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LIGO Construction Project  
**Cost/Schedule/Contingency**

P. Lindquist  
NSF Review  
March 31, 1998

## Overview (as of end of February 1998)

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- \$200 million actual (booked) costs
- \$249 million committed “un-audited”
- 78 percent complete (physical completion)
- 74 percent “costed” (actual costs relative to estimate-at-completion)
- \$21 million contingency remaining
- 30 percent contingency relative to estimate-to-complete

# LIGO Project Controls Activities Since Last Review

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*Last 20 percent of planned construction project.*

- Instituted Monthly Estimate-to-Complete Review
- Increased focus on Integrated Project Schedule
  - Relationship to Installation Schedule being refined
- Increased focus on Open Commitments
  - Currently overstated
  - Working with Caltech Finance and Auditors (*KPMG*) to scrub commitments
- NSF IG Audit Conducted in November 1997
  - Comments (exit debrief) generally very positive
  - Issues
    - **Reconciliation of funds requested with Caltech GL**
    - **Reconciliation of current Ops estimates with original estimates (1994)**
    - **Tax issues**
  - Have not yet received report

# LIGO Funding by NSF Task and Year

Fiscal Year	Construction	R&D	Operations	Advanced R&D	Total
Through 1994	35.9	11.2			47.1
1995	85	4			89
1996	70	2.4			72.4
1997	55	1.6	0.3	0.8	57.7
1998	26.2	0.9	7.3	2.7	37
1999			20.9	2.8	23.7
2000			21.1	2.9	24
2001			19.1 (10 months)	2.9	22
<b>Total</b>	<b>272.1</b>	<b>20</b>	<b>68.7</b>	<b>12.1</b>	<b>372.9</b>

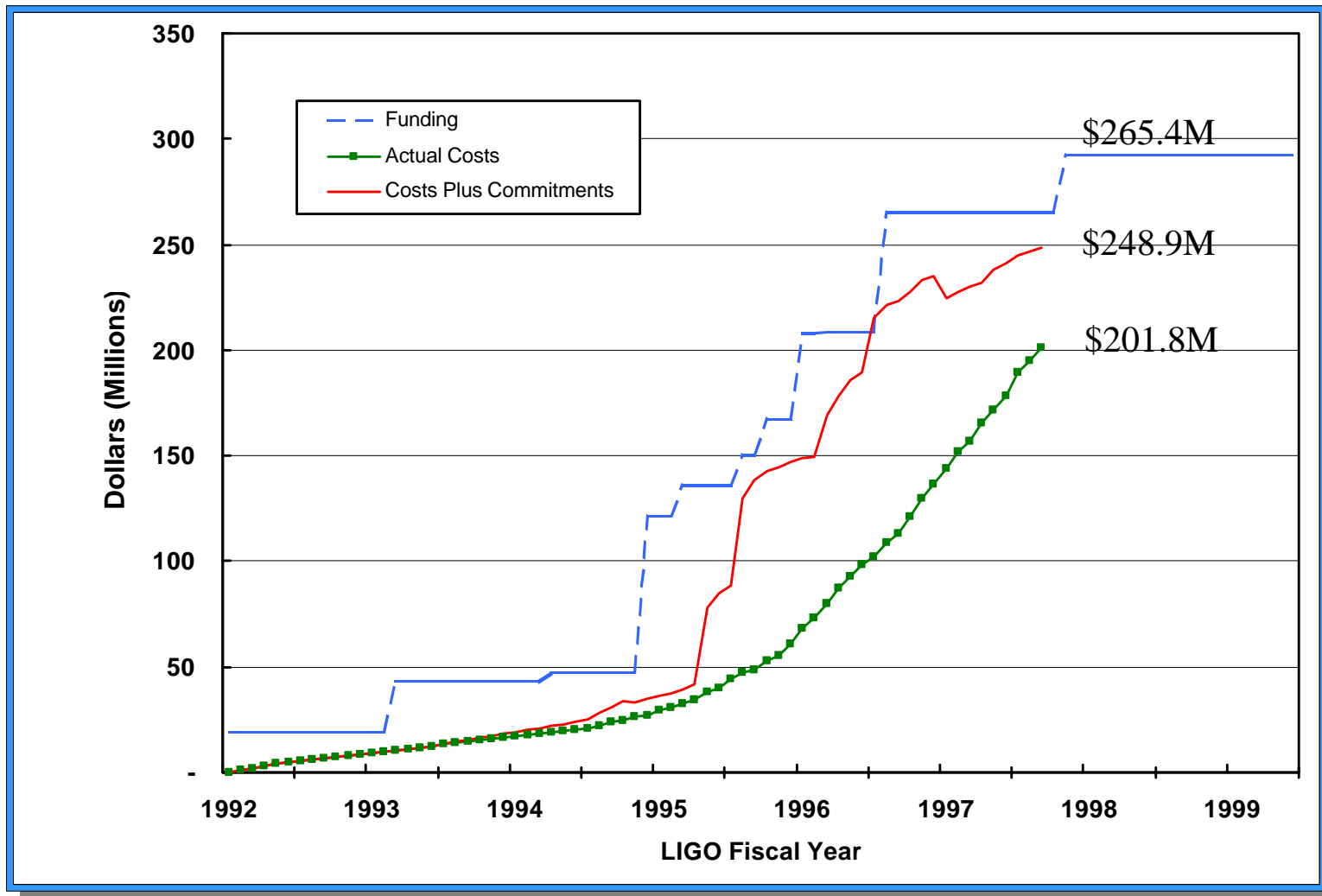
(All funds shown in “then year” \$ Millions)

