
Project Management Control Systems

Phil Lindquist
Project Controls Manager
May 22, 1995

Overview

- Introduction
 - » history
 - » approach
 - » purpose
- Organization
- Cost Estimate
- Integrated Project Schedule
- Performance Measurement Baseline
- Configuration Management
- Earned Value
- Reporting Systems
- Conclusions

History

- Project Authorized - October 1990
- Cooperative Agreement signed - May 1992
- Meeting to review the cost, schedule and management systems - April 1994
- Interim Review of revised WBS, organization plan, and cost estimating plan - June 1994
- Final Cost Estimate Review - September 1994
- Revised Cost Estimate approved by NSB - November 1994

Approach

- Target date proposed during June/September 1994 Reviews
 - » Implement a Project Management Control System - April 28, 1995
- Approach
 - » Use proven tools, methods, experienced personnel
- Implementation Process
 - » Select Project Management Controls System (PMCS) Software - December 1994
 - » Issue Contract for PMCS Implementation Support - January 1995
 - » Convert Cost Estimate to PMCS Database - February 1995
 - » Prepare Integrated Project Schedule - February 1995
 - » Integrate Cost Estimate and Integrated Project Schedule to create Time Phased Budget - March 1995
 - » Weight the Earned Value milestones - April 1995
 - » Allocate Actual Costs - End of March 1995
 - » Prepare Reports - April 1995

Purpose (today)

To show that the management systems

- have been implemented
- are ready to track and report project cost and schedule status
 - » All data shown is based on end of March 1995 reports

Organization

LIGO Project Responsibility Assignment Matrix

WGS	Account Code	Description	Account Manager	Amount (\$)
1.1		Facilities	Coles/Stapfer	156,658
1.1.1	5A5	Vacuum Equipment	J. Worden	45,061
1.1.2	5B5	Beam Tubes	L. Jones	43,785
1.1.3	5C5	Beam Tube Enclosures	F. Asiri	18,062
1.1.4	5D5	Facility Design and Construction	F. Asiri	49,750
1.2		Detector Systems	R. Vogt	48,331
1.2.1	5E5	Interferometer Design/Fabrication	R. Vogt	31,088
1.2.2	5J5	CDS	V. Schmidt	12,292
1.2.3	5K5	Physics Monitoring	TBD	3,387
1.2.4	5L5	Support Equipment	TBD	1,564
1.3	5M5	Research and Development	S. Whitcomb	23,400
1.3.1		Lab Operations	S. Whitcomb	6,790
1.3.2		R & D Tasks	S. Whitcomb	16,610
1.4	5N5	Project Office	G. Sanders	21,472
1.4.1		Project Management	G. Sanders	11,142
1.4.2		Support Services	G. Sanders	848
1.4.3		System Integration	A. Lazzarini	4,613
1.4.4		Administration	B. Moore	4,869

Definition of WBS Levels

WBS	Description	Level	Manager	Account Code
1.0	LIGO Construction		B. Barish/G. Sanders	
1.1	Facilities and Vacuum System		M. Coles/ G. Stapfer	
1.1.1	Vacuum Equipment	Control Account	J. Worden	5A5
1.1.1.1	Vacuum Equipment Design			
1.1.1.1.1		Work Package	J. Worden	5A511
1.1.1.1.2	Contracted Design Competition	Work Package	J. Worden	5A512
1.1.1.1.3	Contracted Design Phase B	Work Package	J. Worden	5A513
1.1.1.2	Washington VE Construction			
1.1.1.2.1	In House Effort	Work Package	J. Worden	5A521

LIGO Project

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Cost Estimating Systems

- Work scope organized and planned by WBS
- **SUCCESS** database prepared by US Cost
- Time phasing based on planned **Commitments**
- Basis year dollars - **FY 1994** (escalated using NSF supplied inflation factors)
- Proposed Approach for Revisions
 - » Annual Revisions during spring in preparation for annual NSF Review focusing on cost and schedule
 - » Intermediate updates to reflect Change Control Board **actions** (changes in scope of work, *changes BAC and EAC*)
 - » Intermediate updates to reflect revised estimates - example: award of major subcontracts

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September 1994 Construction Cost Estimate

WBS	Cost Estimate	Basis
1.1 Facilities	\$ 148.0 M	FY 1994 \$
1.2 Detector	45.0 M	FY 1994 \$
1.3 R&D	22.7 M	FY 1994 \$
1.4 Project Office	<u>20.6 M</u>	FY 1994 \$
Subtotal	\$ 235.7 M	FY 1994 \$
Escalation	13.5 M	
Contingency	<u>42.8 M</u>	Then Year \$
Project Target Cost	\$ 292.1 M	Then Year \$

Integrated Project Schedule (IPS)

