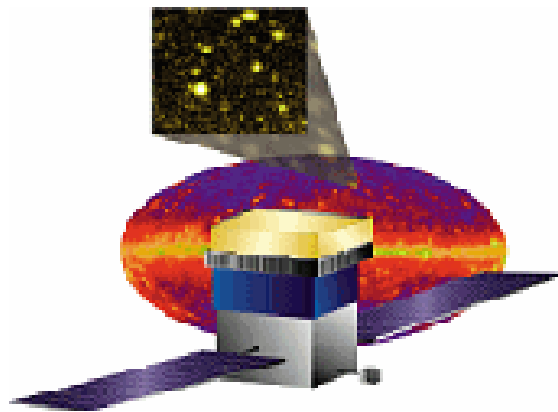


# **Monthly Progress Report**

**(Month Ending December 2003)**

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



LAT-MR-02947-01

February 4, 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 December, 2003.

## 2.0 Recent Progress and Status

### 4.1.4 Tracker

A baseline design was developed for the Tracker/grid interface, and a full set of preliminary drawings for it were completed. To increase the torque that can be supported by the sidewalls, 120-degree countersink screws for sidewall attachment were tested. The multichip module (MCM) burn-in system was finalized and the procedure documented. MCM preproduction continued at Teledyne; fourteen units were delivered, and the first four successfully went through the acceptance thermal-cycle, burn-in, and final test procedures. It is being determined if the Teledyne pitch-adapter-attachment results are suitable for MCM-tray integration at G&A Engineering in Italy. A visit to G&A regarding this is planned for January 16. Preparations were made for a management meeting in Pisa in mid-January. An extended visit to Italy was made by SLAC and GSFC experts to prepare for engineering model (EM) tower thermal-vacuum testing. The EM tower was moved back to INFN Pisa from Alenia Spazio and inspected, including a low-level vibration study. Work continued on designing and fabricating tower assembly and handling fixtures and new bottom-tray fabrication fixtures. Work also progressed on definition and documentation of the tower and stacked-tray electronic and functional test procedures and associated software. The first bias circuits were procured, the last part needed for tray production to begin. Disposition of anomalies observed in the aluminum cores was completed and a new set of cores ordered. Bottom-tray closeout drawings were completed and released, allowing the closeout fabrication to proceed.

### 4.1.5 Calorimeter

Manufacture of flight crystal detector elements (CDEs) commenced. Swales received 272 CsI crystals and 340 PIN diode assemblies. From these, Swales completed bonding of 132 CDEs. Strength testing and inspections of the flight prototype carbon composite structure, SM2, were completed. No problems were detected and reports have been generated. Radiation sensitivity of Calorimeter electronics parts - ASICs, ADC and DAC - were probed using the pulsed UV laser facility at NRL. The testing was to examine sensitivity to upsets and functional interrupts in preparation for subsequent testing at Brookhaven. Pre-production flight printed circuit boards were submitted for manufacture. The Calorimeter engineering model was returned to NRL after successful heavy ion beam test at GSI in Germany.

### 4.1.6 Anticoincidence Detector

An engineering model electronics chassis for the ACD (two high-voltage bias supplies, two front-end electronics cards, 17 phototubes, and all the mechanical hardware) has been completed and is in testing. The first flight tile detector assemblies were received

from Fermilab. The composite panels for the ACD support structure were received. The machined parts for the base electronics assembly were received. The first flight electronics cards were delivered. A phototube failure during thermal vacuum testing is a concern; additional analysis and possible redesign of mounting hardware is likely to impact the schedule.

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

Sixty tower power supply PC boards were received, for the electronics ground support equipment test stands. Components for loading are being ordered and received, and preparations for loading are being made. Sixty tower electronics module PC boards were also received, but loading is being delayed due to connector delivery delay. Central processor unit boards for the test stands were received, as well as several tower electronics module power supply enclosures. Work proceeds on the firmware for the GASU event builder. Most of the global trigger firmware has been debugged. Flight board schematic work has commenced. The primary part of the power distribution unit was assembled. Testing of the spacecraft interface/event processor unit (SIU/EPU) is underway.

The RAD750 CPU board was booted in the flight crate. A primary boot was also performed from the on-board startup ROM, as well as a secondary boot from the external storage & interface board (SIB) EEPROM. The SIB EEPROM was formatted, and the file system laid out. A successful communication test was conducted with the spacecraft instrument interface simulator provided by Spectrum Astro. Commissioning of the LAT communication board and GASU elements continued. The code management tool software was upgraded. Development of flight housekeeping services is underway.

#### 4.1.8 Mechanical Systems

Manufacturing readiness reviews for the grid and radiators were conducted. All drawings for the grid manufacturing package have been completed and a request for quotation has been made. The grid box top assembly drawing is drafted. The downspout and top flange heat pipes are complete, and awaiting approval. The radiator acoustic analysis with LAT model was conducted. The loads are as expected, and will not impact the design. Radiator insert and spool testing was conducted.

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

New cables were installed in sequence on the cable plant mockup. The LAT integration sequence was finalized. Data was analyzed from the 17.6-MeV engineering model Van de Graaff test. Brackets were manufactured to improve the seismic protection of the Van de Graaff machine.