# Actual Costs and Commitments

(All values \$ Thousands)

WBS		Costs Thru Nov 1996	FY 1997 Costs	Dec-97	Jan-98	Feb-98	Cumulative Actual Costs	Open Commitments	Total Cost Plus Commitments
1.1.1	Vacuum Equipment	21,254	9,263	1,990	700	698	33,905	12,439	46,345
1.1.2	Beam Tube	17,262	15,717	2,036	702	2,965	38,681	9,979	48,661
1.1.3	Beam Tube Enclosure	6,237	7,036	1,504	304	179	15,261	6,657	21,918
1.1.4	Civil Construction	14,117	30,564	2,827	1,790	(368)	48,930	6,676	55,606
1.1.5	Beam Tube Bake		75	288	50	367	779	961	1,740
1.2	Detector	6,270	8,069	1,249	1,740	1,374	18,703	7,529	26,232
1.3	Research & Development	16,816	2,865	360	15	295	20,351	1,019	21,371
1.4	Project Management	16,288	6,362	611	320	528	24,108	1,733	25,841
7LIGO	Unassigned	2	(0)	1	8	(3)	7	31	38
	Installation and Commissioning		330	72	103	551	1,055	60	1,115
<b>TOTAL</b>		<b>98,246</b>	<b>80,280</b>	<b>10,939</b>	<b>5,731</b>	<b>6,586</b>	<b>201,781</b>	<b>47,085</b>	<b>248,866</b>
<b>Cumulative Actual Costs</b>		<b>98,246</b>	<b>178,526</b>	<b>189,464</b>	<b>195,196</b>	<b>201,781</b>			
<b>Open Commitments</b>		<b>91,492</b>	<b>62,510</b>	<b>55,236</b>	<b>51,446</b>	<b>47,085</b>			
<b>Total Costs plus Commitments</b>		<b>189,738</b>	<b>241,036</b>	<b>244,700</b>	<b>246,642</b>	<b>248,866</b>			
<i>NSF Funding</i>		<i>208,468</i>	<i>265,389</i>	<i>265,389</i>	<i>265,389</i>	<i>265,389</i>			