- Work scope organized and planned by WBS
- Tasks, durations and logic provided by Control Account Managers
- Activities cover the lifetime of the project through 2001
- Milestone levels defined:
 - » Project Milestones controlled by PM (reported to NSF)
 - » Interface Milestones controlled by PM
 - » Internal Milestones controlled by Group Leader
- Detailed schedules merged into one logic network, horizontal integration provided by interface milestones
- IPS reviewed and approved by the Control Account Managers, the Group Leaders, and the Project Manager
- Status reported monthly by Control Account Manager to Project Controls Group

Sample Reports

- PERT Charts
- Bar Charts (1.1, 1.2, 1.3) - displayed on wall
- Milestone Status Chart

Performance Measurement Baseline

Process

- Resources based on Baseline Cost Estimate
- Timing based on Integrated Project Schedule
- Integrated Project Schedule and the Baseline Cost Estimate merged to create Performance Measurement Baseline
- Iterative process - reviewed and adjusted by Engineers and Managers

Performance Measurement Baseline

Comparison with Cost Estimate

- Work scope organized and planned by WBS
- **OPENPLAN/COBRA** databases maintained by Project Controls Group
- Time phasing based on planned ***Actual*** (***“booked”***) ***Costs***
- Basis year dollars - **“Then Year” Dollars**
- Proposed Approach for Revisions (ETC)
 - » Intermediate updates to reflect Change Control Board actions (changes in scope of work, ***changes BAC and EAC***)

Performance Measurement Baseline

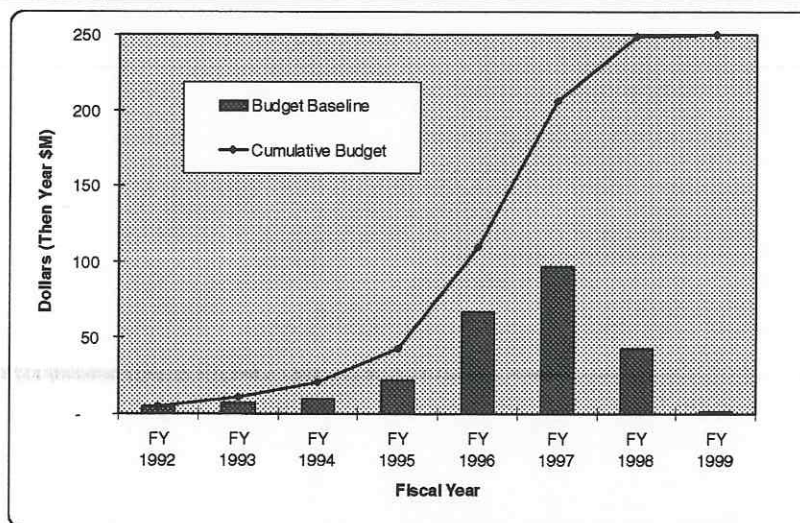
Important Features

- PMB is the only baseline used for measuring cost and schedule progress
- Used for all reporting at various management levels within LIGO project as well as to NSF

Sample Reports

- Time Phased Budget Report (CAP)
- Budget Baseline Histogram
- Commitments vs. Budget Baseline

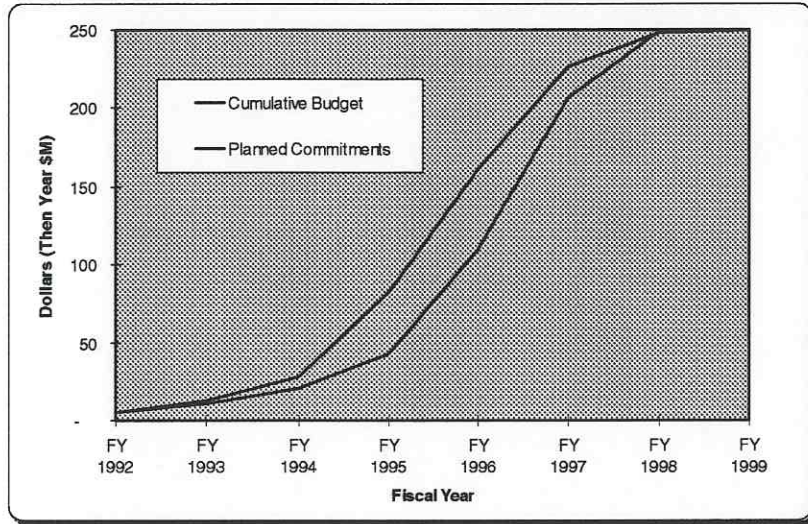
Budget Baseline Histogram



Program: 0395PMB	Description: LIGO Master PMB	Approval:	
Run Date: 05/16/95		Status Date: 03/31/95	Program Manager _____
			Functional Manager _____
			Cost Account Manager _____