### **3.0 Schedule Status**

The critical path for the project is driven by the delayed receipt of Calorimeter ASICs, and leads to a reduction in schedule float for the “ready for CD-4 review” milestone, from nine weeks to seven weeks. The ASICs are expected to be even further delayed. Workarounds being considered include acceleration of the screening and qualification

programs, accelerating the start of thermal vacuum testing of the flight modules, and accelerating the assembly of the first flight modules.

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.

Delivery of 1x4 Grid to I&T/MGSE (1M1001380)

Baseline/Target Finish: 12/19/03      Projected Finish: 02/27/04      Variance: -41 days

The delivery of the 1x4 grid from Mechanical Systems to I&T has been delayed for the resolution of the Tracker/grid interface design modifications. This can be accommodated with little impact to the I&T schedule.

Tracker Engineering Model (1M1001430)

Baseline/Target Finish: 01/02/04      Projected Finish: 03/01/04      Variance: -39 days

The delivery of the full Tracker EM has been delayed by the issues discovered with the interface during the EM vibration test. A workaround plan is underway, enabling integration planning to continue by supplying other hardware and drawings in the interim.

Variances to the following electronics ground support equipment (EGSE) milestones are due to delayed receipt and quality problems with connectors. These milestones are expected to be delayed even further, and a plan is being developed to recover the schedule.

- Updated EGSE Systems (#1-10) to Tracker (1M74000010 through 1M740000100)
- EGSE TEM/TEM PS/CTS w/ FE Electronics #1-3 to I&T (1M7941130, 1M7941150, and 1M7941160)
- G3 Test Stands to ACD (1M76000020 and 1M76000030)
- Test Stations (5) for AFEE to Calorimeter (1M1001900)
- EGSE TEM/TEM PS/CTS/GASU FE Electronics to I&T (1M7941170)
- EGSE Development H/W/FSW 1<sup>st</sup> Delivery to I&T (1M7941180)
- EGSE TEM/TEM PS/CTS #1-2 for Bldg. 33 to I&T (1M7941190 and 1M7941420)
- EGSE TEM/TEM PS/CTS w/ GASU for Bldg. 33 to I&T (1M7941430)

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

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

## **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.

### 4.1.5 Calorimeter

The favorable cost variance is due to invoicing delays for PIN diodes, flight EEE parts, and pre-electronics module parts. PIN diode assembly and crystal detector element tooling costs are significantly less than planned, and a portion is being considered for return to contingency. Costs for travel and level-of-effort labor (e.g. management, system engineering) have also been less than planned, and may also be considered for return to contingency.

### 4.1.C Education & Public Outreach

The favorable cost variance is due to delayed invoice payments, and is expected to be resolved once funding is received (Note: funding brought up to date in January).

## 6.0 Change Control and Contingency Analysis

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

Change Request No.	Description	Submitted By	Current Status	Contingency Impact
LAT-XR-02693-01	Calorimeter Maximum Permitted Humidity	N. Johnson	Approved	N/A
LAT-XR-02713-01	Work Breakdown Structure Update	T. Boysen	Approved	N/A
LAT-XR-02743-01	Addition of Requirements to Wafer Grinding/Lapping and Dicing	J. Clinton	Approved	N/A

The fabrication phase cost baseline remains \$119.5M. Funding applicable to that baseline is \$133.8M; the resulting contingency is \$14.3M.

## 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 current month planned FTEs reflect adjustments made so that the cumulative-to-date manpower plan corresponds to the approved changes.