# Costs and Commitments As a Function of Time



# Project Management Plan Milestones Status

## Facilities

Milestone Description	PMP *	Current Projection	PMP *	Current Projection
<b>Facilities</b>	<b>Hanford</b>		<b>Livingston</b>	
Initiate Site Developemnt	Mar-94	Complete	Aug-95	Complete
Beam Tube Final Design Review	Apr-94	Complete	Apr-94	Complete
Select A&E Contractor	Nov-94	Complete	Nov-94	Complete
Complete Beam Tube Qual Test	Feb-95	Complete	Feb-95	Complete
Select VE Contractor	Mar-95	Complete	Nov-94	Complete
Complete Performance Baseline	Apr-94	Complete	Apr-94	Complete
Initiate Beam Tube Fabrication	Oct-95	Complete	Oct-95	Complete
Initiate Slab Construction	Oct-95	Complete	Jan-97	Complete
Initiate Building Construction	Jun-96	Complete	Jan-97	Complete
Joint Occupancy	Sep-97	Complete	Mar-98	Complete
Accept Tubes and Covers	Mar-98	Complete	Mar-99	Oct-98
Beneficial Occupancy	Mar-98	Complete	Sep-98	Sep-98
Accept Vacuum Equipment	Mar-98	Jul-98	Sep-98	Dec-98
Initiate Facility Shakedown	Mar-98	Jul-98	Mar-99	Dec-98

\* Project Management Plan Revision C submitted to NSF October 1997

# Project Management Plan Milestones Status

## Detector

Milestone Description	PMP *	Current Projection
<b>Detector</b>		
Beam Splitter Chamber Stack FDR	Apr-98	Jun-98
Core Optics Support FDR	Feb-98	Aug-98
Horizontal Access Module FDR	Apr-98	Jun-98
Core Optics Components FDR	Dec-97	Apr-98
Input/Output Optics FDR	Apr-98	Complete
Pre-Stabilized Laser FDR	Aug-98	Oct-98
Alignment Sensing FDR	Apr-98	Jul-98
Length Sensing Control FDR	May-98	Jul-98
WA Controls Area Net Ready to Install	Apr-98	Complete
CDS Data Acquisition FDR	Apr-98	Apr-98
Physics Environment Monitoring FDR	Jun-98	Complete
Detector System PDR	Dec-97	Jul-98
Begin WA Interferometer Installation	Jul-98	Jul-98
Begin LA Interferometer Installation	Jan-99	Jan-99
Begin Coincidence Tests	Dec-00	Dec-00

\* Project Management Plan Revision C submitted to NSF October 1997



# Cost Schedule Status Report (CSSR)

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- The Cost Schedule Status Report is provided each month to the NSF
- Similar report (the Cost Performance Report) is used internally at a lower level of detail to monitor the status of the Project
- The report shown is for the end of February 1998
- **BAC** - sum of the budgets established to accomplish the approved scope
- **BCWS** - sum of the budgets established for work scheduled to have been accomplished to date
- **BCWP** - sum of budget for tasks that have been completed (Earned Value)
- **EAC** - recently began to focus on monthly reporting of the Estimate-at-Completion  $EAC = ACWP + ETC$  (Estimate-to-Complete)

# Cost Schedule Status Report (CSSR)

End of February 1998  
(All values \$ Thousands)

Reporting Level	Cumulative To Date					At Completion		
	Budgeted Cost of Work Scheduled (BCWS) (1)	Budgeted Cost of Work Performed (BCWP) (2)	Actual Cost of Work Performed (ACWP) (3)	Schedule Variance (2-1) (4)	Cost Variance (2-3) (5)	Budget- at- Completion (BAC) (6)	Estimate- at- Completion (EAC) (7)	Variance- at- Completion (6-7) (8)
1.1.1 Vacuum Equipment	35,607	36,610	33,905	1,003	2,705	42,739	43,617	(878)
1.1.2 Beam Tubes	37,378	39,815	38,681	2,437	1,134	47,050	47,147	(97)
1.1.3 Beam Tube Enclosure	16,663	17,565	15,261	902	2,304	19,796	19,244	552
1.1.4 Facility Design & Construction	48,025	48,964	48,930	939	34	50,605	51,774	(1,169)
1.1.5 Beam Tube Bake	999	999	779	-	220	3,564	3,744	(180)
1.2 Detector	27,352	21,397	18,698	(5,955)	2,699	54,200	53,499	701
1.3 Research & Development	22,211	22,144	20,351	(67)	1,793	23,490	23,490	-
1.4 Project Office	23,603	23,603	24,100	-	(497)	27,574	28,570	(996)
								-
Subtotal	211,838	211,097	200,705	(741)	10,392	269,018	271,085	(2,067)
Contingency							21,015	(21,015)
Contingency (MR)						23,082		23,082
Total	211,838	211,097	200,705	(741)	10,392	292,100	292,100	-