WBS[3]			FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02			CUM TO FY02
1.1	Facilities and Vacuum	BCWS	309	1522	3695	10141	52125	68514	20352	0	0	0	0			156658
1.2	Detector	BCWS	0	0	0	3675	7349	20829	16344	134	0	0	0			48330
1.3	Research & Development	BCWS	3226	3660	3520	3919	3263	3005	2162	644	0	0	0			23400
1.4	Project Office	BCWS	975	1501	2254	4292	4153	4256	3686	355	0	0	0			21471
GRAND TOTALS		BCWS	4510	6683	9470	22027	66890	96604	42544	1133	0	0	0			249860

Planned Commitments vs. Budget Baseline



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Configuration Management

- A preliminary draft of LIGO Configuration Management Plan distributed for comment February 1995
- Change Request Form has been designed
- First Change Control Board (CCB) held May 1, 1995
- Second CCB was held May 15, 1995

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Sample Reports

- Change Request Form
- Change Request CR-950005 (CR005)
- Contingency Log

Earned Value Systems

- Time phased budgets assigned to milestones
- Performance Measurement Methods
 - » Milestone completion
 - » Percent complete
 - » Level of Effort

LIGO Change Request

Change Request No.: _____ Date: _____

WBS Element and Title: _____

Originator: _____ Ext: _____ CCB Sponsor: _____

Technical Change Description:

Cost Impact:

Request for EAC:

Schedule Impact:

Concurrence Signatures:

Facilities Group Leader: _____ Date: _____

Deputy Facilities Group Leader: _____ Date: _____

Detector Group Leader: _____ Date: _____

R&D Group Leader: _____ Date: _____

System Engineer: _____ Date: _____

Integration Scientist: _____ Date: _____

Project Controls Manager: _____ Date: _____

CCB Approval/Disposition:

CCB Chairman: _____ Date: _____

Change Request (Interim)

Change Request No.: CR005 Rev B

Date: 4/21/95

WBS Element and Title: See attachment

Originator: Fred Asiri

Ext: 2971

CCB Sponsor: _____

Technical Change Description:

This change order provides for the additional work necessary for the clearing and grubbing of the Livingston site. The additional work includes, back filling the root balls and seeding which are part of the other tasks as well as removal of trees (about 20 Acres), protection of the pipeline crossings and mobilization which are out of scope (see attached table). The out of scope work is needed to upgrade the site for the conditions promised in the proposal.

Cost Impact: \$135,735

To accelerate this activity for the purpose of performing aerial survey and getting ready for ground breaking at the Livingston site.

Schedule Impact:

Delaying approval will delay ground breaking.

Concurrence Signatures:

Facilities Group Leader: Maech loe

Date: May 18, 1995

Deputy Facilities Group Leader: [Signature]

Date: May 1, 1995

Detector Group Leader: [Signature]

Date: _____

R&D Group Leader: Signature faxed

Date: _____

System Engineer: [Signature]

Date: 1 May 1995

Integration Scientist: Signature faxed

Date: _____

Project Controls Manager: [Signature]

Date: Apr 21 May 1 1995

CCB Approval/Disposition:

CCB Chairman: [Signature]

APPROVED

Date: 2 May 1995

LIGO Contingency Log

Item No.	Change Request	Approved Date	WBS No.	System	Description	Contingency Debit	Contingency Credit	Contingency Balance	Current WBS Budget	WBS Debit	WBS Credit	New WBS Budget
					Initial Balance			\$ 42,824,000				
1	CR950010	15-May-95	1.4	Project Office	Allocations of Actual Costs thru FY 1994	\$ 584,000		42,240,000	\$ 20,887,000		\$ 584,000	\$ 21,471,000
2	CR950001	1-May-95	1.1.2	Beam Tube	Improved Beam Tube Cleaning Process	\$ 137,000		42,103,000	\$ 43,785,000		\$ 137,000	\$ 43,922,000
3	CR950005B	1-May-95	1.1.4	Facilities	Contract for Clearing Livingston Site	\$ 135,735		41,967,265	\$ 49,750,000		\$ 135,735	\$ 49,885,735
4												
5												
6												
7												
	TOTALS					\$ 856,735					\$ 856,735	

Sample Reports

- Cobra Accessing the Open Plan Schedules for Status
(COBRA Print Screen)

Actual Costs

- Based on Caltech Financial systems
- Costs accrued at Work Package level
- CIT Finance provides monthly data in "text" format file on floppy disk to be electronically imported into PMCS (by subaccount - labor, supplies, special equipment, subcontracts, etc.)
- CIT Finance provides detailed reports (paper copy)

Cobra Accessing the Open Plan Schedules for Status

Cobra21							
Program: LIGOPMB2		COST ACCOUNT PLANMING		Status Date: 03/31/1995			
Cost Account		1.2.1				Status Open	
Desc Interferometer Design/Fab		Act. Link		Schedule : Start		Finish	
Manager				12/01/1994		01/29/1999	
Work Package		Act. Link LINKED				Status	
5E512		Desc: PSL DESIGN				Open	
		Schedule : Start		12/08/1994		Finish 09/15/1997	
		PMT B <Milestones>					
Milestone	Description	Schedule	Wgt	Link	%Comp	Status	
21120102	PSL REQUIREMENTS SPE	02/01/1995	4	LINKED	100	Closed	
21120104	PSL PRELIMINARY DESI	05/02/1995	6	LINKED	63	Open	
21120105	PSL PROTOTYPE TESTS/	11/01/1995	30	LINKED	0	Unopen	
21120108	PSL FINAL DESIGN	04/17/1996	36	LINKED	0	Unopen	
21120111	PSL 1ST ART. ASSEMBL	09/15/1997	24	LINKED	0	Unopen	
Add Update Delete Exit							