## Attachment 1 Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	Timeline																							
					FY01				FY02				FY03				FY04				FY05				FY06			
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<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*	0	09/15/04*																					▼			
1M1P000040	CD-4 Approval	03/15/06*	0	03/15/06*																							▼	
<b>DOE/NASA Federal Project Managers (Level 1)</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*	0	08/24/04*																						▼		
1M1000700	Pre Environmental Testing Review	07/14/05*	0	07/14/05*																						▼		
1M1000120	PSR-(Instrument Pre-Ship Review)	12/01/05*	0	12/01/05*																							▼	
Run Date					01/28/04 11:21				<b>GLAST LAT PROJECT</b> Project Milestones (Level 1 and 2)												0121 LT_MS1-2				Sheet 1 of 1			
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**Attachment 2**  
**Level 3 Milestones (One-Year View)**  
**Page 1 of 3**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	AV	ND	FY03				FY04				FY05	
							Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1		
<b>Instrument Project Office (Level 3)</b>																
1M59000000	EM from CAL to I&T	08/07/03A	0	08/07/03A	5	9				▼						
1M1000910	(36) MCM's for EM2 from Tracker to Elec	09/15/03A	0	09/15/03A	4	7				▼						
1M1001520	EM CAL Returned to NRL (arrives on dock)	10/16/03	-1	10/17/03A	9	5				▼						
1M74000010	Updated EGSE System 1: Elec to TKR	12/08/03	-23	01/20/04	7	4					▼					
1M76000010	3rd G2 Test Stand: Elec to ACD	12/08/03	0	12/08/03A	7	6					▼					
1M7941130	EGSE TEM/TEM PS/CTS w/ FE Elec #1-Elec to I&T	12/08/03	-23	01/20/04	7	9					▼					
1M76000020	G3 Test Stand (test 2 FREE Cards): Elec to ACD	12/15/03	-41	02/23/04	7	6					▼					
1M1001380	Delivery of EM (1X4) Grid to I&T/MSGE	12/19/03	-41	02/27/04	8	9					▼					
1M74000020	Updated EGSE System 2: Elec to TKR	12/22/03	-30	02/12/04	7	4					▼					
1M7941150	EGSE TEM/TEM PS/CTS w/ FE Elec #2-Elec to I&T	12/22/03	-30	02/12/04	7	9					▼					
1M1001430	Delv of TKR EM to SLAC I&T/MGSE	01/02/04	-39	03/01/04	4	9					▼					
1M74000030	Updated EGSE System 3: Elec to TKR	01/07/04	-30	02/20/04	7	4					▼					
1M7941160	EGSE TEM/TEM PS/CTS w/ FE Elec #3-Elec to I&T	01/07/04	-30	02/20/04	7	9					▼					
1M1000920	EM2 TEM: Elec to Tracker	01/12/04	0	01/12/04	7	4					▼					
1M1001900	Test Stations (5) for AFEE: Elec to CAL	01/14/04	-30	02/27/04	7	5					▼					
1M74000040	EGSE System 4: Elec to TKR	01/14/04	-35	03/05/04	7	4					▼					
1M7941170	EGSE TEM/TEM PS/CTS/GASU FE Elec-Elec to	01/14/04	-30	02/27/04	7	9					▼					
1M1001870	5 EM2 TEM/PS for AFEE brd ass & tst: Elec to CAL	01/15/04	0	01/15/04	7	5					▼					
1M1001220	EM2 TEM/PS/CTS for FMA from Elec to CAL	01/22/04	-30	03/05/04	7	5					▼					
1M74000050	EGSE System 5: Elec to TKR	01/22/04	-30	03/05/04	7	4					▼					
1M7941180	EGSE Development Hrdw/FSW 1st Delivr-Elec to	01/22/04	-25	02/27/04	7	9					▼					
1M1001260	EM2 TEM/PS/CTS for FMB from Elec to CAL	01/29/04	-30	03/12/04	7	5					▼					
1M74000060	EGSE System 6: Elec to TKR	01/29/04	-30	03/12/04	7	4					▼					
1M7941190	EGSE TEM/TEM PS/CTS #1 for Bldg 33-Elec to I&T	01/29/04	-30	03/12/04	7	9					▼					
1M1001600	EM2 TEM/PS/CTS for FM1 from Elec to CAL	02/05/04	-30	03/19/04	7	5					▼					
Run Date	01/29/04 17:51		<b>GLAST LAT PROJECT</b> Project Milestones (Level 3) 1 Year View (+/- 6mo)				0121 LTX1 - MS (L3) FLX1- MS (L3)	Sheet 1 of 3								
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**Attachment 2**  
**Level 3 Milestones (One-Year View)**  
**Page 2 of 3**

