. Indications are that burn-in catches almost all the problems. MCM conformal coating problems are being addressed via materials review board meeting and manufacturing process improvements.

### 4.1.5 Calorimeter

The final 78 cesium iodide crystals have been received and testing is underway. Twenty flight structures have been manufactured. One experienced autoclave cure failure and has been rejected; the remaining nineteen have completed strength verification testing. NRL has received 16 flight structures. Nine pre-electronics modules have been completely assembled and tested with cosmic muons. Qualification testing of the front-end and readout controller ASICs has been completed, with no issues discovered. Thirty six analog front-end electronics (AFEE) boards have completed burn in, temperature cycling and conformal coating. The first flight calorimeter module is ready for data review, prior to shipping to SLAC. The second through sixth flight modules are well into the assembly and test process.

### 4.1.6 Anticoincidence Detector

Flight photomultiplier tube (PMT) assembly is underway; sixteen units are completed, ten are being coated, and twenty additional units are commencing assembly. Vibration and functional testing of the spare/qualification electronics chassis was conducted successfully. Mechanical qualification testing of the new PMT mounting design was completed with no problems. Thirty-six PMTs were received. Assembly and functional

testing of all four single-row electronics chassis was completed (minus the PMTs). The scintillating fiber ribbons have been installed on the Tile Shell Assembly, and the 25 top tile detector assemblies have been put in place in order to check spacing before final installation.



Figure 1: ACD tile shell assembly

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

Three additional TEM/TPS sets (tower electronics module/TEM power supplies) for Calorimeter were tested and are being readied for shipment. The problem with the ACD test stand during high-rate testing is on a path to resolution via additional instruction, revised process (code changes), and installation of LAT communications boards with updated FPGA code and revised I&T software. Low-voltage differential signal translator chip ASICs were thermal-cycle tested; the screening hardware was debugged, and test software is in progress. Air pockets caused by Nusil under the ASICs were discovered during TEM/TPS production; a solution was found and a change made to the process. Bent pins were found in the FPGAs; the cause is under investigation.

The code management system was expanded to automatically rebuild the entire code base and support delivery of formal, integrated releases. All flight software development for the instrument-to-spacecraft interface simulator is complete, and development build testing is nearly complete. Event processing boot code was completed; improvements were made to memory testing, exception handling, and bridge chip initialization in the primary and secondary boot code. Implementation of the LAT communications board driver (LCBD) is complete, and the latest version will be shipped to the ACD group. A fully-tested LCB driver and hardware was shipped to NRL. A major release of the power-on and initialize GASU package (PIG) was made. It was used extensively on the test bed, and controls initialization of the LCB and LAT protocol communications, as well as the power-on on hardware components. Attitude/time processing function design has

commenced. Housekeeping was recoded and tested against the new low-rate science counter set.

#### 4.1.8 Mechanical Systems

The flight grid box assembly machining operations are complete. Electromagnetic interference (EMI) skirt and radiator mount brackets were fit-checked on the flight grid. The finish machining is 85% complete on the second grid. A manufacturing readiness review was held for the grid assembly operations to be performed at SLAC. The variable conductance heat pipes have been bonded to the facesheets of both radiators. The cross-LAT heat pipes have been bent, proof pressure-tested and charged. An engineering EMI test of the radiator coupon was conducted with acceptable results. Qualification testing of the thermostats was conducted (30,000 thermal cycle test).

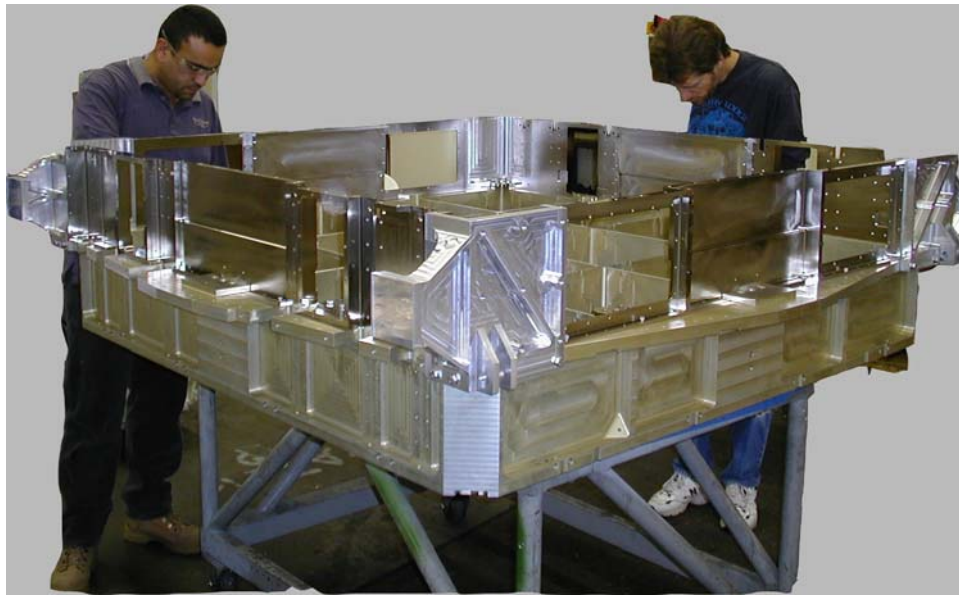


Figure 2: Grid fit check

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

The LAT rotation stand mounting surfaces were surveyed for coplanarity. Preparations were made for the proof test of the integration stand. The LAT Test Executive was updated for the LAT communications board. The Science Verification, Analysis & Calibration (SVAC) test plan was released. SVAC reports were tested, using full tower data. A system was developed to automate the analysis of results from the end-to-end two-tower tests. The Van de Graaff accelerator has worked reliably for ten weeks. The muon telescope design was updated; new scintillators are being made. Documentation is being completed in preparation for the two-tower integration readiness review to be held in November.

### 3.0 Schedule Status

The critical path for the project is driven by the assembly of Tracker trays. There is no float to the “ready for CD-4 review” milestone (baseline has five weeks’ float). Options are being explored with the international partners to accelerate the Tracker production schedule.

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 completion of the flight grid (level 1 milestone 1M1P000060) is discussed below. The start of integration (level 2 milestone 1M1000740), the delay 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 as addressed elsewhere in this section. 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. The schedule impact will be minimized 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 (1M1000210, 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 (though not in final form) by late December.