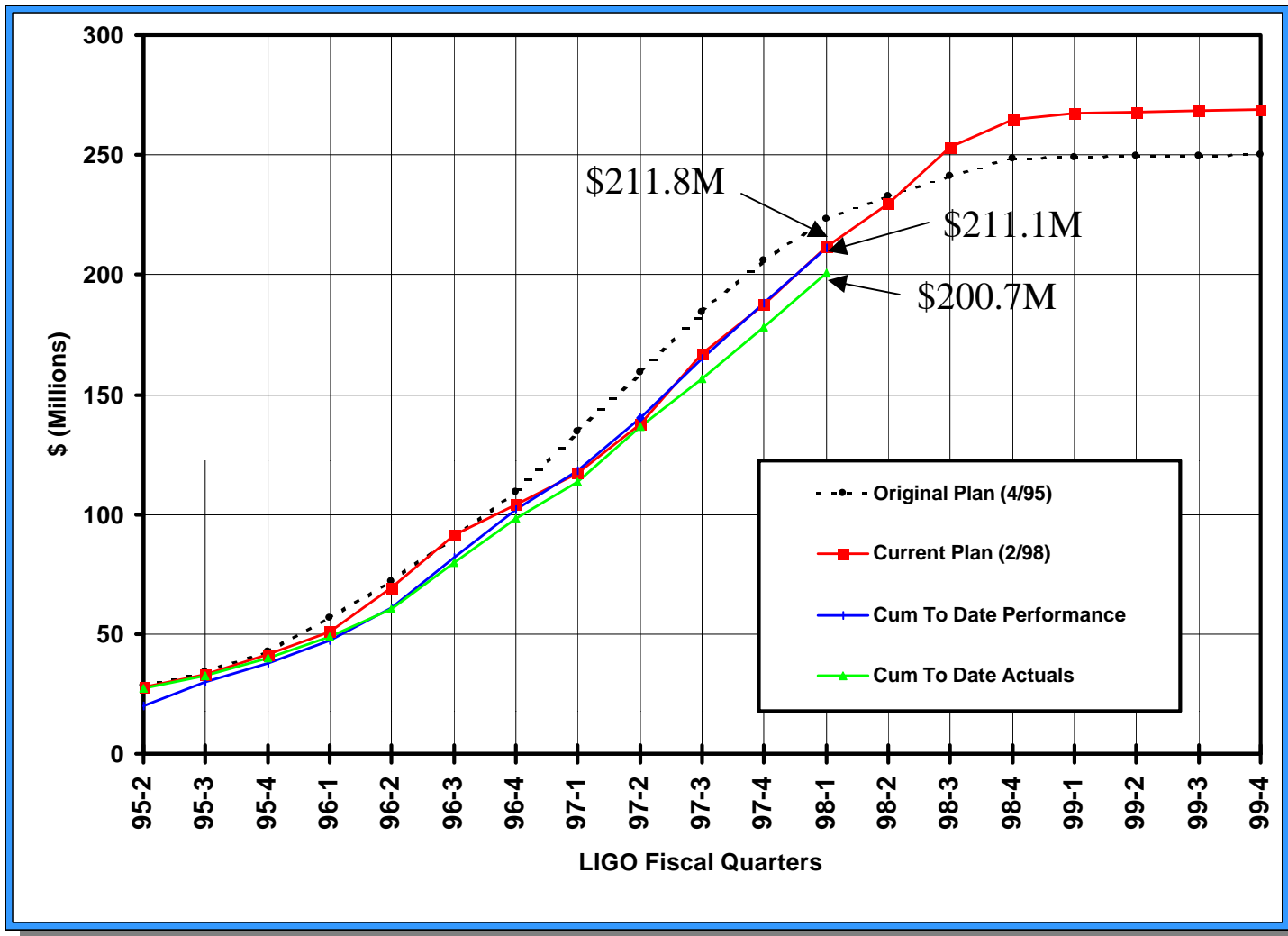
# Performance Summary

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## End of February 1998 data

- Total Budget Scheduled - \$211.8 million
- Total Budget of Work Performed - \$211.1 million
- Schedule Variance - Unfavorable \$0.7 million
- Actual Costs - \$200.7 million
- Cost Variance - \$10.4 million favorable. BAC - \$269.0 million
- Contingency relative to BAC - \$23.1 million
- EAC - \$271.1 million
- At-completion Variance - Unfavorable \$2.1 million
- Contingency relative to EAC - \$21.0 million

# Top Level (WBS 1.0) Performance Chart



# Facilities Performance Chart

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# Detector Performance Chart

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# R&D Performance Chart