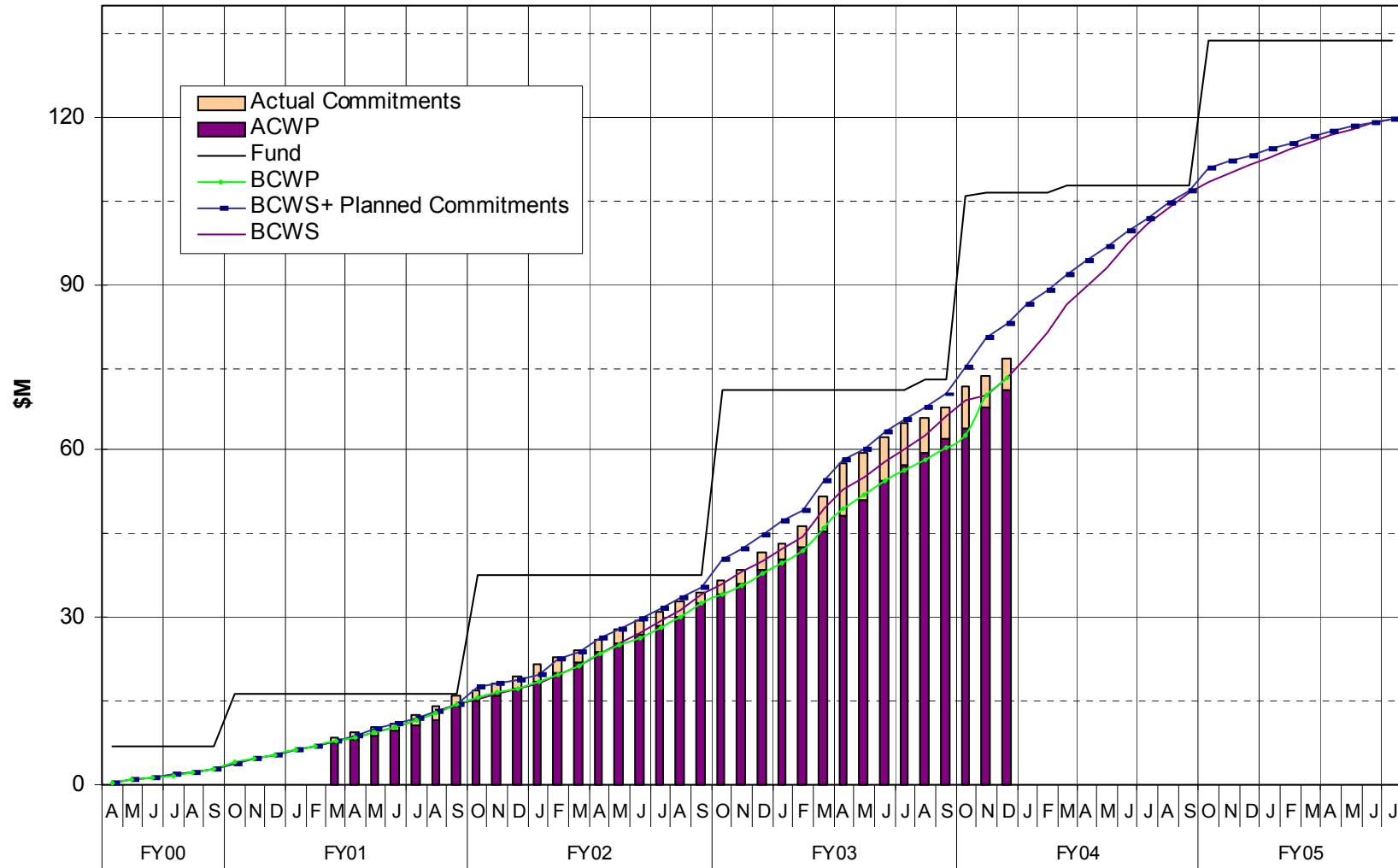
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	AV	ND	Timeline												
							FY03			FY04			FY05						
							Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
<b>Instrument Project Office (Level 3)</b>																			
1M7941420	EGSE TEM/TEM PS/CTS #2 for Bldg 33-Elec to I&T	02/05/04	-30	03/19/04	7	9						▼							
1M7941430	EGSE TEM/TEM PS/CTS w/ GASU for B33-Elec to	02/05/04	-30	03/19/04	7	9					◆	▼							
1M1001650	EM2 TEM/PS/CTS for FM2 from Elec to CAL	02/12/04	-30	03/26/04	7	5						▼							
1M74000070	EGSE System 7: Elec to TKR	02/12/04	-30	03/26/04	7	4						◆	▼						
1M74000080	EGSE System 8: Elec to TKR	02/12/04	-30	03/26/04	7	4						◆	▼						
1M74000090	EGSE System 9: Elec to TKR	02/20/04	-30	04/02/04	7	4							▼						
1M74000100	EGSE System 10: Elec to TKR	02/20/04	-30	04/02/04	7	4							◆	▼					
1M76000030	G3 Test Stand (Fit-like I/F): Elec to ACD	02/20/04	-30	04/02/04	7	6							◆	▼					
1M1001660	EM2 TEM/PS/CTS for FM3 from Elec to CAL	02/27/04	-30	04/09/04	7	5							◆	▼					
1M1001680	EM2 TEM/PS/CTS for FM4 from Elec to CAL	02/27/04	-30	04/09/04	7	5							◆	▼					
1M1001720	EM2 TEM/PS/CTS for FM5 from Elec to CAL	02/27/04	-30	04/09/04	7	5							◆	▼					
1M1001760	EM2 TEM/PS/CTS for FM6 from Elec to CAL	03/05/04	-30	04/16/04	7	5							◆	▼					
1M1001770	EM2 TEM/PS/CTS for FM7 from Elec to CAL	03/05/04	-30	04/16/04	7	5							◆	▼					
1M1001780	EM2 TEM/PS/CTS for FM8 from Elec to CAL	03/05/04	-30	04/16/04	7	5							◆	▼					
1M005480	IOC CDR	03/12/04	0	03/12/04	B	B							◆	▼					
1M79003010	Flight Cables Assy A: Elec to I&T	05/10/04	0	05/10/04	7	9								▼					
1M79003020	Flight Cables Assy B: Elec to I&T	05/10/04	0	05/10/04	7	9								▼					
1M79002010	Flight TEM PS Assy A: Elec to I&T	05/12/04	0	05/12/04	7	9								▼					
1M79002020	Flight TEM PS Assy B: Elec to I&T	05/19/04	0	05/19/04	7	9								▼					
1M79003030	Flight Cables Assy 1: Elec to I&T	06/10/04	0	06/10/04	7	9								▼					
1M79003040	Flight Cables Assy 2: Elec to I&T	06/10/04	0	06/10/04	7	9								▼					
1M79003050	Flight Cables Assy 3: Elec to I&T	06/10/04	0	06/10/04	7	9								▼					
1M79003060	Flight Cables Assy 4: Elec to I&T	06/10/04	0	06/10/04	7	9								▼					
1M79003070	Flight Cables Assy 5: Elec to I&T	06/28/04	0	06/28/04	7	9								▼					
1M79003080	Flight Cables Assy 6: Elec to I&T	06/28/04	0	06/28/04	7	9								▼					
Run Date	01/29/04 17:51	<b>GLAST LAT PROJECT</b> Project Milestones (Level 3) 1 Year View (+/- 6mo)					0121 LTX1 - MS (L3) FLX1- MS (L3)	Sheet 2 of 3											
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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	AV	ND	FY03			FY04			FY05		
							Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	
<b>Instrument Project Office (Level 3)</b>															
1M79003090	Flight Cables Assy 7: Elec to I&T	06/28/04	0	06/28/04	7	9									
1M79003100	Flight Cables Assy 8: Elec to I&T	06/28/04	0	06/28/04	7	9									
1M79003110	Flight Cables Assy 9: Elec to I&T	06/28/04	0	06/28/04	7	9									
1M79003120	Flight Cables Assy 10: Elec to I&T	06/28/04	0	06/28/04	7	9									
Run Date							01/29/04 17:51		<b>GLAST LAT PROJECT</b> Project Milestones (Level 3) 1 Year View (+/- 6mo)				0121 LTX1 - MS (L3) FLX1- MS (L3)		Sheet 3 of 3
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Attachment 3