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. The drawing release process has been improved, and additional staff has been hired. 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)

Variances to the following EGSE milestones are due to delayed receipt and quality problems with connectors. Effort has been diverted to the installation of TEMs on the Test Bed.

- Final EGSE incl S/C Sim, FSW (1M7941440)

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)

The demonstration of the ISIS flight qualification test (1M79110) was delayed by unplanned difficulties in getting the science data interface configured and tested properly.

Errors in the AstroRT interface required unplanned effort to characterize the errors and attempt to work around them.

The demonstrations of command & telemetry (1M79090) and the 1553 service (1M79100) were 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).

#### 4.1.8 Mechanical Systems

The flight grid (1M1000240 and 1M1P000060) 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.

(As of publication of this report, the milestone for the receipt of the flight grid, 1M1P000060, has been completed.)

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.

The Radiator fabrication is behind schedule. LM has re-established the Heat Pipe Product Center in Sunnyvale, CA after it was moved to Mississippi. GLAST was the second Program to go through the Center.

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.

#### 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

The unfavorable schedule variance is due to 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. Additional modification and testing of the engineering model units was required in response. Documentation and drawings for flight fabrication took longer than originally estimated, as did the procurement process. Vendor delays were experienced in the assembly of the TEM and TEM/PS modules.

The above schedule delays have resulted in additional labor cost. The cost of flight fabrication contracts is greater than estimated.

### 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
LAT-XR-04696-01	ACD-LAT ICD Update	R. Bielawski	Approved	N/A
LAT-XR-4766-01	Changes to the Flight Software Specification	M. DeKlotz	Approved	N/A
LAT-XR-04918-01	Changes to the LAT SVAC Calibration Plan	E. do Couto e Silva	Approved	N/A

The fabrication phase cost baseline is \$132.2M. Funding applicable to that baseline is \$136.0M; the resulting contingency is \$3.8M.

## 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 manpower was not reported for the month of October.

## Attachment 1 Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	Fiscal Year							
					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	11/08/04					▼			
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*	-83	12/22/04					▼			
1M1000700	Pre Environmental Testing Review	07/14/05*	-72	10/25/05						▼		
1M1000120	PSR-(Instrument Pre-Ship Review)	12/01/05*	-45	02/13/06							▼	
Run Date					12/03/04 08:14		<b>GLAST LAT PROJECT Project Milestones (Level 1 and 2)</b>			1122 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					
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
<b>Instrument Project Office (Level 3)</b>														
<b>4.1.4 Tracker</b>														
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	-102	12/22/04										
1M1000201	Tracker Modules B RFI	08/18/04	-101	01/20/05										
1M1000220	Tracker Modules 1 RFI	08/18/04	-122	02/18/05										
1M1000221	Tracker Modules 2 RFI	09/08/04	-108	02/18/05										
1M1000250	Flight Tracker Tower 3 RFI	09/08/04	-108	02/18/05										
1M1000251	Flight Tracker Tower 4 RFI	10/14/04	-102	03/21/05										
1M1000260	Flight Tracker Tower 5 RFI	10/14/04	-102	03/21/05										
1M1000261	Flight Tracker Tower 6 RFI	11/05/04	-86	03/21/05										
1M1000270	Flight Tracker Tower 7 RFI	11/05/04	-109	04/21/05										
1M1000271	Flight Tracker Tower 8 RFI	11/24/04	-96	04/21/05										
1M1000280	Flight Tracker Tower 9 RFI	11/24/04	-96	04/21/05										
1M1000281	Flight Tracker Tower 10 RFI	12/17/04	-103	05/23/05										
1M1000290	Flight Tracker Tower 11 RFI	12/17/04	-103	05/23/05										
1M1000291	Flight Tracker Tower 12 RFI	01/11/05	-92	05/23/05										
1M1000300	Flight Tracker Tower 13 RFI	01/11/05	-113	06/22/05										
1M1000301	Flight Tracker Tower 14 RFI	01/25/05	-104	06/22/05										
1M1000310	Flight Tracker Tower 15 RFI	01/25/05	-124	07/21/05										
1M1000311	Flight Tracker Tower 16 RFI	02/08/05	-114	07/21/05										
<b>4.1.5 Calorimeter</b>														
1M1000210	Calorimeter Modules A RFI	07/09/04	-100	12/01/04										
1M1500	Calorimeter Modules B RFI	07/09/04	-100	12/01/04										
1M1000230	Calorimeter Modules 1 RFI	07/30/04	-88	12/06/04										
1M1510	Calorimeter Modules 2 RFI	08/02/04	-101	01/03/05										
1M1000400	Flight Calorimeter Tower 3 RFI	08/17/04	-97	01/12/05										
1M1520	Flight Calorimeter Tower 4 RFI	08/17/04	-100	01/18/05										
1M1000390	Flight Calorimeter Tower 5 RFI	09/15/04	-80	01/18/05										
1M1530	Flight Calorimeter Tower 6 RFI	09/15/04	-117	03/11/05										
1M1000380	Flight Calorimeter Tower 7 RFI	10/11/04	-99	03/11/05										
1M1540	Flight Calorimeter Tower 8 RFI	10/11/04	-105	03/21/05										
Run Date	12/03/04 08:20	<b>GLAST LAT PROJECT</b> Project Milestones (Level 3) 1 Year View (+/- 6mo)			1122 LTX1 - MS (L3) FLX1- MS (L3)	Sheet 1 of 6								
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**Attachment 2**  
**Level 3 Milestones (One-Year View)**  
**Page 2 of 6**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04				FY05			
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1M1000370	Flight Calorimeter Tower 9 RFI	11/02/04	-89	03/21/05					▼			
1M1550	Flight Calorimeter Tower 10 RFI	11/02/04	-98	04/01/05					▼			
1M1560	Flight Calorimeter Tower 12 RFI	11/15/04	-94	04/08/05					▼			
1M1000360	Flight Calorimeter Tower 11 RFI	11/16/04	-88	04/01/05					▼			
1M1000350	Flight Calorimeter Tower 13 RFI	12/02/04	-83	04/08/05					▼			
1M1570	Flight Calorimeter Tower 14 RFI	12/02/04	-90	04/19/05					▼			
1M1000340	Flight Calorimeter Tower 15 RFI (Spare)	01/06/05	-71	04/19/05					▼			
1M1580	Flight Calorimeter Tower 16 RFI (Spare)	01/06/05	-82	05/04/05					▼			
<b>4.1.6 ACD</b>												
1M1001000	ACD Test Scripts (from ACD to I&T)	07/01/04	-102	11/24/04					▼			
1M1000410	ACD Flight Unit at SLAC, Tested/Inspected & RFI	11/03/04	-129	05/17/05							▼	
1M1000990	ACD Calibration Test Unit at SLAC, Tested & RFI	01/18/05	0	01/18/05						▼		
<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	•			▼				
1M74000030	Updated EGSE System 3: Elec to TKR	01/07/04	-104	06/04/04A	•			▼				
1M7941160	EGSE TEM/TEM PS/CTS w/ FE Elec #3-Elec to I&T	01/07/04	-153	08/13/04A	•			▼				
1M1001900	Test Stations (5) for AFEE: Elec to CAL	01/14/04	-100	06/07/04A	•			▼				
1M74000040	EGSE System 4: Elec to TKR	01/14/04	-99	06/04/04A	•			▼				
1M7941170	EGSE TEM/TEM PS/CTS/GASU FE Elec-Elec to I&T	01/14/04	-138	07/30/04A	•			▼				
1M1001870	5 EM2 TEM/PS for AFEE brd ass & tst: Elec to CAL	01/15/04	-99	06/07/04A	•			▼				
1M1001220	EM2 TEM/PS/CTS for FMA from Elec to CAL	01/22/04	-101	06/15/04A	•			▼				
1M74000050	EGSE System 5: Elec to TKR	01/22/04	-94	06/04/04A	•			▼				
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	•			▼				
1M7941190	EGSE TEM/TEM PS/CTS #1 for Bldg 33-Elec to I&T	01/29/04	-104	06/25/04A	•			▼				
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	•			▼				