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# Project Office Performance Chart

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# Change Control Board (CCB) Summary

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## Change Request activity since October 1997 Review

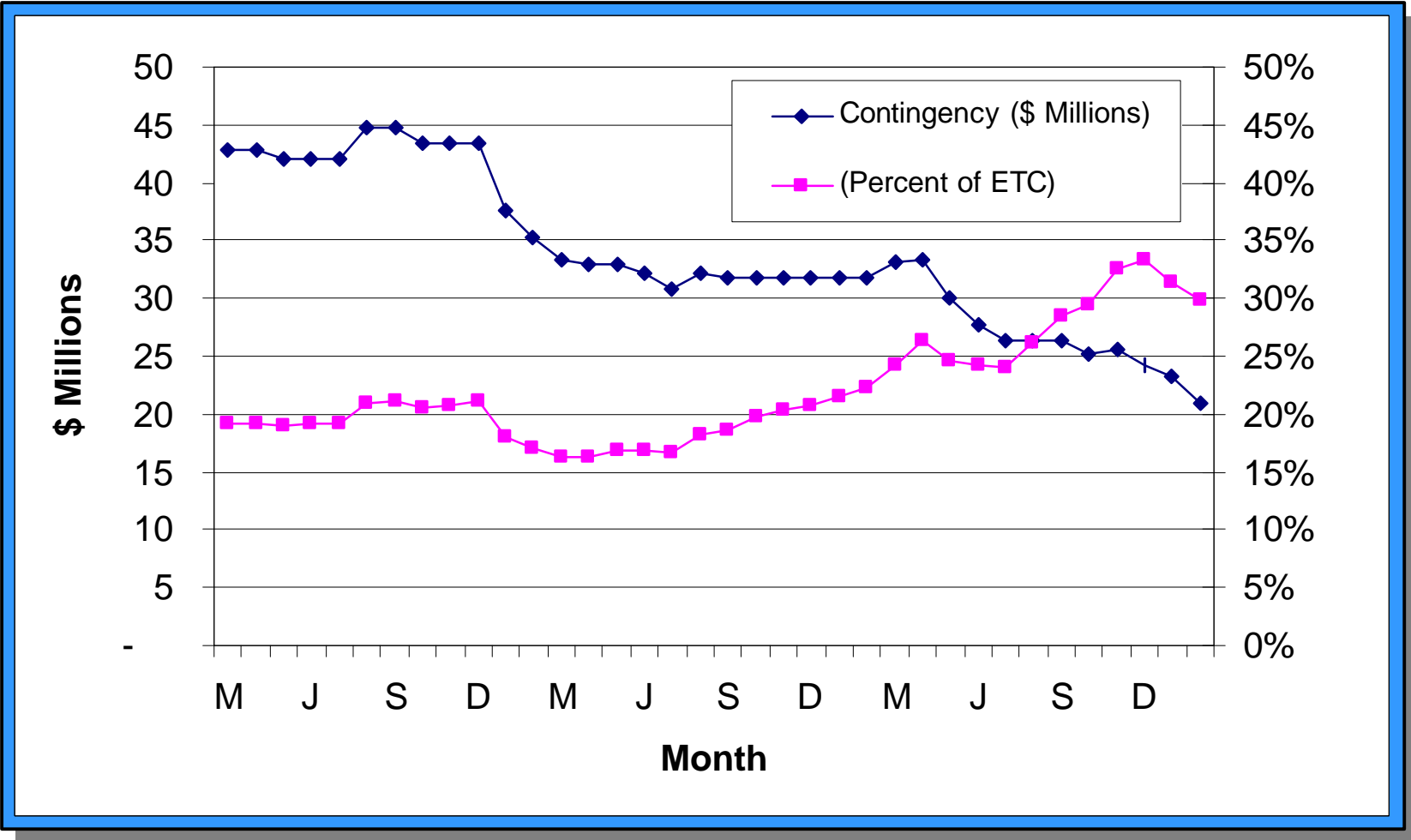
- 21 Change Requests submitted
- 15 Change Requests Approved - \$2.953 million
- One Change Request for Information Only
- One Change Request held - LIGO Data Analysis System (LDAS)
  - Planning Package established - sets aside \$5.5 million
- Four Change Requests Pending
  - Beam Tube Bake
  - Vacuum Equipment Changes
  - Beam Tube Taxes and Module End Conditions
  - Beam Tube Bake Electrical Power