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



**Attachment 4  
LAT Costs, through December 2003, by WBS**

Monthly Contractor Financial Management Report								Report for Month Ending: 12/31/2003		
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	JAN04	FEB04		Project Estimate	Budget Value	
4.1.1 INSTRUMENT MANAGEMENT	380	269	10,248	10,232	315	291	4,648	15,502	15,502	
4.1.2 SYSTEM ENGINEERING	308	129	4,163	4,368	148	123	2,154	6,588	6,588	
4.1.4 TRACKER	408	322	10,477	10,479	391	439	2,288	13,595	13,595	
4.1.5 CALORIMETER	773	816	11,941	13,852	685	641	9,382	22,648	22,648	
4.1.6 ANTICOINCIDENCE DETECTOR	476	820	9,525	10,739	513	364	3,468	13,870	13,870	
4.1.7 ELECTRONICS	403	473	9,925	8,418	615	1,768	6,424	18,733	18,733	
4.1.8 MECHANICAL SYSTEMS	179	566	6,764	6,846	502	476	5,642	13,384	13,384	
4.1.9 INTEGRATION & TEST	124	75	2,676	2,755	133	181	3,394	6,384	6,384	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	158	37	1,012	1,105	44	42	388	1,486	1,486	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	15	3	279	266	3	3	41	326	326	
4.1.C EDUCATION AND PUBLIC OUTREACH	34	55	1,101	1,304	65	62	1,220	2,448	2,448	
4.1.D SCIENCE ANALYSIS SOFTWARE	103	67	1,647	1,748	73	65	1,435	3,220	3,220	
4.1.E SUBORBITAL FLIGHT TEST	0	0	1,325	1,321	0	0	-4	1,321	1,321	
Gen. and Admin.	0	0	0	0	0	0	0	0	0	
<b>Total</b>	<b>3,360</b>	<b>3,632</b>	<b>71,081</b>	<b>73,433</b>	<b>3,487</b>	<b>4,455</b>	<b>40,481</b>	<b>119,504</b>	<b>119,504</b>	

**Attachment 5**  
**LAT Costs, through December 2003, by Organization and Cost Code**

Monthly Contractor Financial Management Report								Report for Month Ending: 12/31/2003		
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	JAN04	FEB04		Project Estimate	Budget Value	
DG *** GSFC	482	867	10,509	12,083	576	425	4,616	16,126	16,126	
DH *** HEPL	476	127	4,318	4,586	140	116	2,257	6,830	6,830	
DL *** SLAC	1,428	1,576	38,529	36,210	1,806	2,951	19,753	63,040	63,040	
DN *** NRL	896	970	14,549	17,126	848	835	11,961	28,193	28,193	
DO *** Financial Plan Transfer/Sub Ou	0	0	38	38	8	8	0	54	54	
DS *** SSU	34	53	1,096	1,291	62	59	1,158	2,376	2,376	
DT *** Texas A&M	0	0	15	16	0	0	0	16	16	
DU *** UCSC	38	32	1,936	1,984	39	53	582	2,610	2,610	
DW *** UW	6	7	91	100	8	8	153	260	260	
<b>Total</b>	<b>3,360</b>	<b>3,632</b>	<b>71,081</b>	<b>73,433</b>	<b>3,487</b>	<b>4,455</b>	<b>40,481</b>	<b>119,504</b>	<b>119,504</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	JAN04	FEB04				
RL LABOR	1,322	1,182	37,741	38,465	1,361	1,256	21,038	61,396	61,396	
<i>FTE (DOE/NASA)</i>	<i>114.0</i>	<i>117.4</i>	<i>3,337.3</i>	<i>3,250.3</i>	<i>116.0</i>	<i>120.0</i>	<i>1,748.9</i>	<i>5,322.2</i>	<i>5,322.2</i>	
<i>HOURS (DOE/NASA)</i>	<i>15,501</i>	<i>15,961</i>	<i>555,319</i>	<i>536,222</i>	<i>18,597</i>	<i>18,229</i>	<i>290,191.2</i>	<i>882,336</i>	<i>882,336</i>	
RT TRAVEL	38	55	1,018	1,575	55	52	1,582	2,707	2,707	
RM MATERIAL & SERVICES	2,000	2,312	30,331	30,823	1,943	3,060	16,388	51,722	51,722	
RX MPS & LAB TAX	0	84	1,991	2,569	128	88	1,473	3,680	3,680	
<b>Total (not incl FTE/Hours)</b>	<b>3,360</b>	<b>3,632</b>	<b>71,081</b>	<b>73,433</b>	<b>3,487</b>	<b>4,455</b>	<b>40,481</b>	<b>119,504</b>	<b>119,504</b>	