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

1122  
 LTX1 - MS (L3)  
 FLX1 - MS (L3)  
 Sheet 2 of 6

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

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04				FY05					
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
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				▼						
1M76000030	G3 Test Stand (Fit-like I/F): Elec to ACD	02/20/04	-64	05/20/04A			▼							
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				▼						
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	-186	02/10/05									▽	
1M79003020	Flight Cables Assy B: Elec to I&T	05/10/04	-186	02/10/05									▽	
1M79002010	Flight TEM PS Assy A: Elec to I&T	05/12/04	-166	01/14/05									▽	
1M79002020	Flight TEM PS Assy B: Elec to I&T	05/19/04	-161	01/14/05									▽	
1M79010	Demo: SI Functionality - Elec to MO	05/28/04*	0	05/28/04A				▼						
1M79001010	Flight TEM Assy A: Elec to I&T	06/07/04	-149	01/14/05									▽	
1M79003030	Flight Cables Assy 1: Elec to I&T	06/10/04	-164	02/10/05									▽	
1M79003040	Flight Cables Assy 2: Elec to I&T	06/10/04	-164	02/10/05									▽	
1M79003050	Flight Cables Assy 3: Elec to I&T	06/10/04	-164	02/10/05									▽	
1M79003060	Flight Cables Assy 4: Elec to I&T	06/10/04	-164	02/10/05									▽	
1M79001020	Flight TEM Assy B: Elec to I&T	06/14/04	-144	01/14/05									▽	
1M79003070	Flight Cables Assy 5: Elec to I&T	06/28/04	-152	02/10/05									▽	
1M79003080	Flight Cables Assy 6: Elec to I&T	06/28/04	-152	02/10/05									▽	
1M79003090	Flight Cables Assy 7: Elec to I&T	06/28/04	-152	02/10/05									▽	
1M79003100	Flight Cables Assy 8: Elec to I&T	06/28/04	-152	02/10/05									▽	
1M79003110	Flight Cables Assy 9: Elec to I&T	06/28/04	-152	02/10/05									▽	
1M79003120	Flight Cables Assy 10: Elec to I&T	06/28/04	-152	02/10/05									▽	
1M79002030	Flight TEM PS Assy 1: Elec to I&T	07/01/04	-164	03/04/05									▽	
1M79002040	Flight TEM PS Assy 2: Elec to I&T	07/09/04	-164	03/11/05									▽	
1M79003130	Flight Cables Assy 11: Elec to I&T	07/15/04	-140	02/10/05									▽	
1M79003140	Flight Cables Assy 12: Elec to I&T	07/15/04	-140	02/10/05									▽	
1M79003150	Flight Cables Assy 13: Elec to I&T	07/15/04	-140	02/10/05									▽	