# Change Control Log

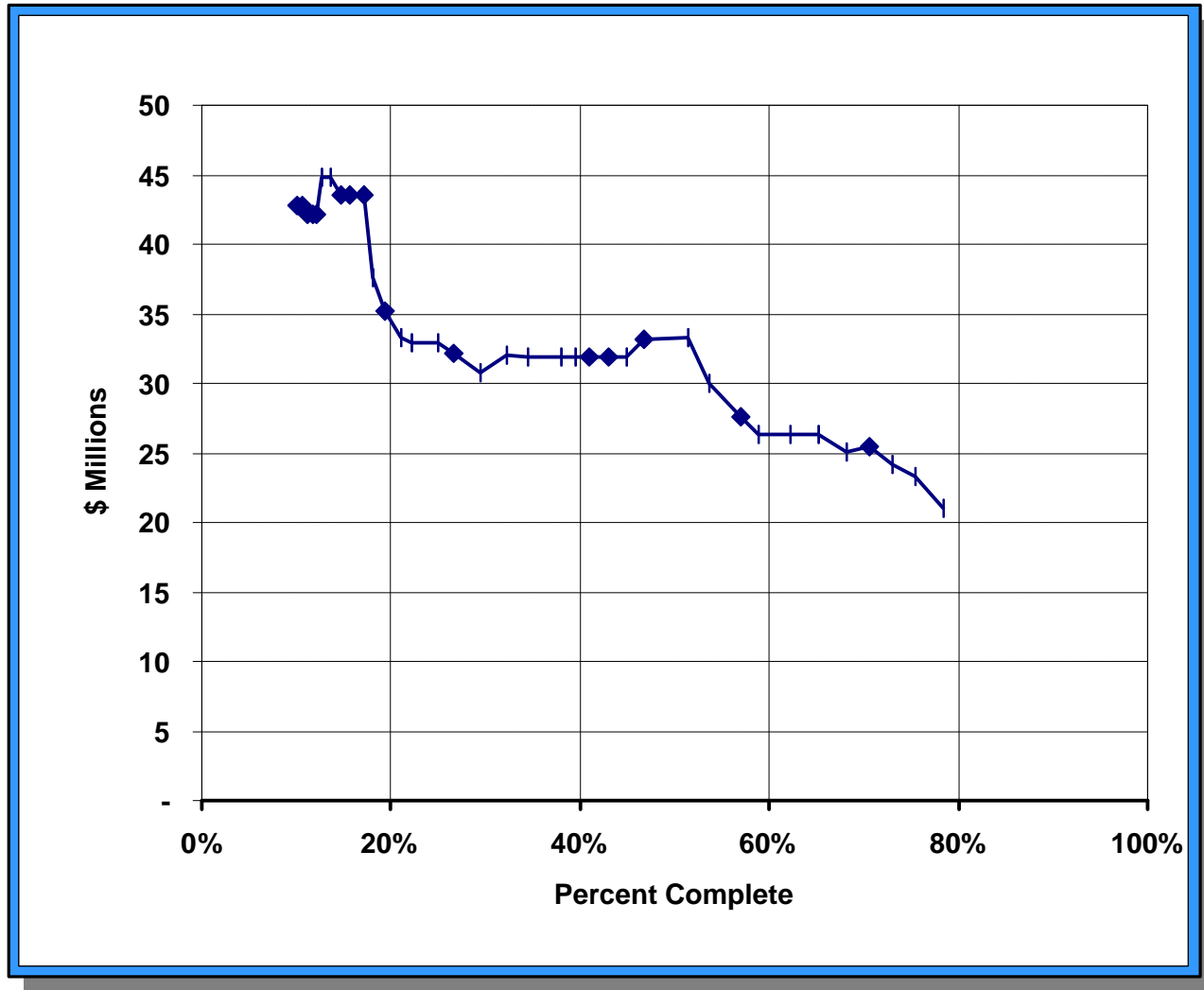
Change Requests approved since October 1997 Review