Internal Reporting Systems

- Schedule Status Report
- Cost Performance Reports
- Cost Performance Graphs
- Actual cost reports

External Reporting Systems

- Cost Schedule Status Report
- Monthly Progress Report
- Quarterly Progress Report
- Annual Report
- Annual Work Plan

COST PERFORMANCE REPORT - WORK BREAKDOWN STRUCTURE

CONTRACTOR: Caltech LOCATION: Pasadena, CA			CONTRACT TYPE/NO: PHY-9210038			PROJECT NAME/NO: LIGO Master PMB		REPORT PERIOD: 28FEB95-31MAR95		
QUANTITY	NEGOTIATED COST	EST. COST AUTHORIZED UNPRICED WORK	TGT. PROFIT/FEE %	TGT. PRICE	EST. PRICE	SHARE RATIO	CONTRACT CEILING	ESTIMATED CONTRACT CEILING		
1	292,100,000	0	0/0	292,100,000	0	0	0	0		

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)	(14)
WORK BREAKDOWN STRUCTURE													
1.1.1: Vacuum Equipment	31	611	14	580	597	611	611	552	0	59	45061	45061	0
1.1.2: Beam Tubes	239	2421	36	2182	2385	2200	2421	2000	220	421	43785	43785	0
1.1.3: Beam Tube Enclos	39	131	3	92	128	131	131	21	0	110	18062	18062	0
1.1.4: Facility Design	165	4185	292	4020	3892	4121	4185	4328	63	(143)	49750	49750	0
1.2.1: Interferometer D	125	369	88	244	281	425	369	417	(57)	(48)	31088	31088	0
1.2.2: Control & Data S	68	218	200	150	18	121	218	471	97	(253)	12292	12292	0
1.2.3: Physical Environ	0	0	0	0	0	0	0	0	0	0	3387	3387	0
1.2.4: Support Equipmen	7	0	0	(7)	0	7	0	0	(7)	0	1564	1564	0
1.3.1: Lab Operations	96	2418	35	2322	2383	2418	2418	2195	0	223	6790	6790	0
1.3.2: R&D Tasks	232	8979	121	8747	8858	9168	8979	9031	(189)	(52)	16610	16610	0
1.4.1: Project Manageme	191	3683	179	3491	3503	3683	3683	3660	0	22	11142	11142	0
1.4.2: Support Services	12	167	0	155	167	167	167	120	0	47	848	848	0
1.4.3: System Engineeri	89	624	23	535	601	624	624	395	0	229	4613	4613	0
1.4.4: Office Operation	67	1677	110	1610	1567	1677	1677	1766	0	(89)	4869	4869	0
GEN. AND ADMIN.	0	0	0	0	0	0	0	0	0	0	0	0	0
UNDIST. BUDGET	////	////	////	////	////	////	////	////	////	////	0	42240	(42240)
SUBTOTAL	1361	25482	1101	24121	24380	25354	25482	24955	128	527	249860	292100	(42)
MANAGEMENT RESRV.	////	////	////	////	////	////	////	////	////	////	42240	0	42240
TOTAL	1361	25482	1101	24121	24380	25354	25482	24955	128	527	292100	292100	0

RECONCILIATION TO CONTRACT BUDGET BASELINE

VARIANCE ADJSTMT.	////	////	////	////	////	////	////	////	////	////	////	////	////
TOTAL CONTR. VAR.	////	////	////	////	////	////	////	////	////	////	////	////	////

Thousands of \$

COST PERFORMANCE REPORT - WORK BREAKDOWN STRUCTURE

CONTRACTOR: Caltech LOCATION: Pasadena, CA			CONTRACT TYPE/NO: PHY-9210038			PROJECT NAME/NO: LIGO Master PMB		REPORT PERIOD: 28FEB95-31MAR95			
QUANTITY 1	NEGOTIATED COST 292,100,000	EST. COST AUTHORIZED UNPRICED WORK 0	TGT. PROFIT/ FEE % 0/0	TGT. PRICE 292,100,000	EST. PRICE 0	SHARE RATIO 0	CONTRACT CEILING 0	ESTIMATED CONTRACT CEILING 0			