Run Date 12/03/04 08:20

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

1122  
LTX1 - MS (L3)  
FLX1 - MS (L3)

Sheet 3 of 6

**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					
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
1M79003160	Flight Cables Assy 14: Elec to I&T	07/15/04	-140	02/10/05										
1M79003170	Flight Cables Assy 15: Elec to I&T	07/15/04	-140	02/10/05										
1M79003180	Flight Cables Assy 16: Elec to I&T	07/15/04	-140	02/10/05										
1M79002050	Flight TEM PS Assy 3: Elec to I&T	07/16/04	-163	03/17/05										
1M79002060	Flight TEM PS Assy 4: Elec to I&T	07/23/04	-162	03/23/05										
1M79002070	Flight TEM PS Assy 5: Elec to I&T	07/30/04	-161	03/29/05										
1M79020	Demo: Inter-task Communications	07/30/04	0	07/30/04A										
1M79001030	Flight TEM Assy 1: Elec to I&T	08/03/04	-142	03/04/05										
1M79002080	Flight TEM PS Assy 6: Elec to I&T	08/06/04	-160	04/04/05										
1M79001040	Flight TEM Assy 2: Elec to I&T	08/10/04	-142	03/11/05										
1M79002090	Flight TEM PS Assy 7: Elec to I&T	08/13/04	-160	04/11/05										
1M79001050	Flight TEM Assy 3: Elec to I&T	08/17/04	-141	03/17/05										
1M79002100	Flight TEM PS Assy 8: Elec to I&T	08/20/04	-160	04/18/05										
1M79001060	Flight TEM Assy 4: Elec to I&T	08/24/04	-140	03/23/05										
1M79002110	Flight TEM PS Assy 9: Elec to I&T	08/25/04	-162	04/25/05										
1M79002120	Flight TEM PS Assy 10: Elec to I&T	08/30/04	-164	05/02/05										
1M79001070	Flight TEM Assy 5: Elec to I&T	08/31/04	-139	03/29/05										
1M79030	Demo: Preliminary ISIS	09/01/04	-2	09/03/04A										
1M79002130	Flight TEM PS Assy 11: Elec to I&T	09/02/04	-166	05/09/05										
1M79001080	Flight TEM Assy 6: Elec to I&T	09/08/04	-138	04/04/05										
1M79002140	Flight TEM PS Assy 12: Elec to I&T	09/08/04	-168	05/16/05										
1M79002150	Flight TEM PS Assy 13: Elec to I&T	09/13/04	-170	05/23/05										
1M79001090	Flight TEM Assy 7: Elec to I&T	09/15/04	-138	04/11/05										
1M79002160	Flight TEM PS Assy 14: Elec to I&T	09/16/04	-172	05/31/05										
1M79002170	Flight TEM PS Assy 15: Elec to I&T	09/21/04	-174	06/07/05										
1M79001100	Flight TEM Assy 8: Elec to I&T	09/22/04	-138	04/18/05										
1M79002180	Flight TEM PS Assy 16: Elec to I&T	09/24/04	-176	06/14/05										
1M79001110	Flight TEM Assy 9: Elec to I&T	09/29/04	-138	04/25/05										
1M79080	Demo: LAT Communication Board Driver	10/01/04	0	10/01/04A										
1M79090	Demo: Command and Telemetry	10/01/04	-41	12/01/04										
1M79100	Demo: 1553 Service	10/01/04	-41	12/01/04										
1M79001120	Flight TEM Assy 10: Elec to I&T	10/06/04	-138	05/02/05										

Run Date 12/03/04 08:20

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

1122  
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	FY04				FY05					
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
1M79110	Demo: ISIS FQT	10/08/04	-41	12/08/04										
1M79001130	Flight TEM Assy 11: Elec to I&T	10/13/04	-138	05/09/05										
1M7941080	Flight SIU-Elec to I&T	10/13/04	-141	05/12/05										
1M7942000	Flight PDU Box-Elec to I&T	10/13/04	-128	04/25/05										
1M79001140	Flight TEM Assy 12: Elec to I&T	10/20/04	-138	05/16/05										
1M7941110	Flight Harness-Elec to I&T	10/20/04	-72	02/10/05										
1M79001150	Flight TEM Assy 13: Elec to I&T	10/27/04	-138	05/23/05										
1M79120	Demo: Primary Boot	10/29/04	-3	11/03/04										
1M79130	Demo: Secondary Boot	10/29/04	-3	11/03/04										
1M79140	Demo: LCB Service	10/29/04	-3	11/03/04										
1M79150	Demo: Power/Initialize GASU	10/29/04	-3	11/03/04										
1M7941070	Flight GASU Box-Elec to I&T	11/01/04*	-121	05/03/05										
1M7941090	Flight Event Processor Units-Elec to I&T	11/01/04	-117	04/27/05										
1M79001160	Flight TEM Assy 14: Elec to I&T	11/03/04	-138	05/31/05										
1M79001170	Flight TEM Assy 15: Elec to I&T	11/10/04	-138	06/07/05										
1M79001180	Flight TEM Assy 16: Elec to I&T	11/17/04	-138	06/14/05										
1M79160	Demo: File and Memory Management	12/03/04	0	12/03/04										
1M79170	Demo: Spacecraft Interfaces	12/03/04	0	12/03/04										
1M79180	Demo: Inter-task Communications	12/03/04	0	12/03/04										
1M7941440	Final EGSE incl S/C Sim, FSW-Elec to I&T	12/13/04	-89	04/27/05										
1M79190	Demo: Command and Telemetry Data Dictionary	01/07/05	0	01/07/05										
1M79200	Demo: Thermal Control	01/07/05	0	01/07/05										
1M79210	Demo: Watchdog	01/07/05	0	01/07/05										
1M79220	Demo: Charge Injection Calibration	01/07/05	0	01/07/05										
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										
4.1.8 Mechanical														
1M1000240	Flight Grid RFI-Mech to I&T	07/22/04	-105	12/21/04										

Run Date 12/03/04 08:20  
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**GLAST LAT PROJECT**  
**Project Milestones (Level 3)**  
**1 Year View (+/- 6mo)**

1122  
 LTX1 - MS (L3)  
 FLX1 - MS (L3)  
 Sheet 5 of 6

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

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY04				FY05					
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
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	-100	12/15/04										
1M1001800	EM2 TEM/PS (return FMB) from I&T to CAL	07/23/04	-100	12/15/04										
1M1001810	EM2 TEM/PS (return FM1) from I&T to CAL	08/13/04	-88	12/20/04										
1M1001820	EM2 TEM/PS (return FM2) from I&T to CAL	08/16/04	-101	01/18/05										
1M1001830	EM2 TEM/PS (return FM3) from I&T to CAL	08/31/04	-97	01/27/05										
1M1001840	EM2 TEM/PS (return FM4) from I&T to CAL	08/31/04	-100	02/01/05										
1M1001850	EM2 TEM/PS (return FM5) from I&T to CAL	09/29/04	-80	02/01/05										
1M1001860	EM2 TEM/PS (return FM6) from I&T to CAL	09/29/04	-117	03/25/05										
<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	-120	05/11/05										
1M7941270	Ground System Interface Test start	11/10/04	-120	05/11/05										