**Attachment 6  
LAT Performance, through December 2003, by WBS**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 11/30/2003 12/31/2003			
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]  Item	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)
4.1.1 INSTRUMENT MANAGEMENT	269	269	380	0	-110	10,232	10,232	10,248	0	-16	15,502	15,502	0
4.1.2 SYSTEM ENGINEERING	129	129	308	0	-179	4,368	4,368	4,163	0	206	6,588	6,588	0
4.1.4 TRACKER	322	321	408	-1	-87	10,479	10,454	10,477	-25	-23	13,595	13,595	0
4.1.5 CALORIMETER	816	518	773	-298	-255	13,852	13,536	11,941	-316	1,596	22,648	22,648	0
4.1.6 ANTICOINCIDENCE DETECTOR	820	580	476	-239	105	10,739	10,485	9,525	-255	960	13,870	13,870	0
4.1.7 ELECTRONICS	473	1,193	403	720	790	8,418	9,110	9,925	692	-816	18,733	18,733	0
4.1.8 MECHANICAL SYSTEMS	566	372	179	-194	193	6,846	6,614	6,764	-231	-149	13,384	13,384	0
4.1.9 INTEGRATION & TEST	75	97	124	21	-27	2,755	2,747	2,676	-8	71	6,384	6,384	0
4.1.A PERFORMANCE AND SAFETY ASS	37	37	158	0	-121	1,105	1,105	1,012	0	93	1,486	1,486	0
4.1.B LAT INSTRUMENT OPERATIONS	3	3	15	0	-13	266	266	279	0	-13	326	326	0
4.1.C EDUCATION AND PUBLIC OUTRE	55	42	34	-13	8	1,304	1,367	1,101	63	266	2,448	2,448	0
4.1.D SCIENCE ANALYSIS SOFTWARE	67	67	103	0	-36	1,748	1,748	1,647	0	101	3,220	3,220	0
4.1.E SUBORBITAL FLIGHT TEST	0	0	0	0	0	1,321	1,321	1,325	0	-4	1,321	1,321	0
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0	0	0
Sub Total	3,632	3,628	3,360	-4	268	73,433	73,353	71,081	-80	2,271	119,504	119,504	0
Contingency											14,345	14,345	0
Total	3,632	3,628	3,360	-4	268	73,433	73,353	71,081	-80	2,271	133,849	133,849	0

**Attachment 7**  
**LAT Performance, through December 2003, by Organization**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:						Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 11/30/2003                      12/31/2003		
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	867	619	482	-248	137	12,083	11,815	10,509	-268	1,307	16,126	16,126	0
DH *** HEPL	127	137	476	10	-339	4,586	4,570	4,318	-16	252	6,830	6,830	0
DL *** SLAC	1,576	2,146	1,428	570	718	36,210	36,676	38,529	465	-1,854	63,040	63,040	0
DN *** NRL	970	648	896	-322	-249	17,126	16,801	14,549	-325	2,251	28,193	28,193	0
DO *** Financial Plan	0	0	0	0	0	38	38	38	0	0	54	54	0
DS *** SSU	53	40	34	-13	6	1,291	1,354	1,096	63	258	2,376	2,376	0
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0
DU *** UCSC	32	32	38	0	-6	1,984	1,984	1,936	1	48	2,610	2,610	0
DW *** UW	7	7	6	0	1	100	100	91	0	9	260	260	0
Gen. and Admin. Undist. Budget	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total	3,632	3,628	3,360	-4	268	73,433	73,353	71,081	-80	2,271	119,504	119,504	0
Management Resrv.											14,345	14,345	0
Total	3,632	3,628	3,360	-4	268	73,433	73,353	71,081	-80	2,271	133,849	133,849	0

**Attachment 8  
LAT Performance Analysis, December 2003**

	WBS	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	% BCWS	% BCWP	% ACWP	SPI Trend	CPI Trend	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	119,504	73,433	73,353	71,081	-80	2,271	61.45	61.38	59.48	↔	↔	0.999	1.032	115,804	115,853
2	4.1.1	15,502	10,232	10,232	10,248	0	-16	66.00	66.00	66.11	↔	↓	1.000	0.998	15,526	15,526
3	4.1.2	6,588	4,368	4,368	4,163	0	206	66.31	66.31	63.19	↔	↓	1.000	1.049	6,278	6,278
4	4.1.4	13,595	10,479	10,454	10,477	-25	-23	77.08	76.90	77.07	↔	↓	0.998	0.998	13,624	13,632
5	4.1.5	22,648	13,852	13,536	11,941	-316	1,596	61.16	59.77	52.72	↓	↓	0.977	1.134	19,979	20,166
6	4.1.6	13,870	10,739	10,485	9,525	-255	960	77.43	75.59	68.67	↓	↔	0.976	1.101	12,601	12,676
7	4.1.7	18,733	8,418	9,110	9,925	692	-816	44.94	48.63	52.98	↑	↑	1.082	0.918	20,410	19,613
8	4.1.8	13,384	6,846	6,614	6,764	-231	-149	51.15	49.42	50.53	↓	↑	0.966	0.978	13,686	13,928
9	4.1.9	6,384	2,755	2,747	2,676	-8	71	43.16	43.03	41.92	↑	↓	0.997	1.027	6,219	6,229
10	4.1.A	1,486	1,105	1,105	1,012	0	93	74.39	74.39	68.11	↔	↓	1.000	1.092	1,361	1,361
11	4.1.B	326	266	266	279	0	-13	81.60	81.60	85.61	↔	↓	1.000	0.953	342	342
12	4.1.C	2,448	1,304	1,367	1,101	63	266	53.25	55.83	44.97	↓	↔	1.048	1.242	1,972	1,932
13	4.1.D	3,220	1,748	1,748	1,647	0	101	54.29	54.29	51.16	↔	↓	1.000	1.061	3,034	3,034
14	4.1.E	1,321	1,321	1,321	1,325	0	-4	100.00	100.00	100.29	↔	↔	1.000	0.997	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