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)	(14)
WORK BREAKDOWN STRUCTURE													
5M505: Stack Upgrade -	6	12	4	5	8	18	12	9	(7)	3	59	59	0
5M506: Recombiner/Recyc	34	33	25	(1)	8	136	33	132	(103)	(100)	831	831	0
5M507: Phase Noise Demo	65	199	5	134	195	192	199	81	8	118	954	954	0
5M508: Alignment Develo	24	46	0	22	46	72	46	20	(25)	26	519	519	0
5M509: Miscellaneous Ta	54	215	45	161	170	215	215	105	0	111	4823	4823	0
5M510: R & D Modeling	14	31	11	17	20	43	31	55	(12)	(24)	398	398	0
5N501: Management	110	2642	142	2532	2500	2642	2642	2772	0	(130)	7658	7658	0
5N502: Project Control	82	1041	37	959	1003	1041	1041	888	0	153	3483	3483	0
5N503: QA Services	5	21	0	16	21	21	21	3	0	18	374	374	0
5N504: ES&H Services	5	137	0	132	137	137	137	117	0	20	366	366	0
5N505: Consultants	2	9	0	7	9	9	9	0	0	9	108	108	0
5N506: System Integrati	53	459	21	406	438	459	459	340	0	119	2828	2828	0
5N507: Documentation	3	10	0	8	10	10	10	0	0	10	114	114	0
5N508: System Modeling	34	154	2	120	152	154	154	55	0	99	1670	1670	0
5N509: Administration	43	872	52	829	819	872	872	854	0	17	2968	2968	0
5N510: General Computin	24	805	58	781	748	805	805	912	0	(107)	1901	1901	0
GEN. AND ADMIN.	0	0	0	0	0	0	0	0	0	0	0	0	0
UNDIST. BUDGET	////	////	////	////	////	////	////	////	////	////	0	42240	(42240)
SUBTOTAL	1361	25482	1101	24121	24380	25354	25482	24955	128	527	249860	292100	(42)
MANAGEMENT RESRV.	////	////	////	////	////	////	////	////	////	////	42240	0	42240
TOTAL	1361	25482	1101	24121	24380	25354	25482	24955	128	527	292100	292100	0

RECONCILIATION TO CONTRACT BUDGET BASELINE

VARIANCE ADJUSTMT.	////	////	////	////	////	////	////	////	////	////	////	////	////
TOTAL CONTR. VAR.	////	////	////	////	////	////	////	////	////	////	////	////	////