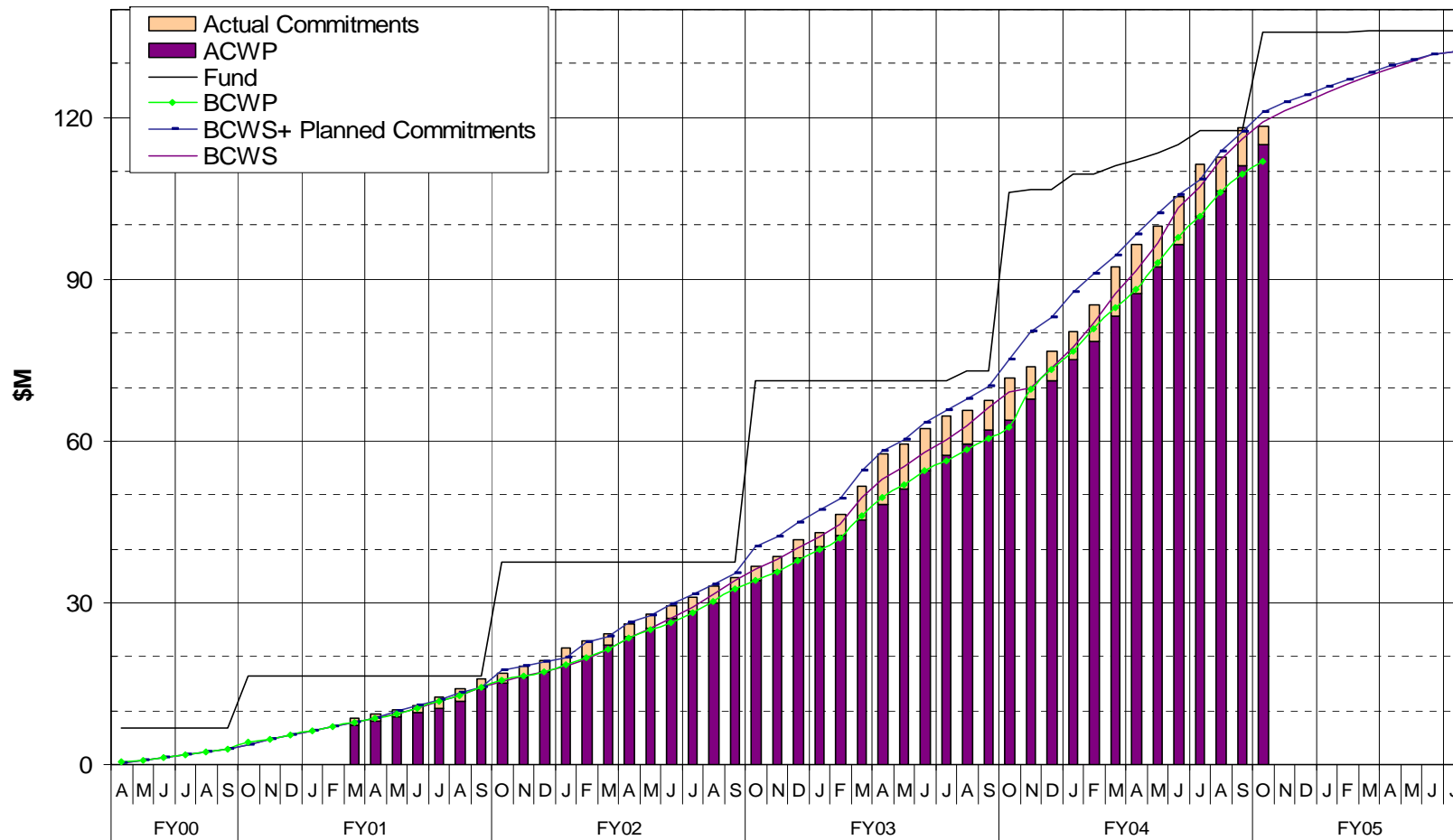
  

Run Date	12/03/04 08:20	<b>GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)</b>	1122 LTX1 - MS (L3) FLX1 - MS (L3)	Sheet 6 of 6
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### Attachment 3

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



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

Monthly Contractor Financial Management Report								Report for Month Ending: 10/31/2004		
To: Kevin Grady, GLAST Project Manager (NASA) Ev Valle, LAT Project Manager (DOE)				From: Tanya Boysen, LAT Project Controls Manager				Budget Value		
								Cost:	Fee:	
								0	0	
LAT3		Type:						Fund Limitation:		
GLAST LAT Project								0		
Reporting Category		Cost Incurred				Estimated Cost			4/3/2000 Billing	
									Estimated Final Cost	
		During Month		Cum. to Date		Detail		Balance of Budget	Project Estimate	Budget Value
Actual	Planned	Actual	Planned	NOV04	DEC04					
4.1.1 INSTRUMENT MANAGEMENT		266	363	14,186	14,259	346	280	2,099	16,911	16,911
4.1.2 SYSTEM ENGINEERING		170	152	5,582	5,811	152	129	1,184	7,047	7,047
4.1.4 TRACKER		424	674	15,579	15,948	219	60	715	16,573	16,573
4.1.5 CALORIMETER		505	581	18,410	20,410	349	204	3,058	22,022	22,022
4.1.6 ANTICOINCIDENCE DETECTOR		387	118	14,895	15,157	80	114	507	15,595	15,595
4.1.7 ELECTRONICS		1,146	269	20,978	20,778	229	215	633	22,055	22,055
4.1.8 MECHANICAL SYSTEMS		617	409	12,251	12,497	407	147	1,373	14,179	14,179
4.1.9 INTEGRATION & TEST		279	283	5,257	5,680	264	200	2,043	7,764	7,764
4.1.A PERFORMANCE AND SAFETY ASSURANCE		76	142	2,307	2,465	135	115	378	2,935	2,935
4.1.B LAT INSTRUMENT OPERATIONS CENTER		2	4	297	299	3	3	25	328	328
4.1.C EDUCATION AND PUBLIC OUTREACH		30	51	1,636	2,035	44	36	733	2,448	2,448
4.1.D SCIENCE ANALYSIS SOFTWARE		41	78	2,200	2,387	74	63	683	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
Total		3,942	3,123	114,903	119,051	2,302	1,566	13,432	132,202	132,202