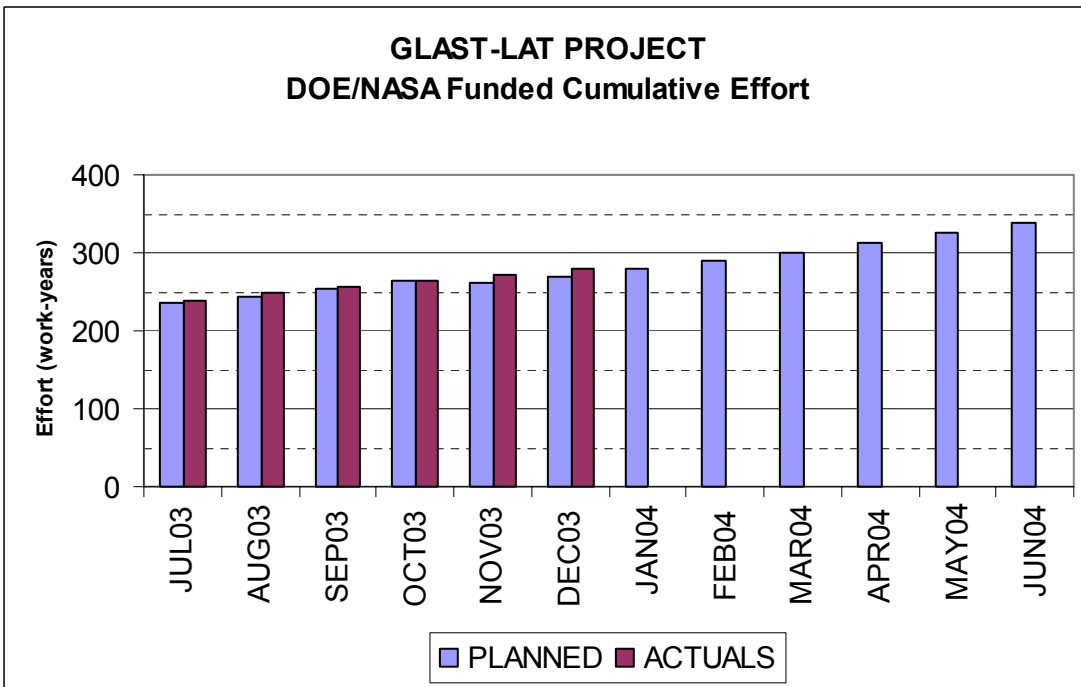
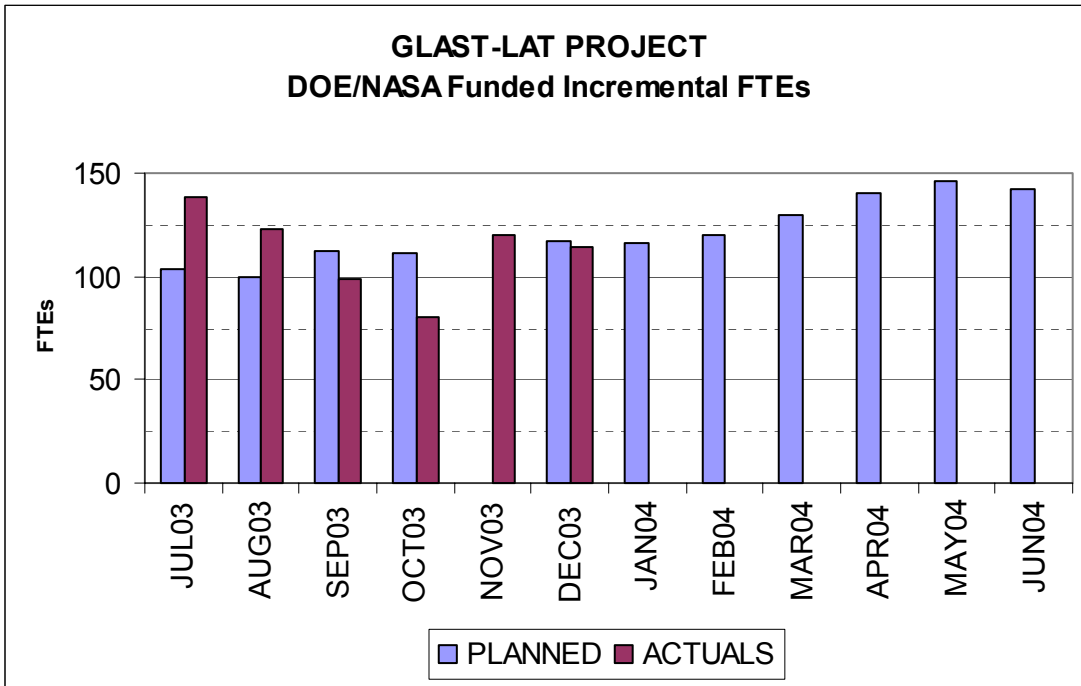
Cpi\_Fcst: CPI (to date) EAC Forecast = BAC / CPI