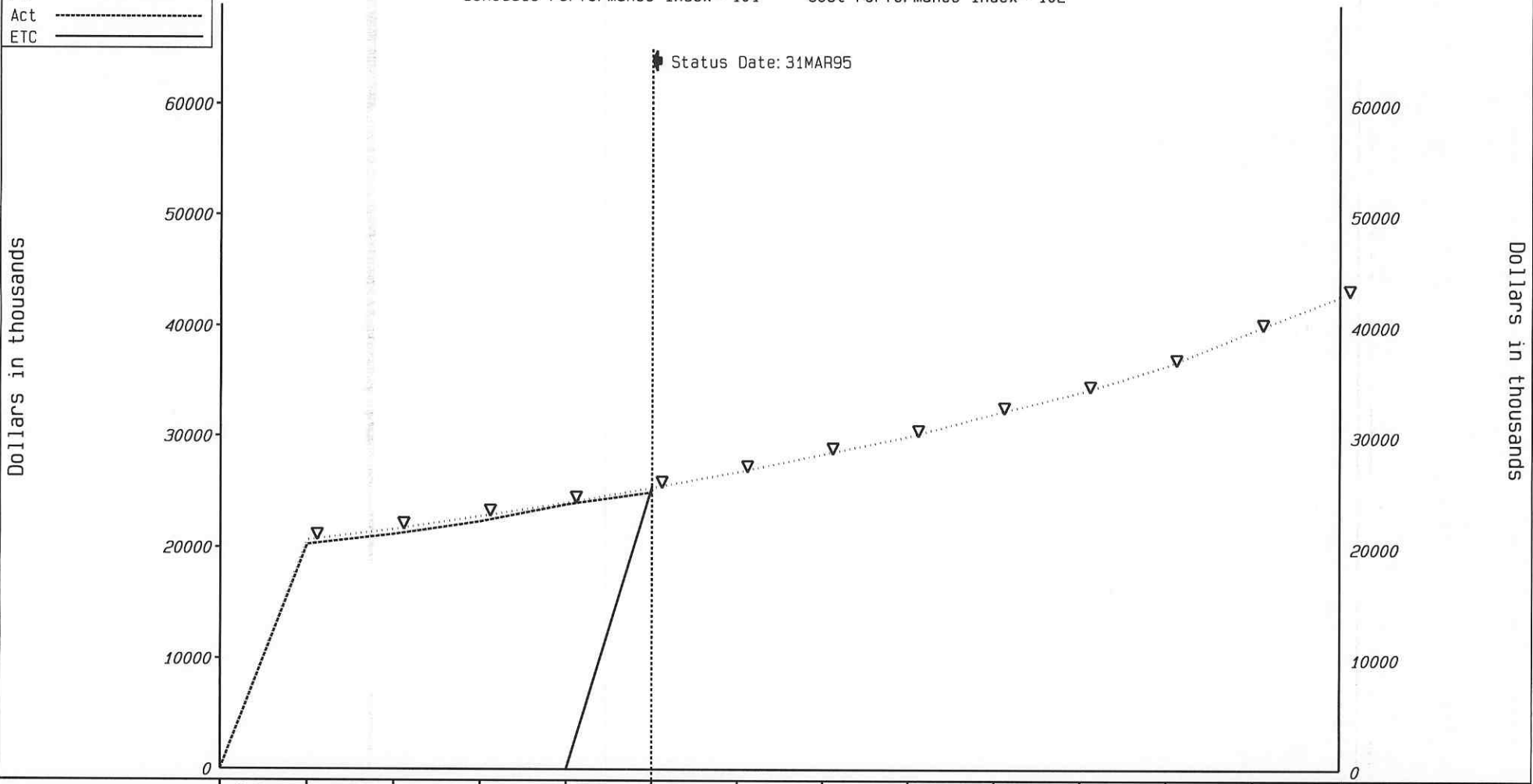
Thousands of \$

LEGEND

Bud▽.....▽.....▽.....▽
Per	—————
Act	-----
ETC	=====

Budget vs Performance vs Actual

Schedule Performance Index= 101 Cost Performance Index= 102



	FY94	DEC94	JAN95	FEB95	MAR95	APR95	MAY95	JUN95	JUL95	AUG95	SEP95	OCT95	NOV95	SCALE
Budget	20,663	21,635	22,796	23,993	25,354	26,789	28,391	30,009	32,075	34,024	36,448	39,630	42,690	K\$
Performance	0	0	0	0	25,482									K\$
Actual/Forecast	20,255	21,173	22,343	23,853	24,955									K\$
Schedule Variance	-20,663	-21,635	-22,796	-23,993	128									K\$
Cost Variance	-20,255	-21,173	-22,343	-23,853	527									K\$

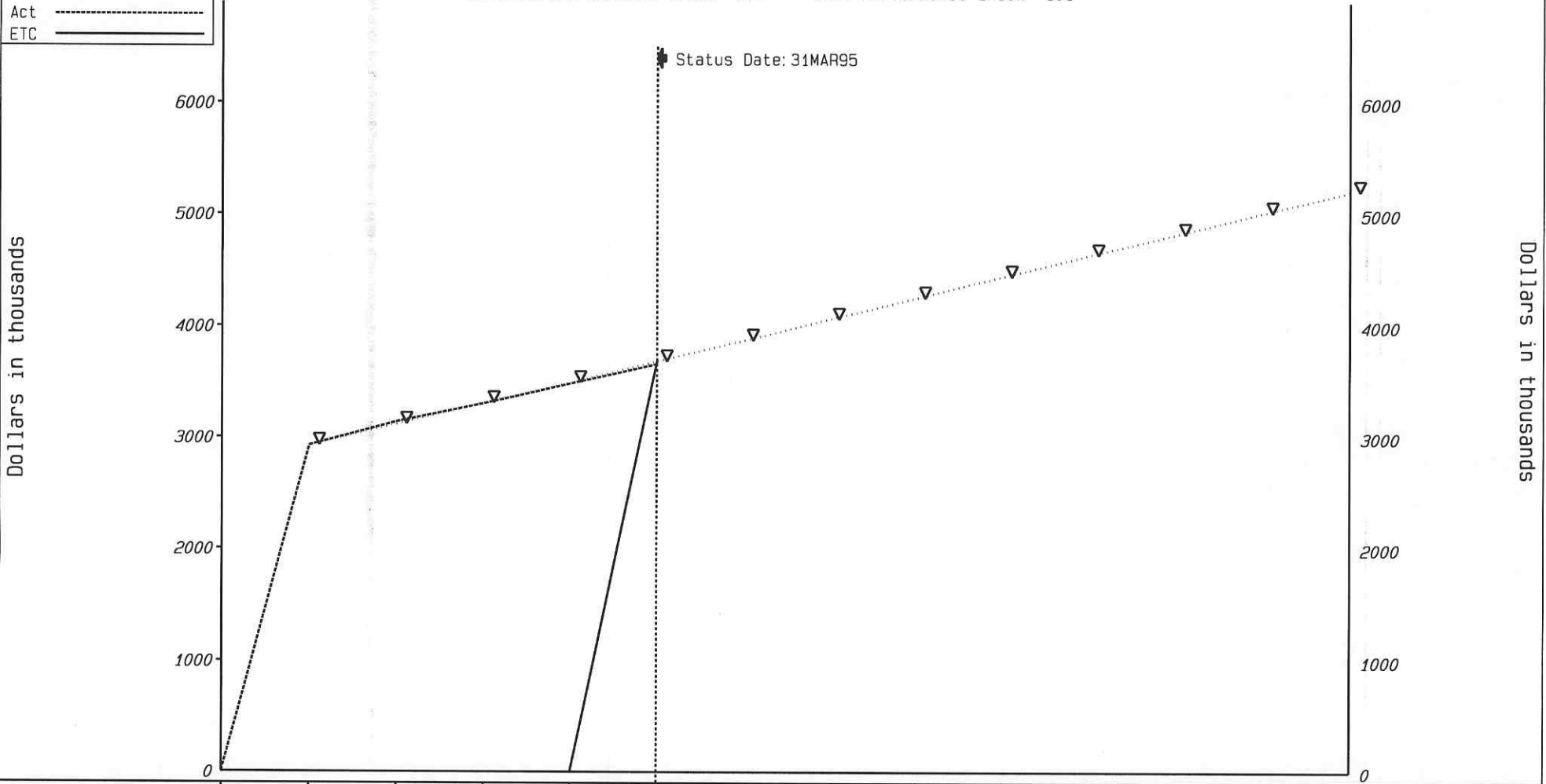
Schedule Variance = Perf-Budg Cost Variance = Perf-Actual Schedule Performance Index= Perf/Budg Cost Performance Index= Perf/Actual