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

Monthly Contractor Financial Management Report								Report for Month Ending: 10/31/2004	
To: Kevin Grady, GLAST Project Manager (NASA) Ev Valle, LAT Project Manager (DOE)				From: Tanya Boysen, LAT Project Controls Manager				Budget Value	
								Cost:	Fee:
								0	0
LAT3	Type:							Fund Limitation:	
GLAST LAT Project								0	
Reporting Category	Cost Incurred				Estimated Cost			4/3/2000	Billing
	During Month		Cum. to Date		Detail		Balance of Budget	Estimated Final Cost	Unfilled Orders Outstanding
	Actual	Planned	Actual	Planned	NOV04	DEC04			
DG *** GSFC	400	155	16,206	16,798	115	144	1,076	17,541	17,541
DH *** HEPL	88	139	5,813	6,425	135	112	1,482	7,542	7,542
DL *** SLAC	2,788	2,052	66,492	66,826	1,510	944	6,038	74,984	74,984
DN *** NRL	604	680	22,219	24,336	455	293	3,712	26,679	26,679
DO *** Financial Plan Transfer/Sub Ou	0	0	59	54	0	0	-5	54	54
DS *** SSU	30	50	1,622	1,994	43	35	701	2,401	2,401
DT *** Texas A&M	0	0	15	16	0	0	0	16	16
DU *** UCSC	30	38	2,301	2,416	36	31	358	2,726	2,726
DW *** UW	1	9	176	187	8	7	69	260	260
<b>Total</b>	<b>3,942</b>	<b>3,123</b>	<b>114,903</b>	<b>119,051</b>	<b>2,302</b>	<b>1,566</b>	<b>13,431</b>	<b>132,202</b>	<b>132,202</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	NOV04	DEC04				
RL LABOR	2,134	1,458	56,423	56,961	1,256	977	6,507	65,164	65,164	
<i>FTE (DOE/NASA)</i>	98.8	113.6	5,141.3	4,856.5	106.0	94.0	184.2	5,525.5	5,525.5	
<i>HOURS (DOE/NASA)</i>	16,602	19,089	857,783	807,312	16,956	12,836	27,771.8	915,347	915,347	
RT TRAVEL	27	68	1,426	2,004	64	45	947	2,481	2,481	
RM MATERIAL & SERVICES	1,781	1,593	54,697	57,596	978	541	5,742	61,958	61,958	
RX MPS & LAB TAX	0	4	2,357	2,489	4	3	235	2,599	2,599	
<b>Total (not incl FTE/Hours)</b>	<b>3,942</b>	<b>3,123</b>	<b>114,903</b>	<b>119,051</b>	<b>2,302</b>	<b>1,566</b>	<b>13,431</b>	<b>132,202</b>	<b>132,202</b>	

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

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 9/30/2004 10/31/2004			
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			Latest Revised	
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Estimate	Variance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
4.1.1 INSTRUMENT MANAGEMENT	363	363	266	0	97	14,259	14,259	14,186	0	74	16,911	16,911	0
4.1.2 SYSTEM ENGINEERING	152	152	170	0	-18	5,811	5,811	5,582	0	229	7,047	7,047	0
4.1.4 TRACKER	674	260	424	-414	-164	15,948	14,959	15,579	-989	-621	16,573	16,573	0
4.1.5 CALORIMETER	581	643	505	62	138	20,410	18,576	18,410	-1,833	166	22,022	22,022	0
4.1.6 ANTICOINCIDENCE DETECTOR	118	170	387	52	-217	15,157	14,635	14,895	-522	-259	15,595	15,595	0
4.1.7 ELECTRONICS	269	172	1,146	-97	-974	20,778	18,293	20,978	-2,485	-2,684	22,055	22,055	0
4.1.8 MECHANICAL SYSTEMS	409	159	617	-250	-458	12,497	11,674	12,251	-823	-577	14,179	14,179	0
4.1.9 INTEGRATION & TEST	283	226	279	-57	-53	5,680	5,129	5,257	-551	-128	7,764	7,764	0
4.1.A PERFORMANCE AND SAFETY AS	142	142	76	0	66	2,465	2,465	2,307	0	159	2,935	2,935	0
4.1.B LAT INSTRUMENT OPERATIONS C	4	4	2	0	2	299	299	297	0	2	328	328	0
4.1.C EDUCATION AND PUBLIC OUTRE	51	52	30	2	23	2,035	2,036	1,636	2	401	2,448	2,448	0
4.1.D SCIENCE ANALYSIS SOFTWARE	78	78	41	0	38	2,387	2,387	2,200	0	187	3,020	3,020	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	3,123	2,421	3,942	-702	-1,521	119,051	111,850	114,903	-7,201	-3,053	132,202	132,202	0
Contingency											3,783	3,783	0
Total	3,123	2,421	3,942	-702	-1,521	119,051	111,850	114,903	-7,201	-3,053	135,985	135,985	0

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

Cost Performance Report - Work Breakdown Structure															
Contractor: Location:				Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 9/30/2004					#####	
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	0					
OBS[1]	Current Period					Cumulative to Date					At Completion				
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest Revised			
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Estimate	Variance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
DG *** GSFC	155	207	400	52	-193	16,798	16,277	16,206	-522	71	17,541	17,541	0		
DH *** HEPL	139	139	88	0	51	6,425	6,419	5,813	-6	606	7,542	7,542	0		
DL *** SLAC	2,052	1,251	2,788	-801	-1,537	66,826	62,133	66,492	-4,693	-4,359	74,984	74,984	0		
DN *** NRL	680	726	604	46	122	24,336	22,364	22,219	-1,972	144	26,679	26,679	0		
DO *** Financial Plan	0	0	0	0	0	54	54	59	0	-5	54	54	0		
DS *** SSU	50	52	30	2	22	1,994	1,995	1,622	2	374	2,401	2,401	0		
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0		
DU *** UCSC	38	38	30	0	8	2,416	2,406	2,301	-9	105	2,726	2,726	0		
DW *** UW	9	9	1	0	8	187	187	176	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	3,123	2,421	3,942	-702	-1,521	119,051	111,850	114,903	-7,201	-3,053	132,202	132,202	0		
Contingency											3,783	3,783	0		
Total	3,123	2,421	3,942	-702	-1,521	119,051	111,850	114,903	-7,201	-3,053	135,985	135,985	0		