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)**



**Attachment 10  
LAT Manpower Data, through December 2003, by Organization**

Program: LAT3		Description: GLAST LAT Project		Approval: Program Manager			Functional Manager			Cost Account Manager						
Run Date: 1/28/2004		Status Date: 12/31/2003														
		PRIOR	JUL03	AUG03	SEP03	OCT03	NOV03	DEC03	Cum-to- Date	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	
OBS																
DG *** GSFC																
FTE	PLANNED	624.4	17.6	18.6	22.0	22.2	-8.1	21.2	717.8	20.2	28.8	33.8	28.2	28.9	21.4	
	ACTUALS	579.3	52.6	39.3	23.6	0.0	0.0	0.0	694.9	0.0	0.0	0.0	0.0	0.0	0.0	
DH *** HEPL																
FTE	PLANNED	273.8	7.2	6.6	8.8	7.2	-56.1	5.3	252.7	4.9	3.4	3.8	4.3	8.3	9.1	
	ACTUALS	213.7	5.1	4.5	0.0	0.0	6.1	13.6	243.0	0.0	0.0	0.0	0.0	0.0	0.0	
DL *** SLAC																
FTE	PLANNED	1335.8	60.9	62.4	64.7	62.7	23.1	64.2	1673.9	68.1	64.9	67.9	78.7	77.8	78.4	
	ACTUALS	1255.0	50.3	52.2	55.0	64.3	66.4	63.0	1606.1	0.0	0.0	0.0	0.0	0.0	0.0	
DN *** NRL																
FTE	PLANNED	609.6	28.7	21.9	25.8	32.5	37.9	36.5	792.8	32.2	30.5	37.4	47.6	51.3	52.0	
	ACTUALS	624.7	27.3	25.7	30.1	20.7	35.4	38.3	802.2	0.0	0.0	0.0	0.0	0.0	0.0	
DS *** SSU																
FTE	PLANNED	63.0	2.9	2.9	2.9	2.3	2.7	2.4	78.9	2.4	2.4	2.4	2.4	2.4	2.4	
	ACTUALS	73.3	2.5	4.4	3.7	2.4	4.0	3.5	93.7	0.0	0.0	0.0	0.0	0.0	0.0	
DU *** UCSC																
FTE	PLANNED	194.3	4.5	4.5	4.5	4.5	10.0	4.6	226.7	4.9	6.6	4.5	4.2	4.2	4.2	
	ACTUALS	243.1	7.1	6.4	-5.2	4.3	19.4	5.8	280.8	0.0	0.0	0.0	0.0	0.0	0.0	
DW *** UW																
FTE	PLANNED	35.7	0.4	0.4	0.4	0.4	0.4	0.4	38.1	0.4	0.4	0.4	0.4	0.4	0.4	
	ACTUALS	5.9	1.1	0.0	2.0	0.0	0.6	1.0	10.6	0.0	0.0	0.0	0.0	0.0	0.0	
FF *** France																
FTE	PLANNED	943.0	31.0	31.0	31.0	31.4	-15.5	10.9	1062.7	14.8	15.2	15.2	15.2	15.2	15.2	
	ACTUALS								0.0							
FI *** Italy																
FTE	PLANNED	380.1	11.1	12.0	14.1	14.8	-69.7	9.1	371.6	9.1	10.9	15.4	14.5	13.5	11.7	
	ACTUALS	267.2	10.9	10.9	10.9	10.9	10.9	10.9	332.3	0.0	0.0	0.0	0.0	0.0	0.0	
FJ *** Japan																
FTE	PLANNED	90.3	1.0	1.0	1.0	1.0	0.9	1.2	96.4	1.0	1.0	0.9	0.5	0.5	0.5	
	ACTUALS	65.0	1.8	1.8	1.8	1.8	1.8	1.8	75.5	0.0	0.0	0.0	0.0	0.0	0.0	
FK *** Sweden																
FTE	PLANNED	84.2	5.1	5.1	5.1	5.1	5.1	3.8	113.5	3.5	3.6	3.6	3.6	3.6	3.6	
	ACTUALS								0.0							
Grand Totals:																
	PLANNED	4634.0	170.2	166.3	180.1	184.2	-69.4	159.7	5425.1	161.4	167.6	185.1	199.6	206.0	198.9	
	ACTUALS	3327.1	158.6	145.1	121.9	104.2	144.5	137.8	4139.0	0.0	0.0	0.0	0.0	0.0	0.0	
<b>4.1 GLAST LAT</b>																
Contributed	PLANNED	1918.3	66.2	66.8	67.7	73.0	-59.5	42.4	2174.8	45.1	47.7	55.8	59.6	59.5	57.1	
	ACTUALS	663.5	20.6	22.5	22.8	24.3	24.4	23.8	801.7	0.0	0.0	0.0	0.0	0.0	0.0	
Funded	PLANNED	2715.7	104.0	99.4	112.4	111.2	-9.9	117.4	3250.3	116.2	119.9	129.4	139.9	146.6	141.8	
	ACTUALS	2663.6	138.0	122.7	99.1	80.0	120.1	114.0	3337.3	0.0	0.0	0.0	0.0	0.0	0.0	
Grand Totals:																
	PLANNED	4634.0	170.2	166.3	180.1	184.1	-69.4	159.7	5425.1	161.4	167.6	185.1	199.6	206.0	198.8	
	ACTUALS	3327.1	158.6	145.1	121.9	104.2	144.4	137.8	4139.1	0.0	0.0	0.0	0.0	0.0	0.0	