LIGO PROJECT
1.4.1 Project Management
Budget vs Performance vs Actual

LEGEND

Bud▽.....▽.....▽.....▽
Per	—————
Act	-----
ETC	—————

Schedule Performance Index= 100 Cost Performance Index= 101



	FY94	DEC94	JAN95	FEB95	MAR95	APR95	MAY95	JUN95	JUL95	AUG95	SEP95	OCT95	NOV95	SCALE
Budget	2,926	3,117	3,308	3,491	3,683	3,871	4,062	4,251	4,442	4,634	4,822	5,014	5,202	K\$
Performance	0	0	0	0	3,683									K\$
Actual/Forecast	2,925	3,137	3,301	3,481	3,660									K\$
Schedule Variance	-2,926	-3,117	-3,308	-3,491	0									K\$
Cost Variance	-2,925	-3,137	-3,301	-3,481	23									K\$

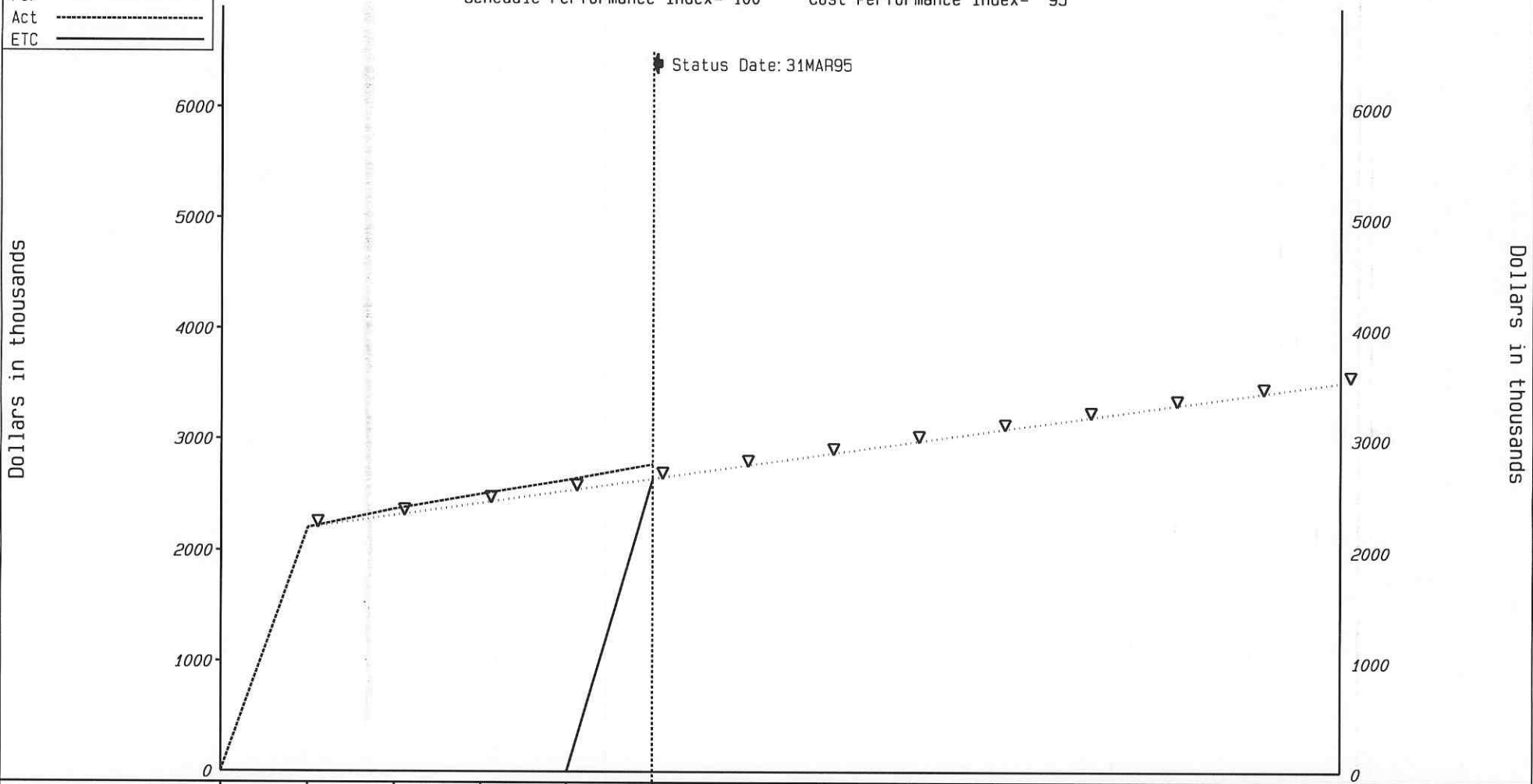
Schedule Variance = Perf-Budg Cost Variance = Perf-Actual Schedule Performance Index= Perf/Budg Cost Performance Index= Perf/Actual