## Attachment 8 LAT Performance Analysis, October 2004

	WBS	Description	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	%BCWS	%BCWP	%ACWP	SPI	CPI	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	LAT	132,202	119,051	111,850	114,903	-7,201	-3,053	90.05	84.61	86.91	↔	↓	0.940	0.973	135,811	137,157
2	4.1.1	Instr Mgmt	16,911	14,259	14,259	14,186	0	74	84.32	84.32	83.88	↔	↑	1.000	1.005	16,824	16,824
3	4.1.2	System Engr	7,047	5,811	5,811	5,582	0	229	82.46	82.46	79.21	↔	↓	1.000	1.041	6,770	6,770
4	4.1.4	Tracker	16,573	15,948	14,959	15,579	-989	-621	96.23	90.26	94.00	↓	↓	0.938	0.960	17,261	17,372
5	4.1.5	Calorimeter	22,022	20,410	18,576	18,410	-1,833	166	92.68	84.35	83.60	↔	↑	0.910	1.009	21,825	22,162
6	4.1.6	ACD	15,595	15,157	14,635	14,895	-522	-259	97.19	93.84	95.51	↔	↓	0.966	0.983	15,872	15,907
7	4.1.7	Electronics	22,055	20,778	18,293	20,978	-2,485	-2,684	94.21	82.94	95.11	↔	↓	0.880	0.872	25,291	25,877
8	4.1.8	Mechanical	14,179	12,497	11,674	12,251	-823	-577	88.14	82.34	86.41	↓	↓	0.934	0.953	14,880	15,065
9	4.1.9	I&T	7,764	5,680	5,129	5,257	-551	-128	73.15	66.06	67.71	↔	↓	0.903	0.976	7,959	8,249
10	4.1.A	PSA	2,935	2,465	2,465	2,307	0	159	83.99	83.99	78.59	↔	↑	1.000	1.069	2,746	2,746
11	4.1.B	ISOC	328	299	299	297	0	2	91.21	91.21	90.63	↔	↑	1.000	1.006	326	326
12	4.1.C	EPO	2,448	2,035	2,036	1,636	2	401	83.10	83.17	66.81	↔	↔	1.001	1.245	1,967	1,967
13	4.1.D	SAS	3,019	2,387	2,387	2,200	0	187	79.06	79.06	72.86	↔	↑	1.000	1.085	2,783	2,783
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)

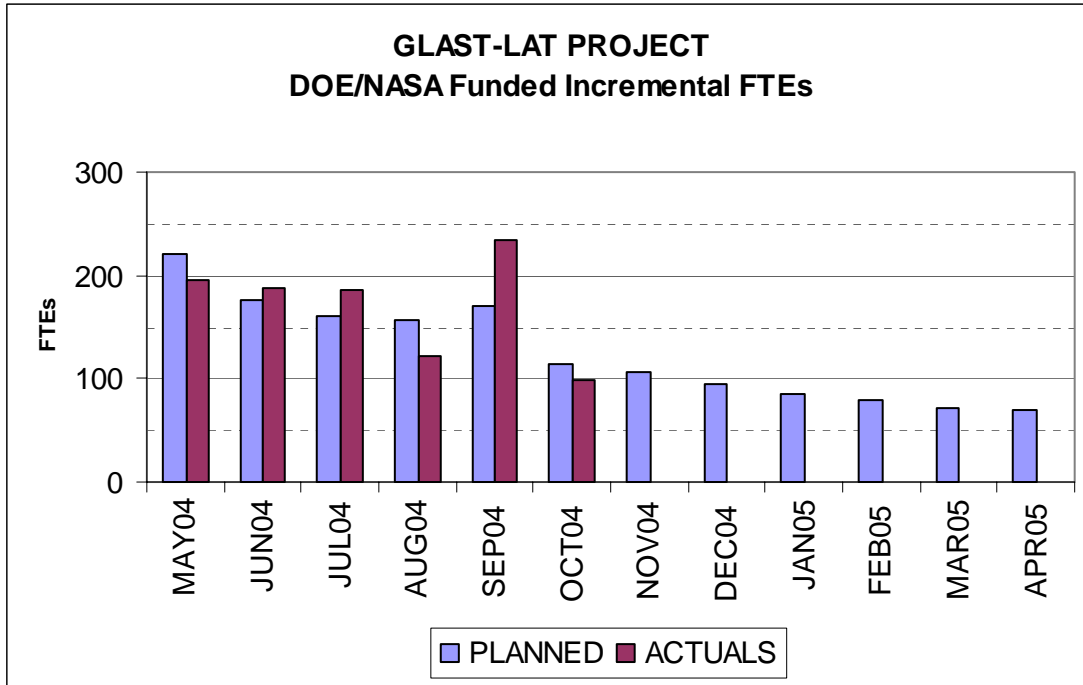
SV \$: Schedule Variance = BCWP - BCWS  
 CV \$: Cost Variance = BCWP - ACWP  
 SPI: Schedule Performance Index = BCWP/BCWS  
 CPI: Cost Performance Index = BCWP/ACWP

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

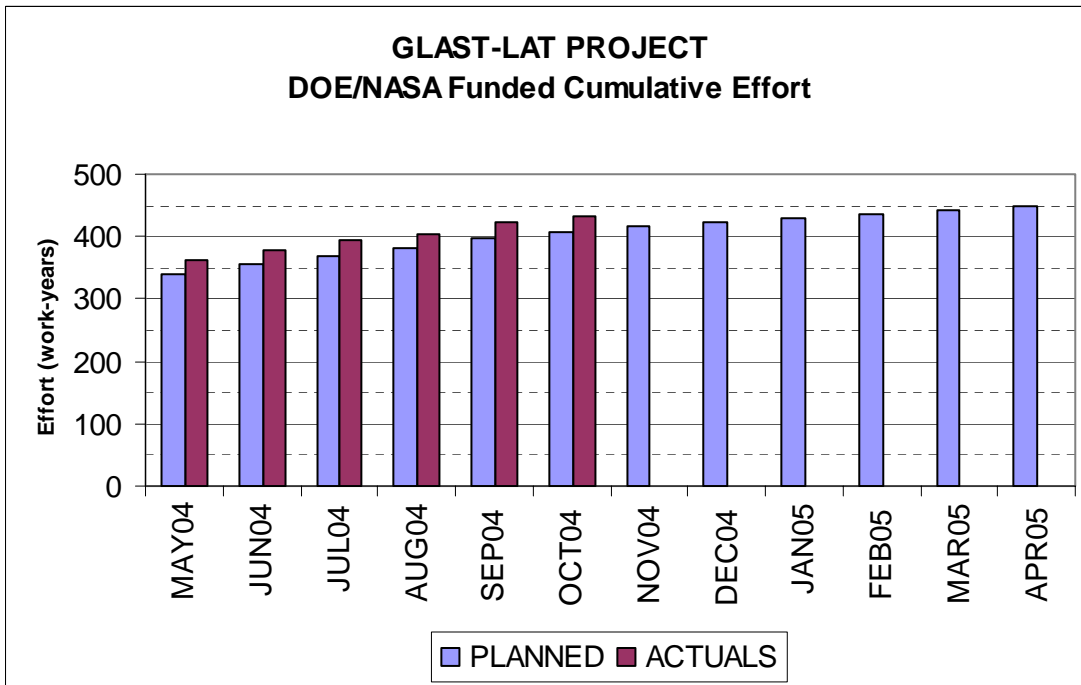
Cpi\_Fcst: CPI (to date) EAC Forecast = BAC / CPI  
 CpiSpi\_Fcst: Combination CPI and SPI EAC Forecast = ACWP + (BAC - BCWP) / (CPI \* SPI)