*** Prepared by LIGO Project Controls Group ***

LEGEND

Bud▽.....▽.....▽.....▽
Per	—————
Act	-----
ETC	—————

Budget vs Performance vs Actual
Schedule Performance Index= 100 Cost Performance Index= 95



	FY94	DEC94	JAN95	FEB95	MAR95	APR95	MAY95	JUN95	JUL95	AUG95	SEP95	OCT95	NOV95	SCALE
Budget	2,203	2,313	2,423	2,532	2,642	2,752	2,861	2,971	3,081	3,190	3,300	3,410	3,520	K\$
Performance	0	0	0	0	2,642									K\$
Actual/Forecast	2,203	2,367	2,502	2,630	2,772									K\$
Schedule Variance	-2,203	-2,313	-2,423	-2,532	0									K\$
Cost Variance	-2,203	-2,367	-2,502	-2,630	-130									K\$

Schedule Variance = Perf-Budg Cost Variance = Perf-Actual Schedule Performance Index= Perf/Budg Cost Performance Index= Perf/Actual
*** Prepared by LIGO Project Controls Group ***

CONTRACTOR: Caltech
LOCATION: Pasadena, CA

CONTRACT TYPE/NO:
PHY-9210038

PROJECT NAME/NO:
LIGO Master PMB

REPORT PERIOD:
28FEB95-31MAR95

SIGNATURE:
TITLE / DATE:

CONTRACT DATA

ORIGINAL CONTRACT TARGET COST	NEGOTIATED CONTRACT CHANGES 292, 100, 000	CURRENT TARGET COST 292, 100, 000	ESTIMATED COST OF AUTHORIZED UNPRICED WORK	CONTRACT BUDGET BASELINE 292, 100, 000
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PERFORMANCE DATA

MPR Level	CUMULATIVE TO DATE					AT COMPLETION		
	BUDGETED COST		(3) ACTUAL COST WORK PERFORMED	VARIANCE		(6) BUDGETED	(7) ESTIMATE AT COMPLETE	(8) VARIANCE (6-7)
	(1) WORK SCHEDULED	(2) WORK PERFORMED		(4) SCHEDULE (2-1)	(5) COST (2-3)			
1.1.1 : Vacuum Equipment	611	611	552	0	59	45061	45061	0
1.1.2 : Beam Tubes	2200	2421	2000	220	421	43785	43785	0
1.1.3 : Beam Tube Enclosur	131	131	21	0	110	18062	18062	0
1.1.4 : Facility Design &	4121	4185	4328	63	(143)	49750	49750	0
1.2 : Detector	553	587	887	33	(301)	48330	48330	0
1.3 : Research & Developme	11586	11397	11226	(189)	171	23400	23400	0
1.4 : Project Office	6151	6151	5942	0	209	21471	21471	0
SUBTOTAL	25354	25482	24955	128	527	249860	249860	0
CONTINGENCY						0	42240	(42240)
MANAGEMENT RESERVE						42240	0	42240
TOTAL	25354	25482	24955	128	527	292100	292100	0

Training and Routine Operations

- five to six month start up process required to develop high confidence in performance data
- data accumulation and reporting has started
- process involves tuning data and systems and the development of management familiarity

Conclusions

- We have met the milestone to implement a Project Management Control System by April 28, 1995
- The Performance Measurement Baseline is based on an Integrated Project Schedule and a time phased budget consistent with the Cost Estimate presented in September
- The system provides a consistent set of tools to track and report project status to LIGO management and to NSF
- The system provides the means to track the use of project contingency
- We are now using the system to manage project cost and schedule