<span style="color: red;">■</span>	Worse than .85	<span style="color: green;">■</span>	Between .95 and 1.10
<span style="color: yellow;">■</span>	Between .85 and .95	<span style="color: blue;">■</span>	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. The September, 2004, incremental FTE report includes a correction, so that the cumulative-to-date actual manpower is correct. Goddard manpower was not reported in the month of October, 2004.*



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

Program: LAT3		Description: GLAST LAT Project		Approval: Program Manager Functional Manager Cost Account Manager												
Run Date: 12/3/2004		Status Date: 10/31/2004														
		PRIOR	MAY04	JUN04	JUL04	AUG04	SEP04	OCT04	Cum-to- Date	NOV04	DEC04	JAN05	FEB05	MAR05	APR05	
OBS																
DG *** GSFC																
FTE	PLANNED	894.7	28.6	38.3	31.6	54.1	55.3	13.3	1115.7	17.8	13.0	7.7	7.7	7.7	7.7	
	ACTUALS	1008.0	61.1	47.3	46.2	0.0	69.7	0.0	1232.4	0.0	0.0	0.0	0.0	0.0	0.0	
DH *** HEPL																
FTE	PLANNED	261.5	3.4	4.5	4.9	-0.9	2.0	3.8	279.2	3.8	3.7	3.8	3.8	3.8	3.7	
	ACTUALS	259.0	3.6	3.9	1.5	0.0	5.9	2.4	276.2	0.0	0.0	0.0	0.0	0.0	0.0	
DL *** SLAC																
FTE	PLANNED	2026.1	158.4	98.2	89.4	85.4	94.3	80.2	2632.1	77.3	77.5	69.7	65.0	61.4	58.8	
	ACTUALS	1928.4	95.2	101.4	105.0	105.6	124.1	70.9	2530.5	0.0	0.0	0.0	0.0	0.0	0.0	
DN *** NRL																
FTE	PLANNED	906.7	49.4	52.2	44.2	41.4	31.9	29.4	1155.1	21.0	17.6	15.9	12.8	10.7	11.1	
	ACTUALS	937.4	42.6	39.8	36.4	31.8	41.1	36.1	1165.2	0.0	0.0	0.0	0.0	0.0	0.0	
DS *** SSU																
FTE	PLANNED	93.2	3.2	3.2	3.2	3.2	3.2	2.0	110.9	2.0	1.9	1.9	1.9	1.9	1.9	
	ACTUALS	111.0	3.4	2.7	3.4	4.6	4.9	3.2	133.1	0.0	0.0	0.0	0.0	0.0	0.0	
DU *** UCSC																
FTE	PLANNED	249.0	4.4	4.4	4.4	4.4	4.4	4.4	275.5	4.4	4.4	4.4	4.4	4.4	4.4	
	ACTUALS	300.8	1.0	5.5	5.0	5.0	4.7	2.4	324.3	0.0	0.0	0.0	0.0	0.0	0.0	
DW *** UW																
FTE	PLANNED	39.7	0.4	0.4	0.4	0.4	0.4	0.4	42.1	0.4	0.4	0.4	0.4	0.4	0.4	
	ACTUALS	14.1	1.1	1.0	1.1	1.0	1.1	1.0	20.3	0.0	0.0	0.0	0.0	0.0	0.0	
FF *** France																
FTE	PLANNED	1122.9	15.2	15.2	15.2	15.2	15.2	14.2	1212.9	13.9	10.8	6.4	6.7	6.7	6.7	
	ACTUALS								0.0							
FI *** Italy																
FTE	PLANNED	414.8	15.2	14.9	12.8	14.6	15.2	9.1	496.5	9.1	7.1	1.5	1.5	1.5	1.5	
	ACTUALS	375.7	10.9	10.9	10.9	21.2	0.0	10.9	440.4	0.0	0.0	0.0	0.0	0.0	0.0	
FJ *** Japan																
FTE	PLANNED	99.7	0.5	0.5	0.5	0.5	0.5	0.5	102.4	0.5	0.5	0.5	0.5	0.5	0.5	
	ACTUALS	82.5	1.8	1.8	1.8	3.4	0.0	1.8	92.9	0.0	0.0	0.0	0.0	0.0	0.0	
FK *** Sweden																
FTE	PLANNED	127.7	3.6	3.6	3.6	3.6	3.6	3.6	149.1	3.6	2.7	3.4	3.6	3.6	3.6	
	ACTUALS								0.0							
Grand Totals:																
	PLANNED	6236.0	282.1	235.1	210.0	221.7	225.8	160.8	7571.5	153.8	139.5	115.5	108.2	102.5	100.3	
	ACTUALS	5016.8	220.5	214.2	211.1	172.6	251.4	128.5	6215.2	0.0	0.0	0.0	0.0	0.0	0.0	
<b>4.1 GLAST LAT</b>																
Contributed	PLANNED	2376.3	61.1	59.7	49.7	65.6	55.3	47.2	2715.0	47.9	45.1	30.6	28.8	30.5	30.5	
	ACTUALS	901.3	24.5	25.8	25.3	50.8	16.5	29.6	1073.8	0.0	0.0	0.0	0.0	0.0	0.0	
Funded	PLANNED	3859.7	221.0	175.4	160.3	156.1	170.5	113.6	4856.5	106.0	94.4	84.8	79.4	72.0	69.8	
	ACTUALS	4115.5	196.1	188.4	185.8	121.8	234.9	98.8	5141.3	0.0	0.0	0.0	0.0	0.0	0.0	
Grand Totals:																
	PLANNED	6236.0	282.1	235.1	210.0	221.7	225.8	160.8	7571.4	153.8	139.5	115.5	108.2	102.5	100.3	
	ACTUALS	5016.9	220.6	214.2	211.1	172.6	251.4	128.5	6215.2	0.0	0.0	0.0	0.0	0.0	0.0	