Change Request Number	WBS	Description	Submittal Date	Amount
CR-970033	1.1.4	Civil Construction, Hanford, A&E Support	Sep-97	50,000
CR-970034	1.1.4	Civil Construction, Hanford, Landscaping	Sep-97	228,000
CR-970035	1.4.4	General Computing - Hanford	Sep-97	250,000
CR-970036	1.4.4	General Computing - Livingston	Sep-97	250,000
CR-970038	1.1.5	Beam Tube Vacuum Bake Phase 2	Oct-97	(441,000)
CR-970039	1.1.4	Operations Support Building Modifications - Hanford	Nov-97	110,000
CR-970040	1.1.4	Operations Support Building Modifications - Livingston	Nov-97	110,000
CR-970041	1.1.2	Beam Tube Labor Rate Adjustment - Louisiana	Nov-97	873,140
CR-970042	1.1.4	Civil Construction - Levernier Field Work Directives	Dec-97	324,328
CR-970043	1.1.2	Beam Tube In-House Miscellaneous	Dec-97	1,088,000
CR-980001	1.1.4	Hensel Phelps Field Work Directives (info)	Jan-98	38,331
CR-980002	1.1.4	Civil Construction Added Scope - Hanford	Jan-98	104,115
CR-980003	1.1.4	5000 Square Foot Building at Hanford	Feb-98	510,000
CR-980004	1.2.3	Physics Environment Monitoring Effort Replan	Feb-98	(757,000)
CR-980005	1.1.4	Extending Parsons Support at Hanford	Feb-98	68,000
CR-980006	1.2.1	Seismic Isolation - Spring Cleaning and Bellows Fabric	Mar-98	147,052
<b>Total</b>				<b>2,952,966</b>

# Project Contingency as a Function of Time



# Project Contingency vs. Percent Complete



# Analysis of Potential Contingency Needs for Facilities

Description	CR	WBS	Direct	Benefits	Overhead	Total
Additional Quality/Safety	CR-980009	1.1.1	164,241			164,241
Chamber Floor Elevation Change	CR-980008	1.1.1	200,000			200,000
Labor Rate Escalation	CR-980009	1.1.1	200,000			200,000
Light Duty Cranes/Hoists	CR-980009	1.1.1	45,000			45,000
RGA Calibration/Outgassing Measurement System	CR-980009	1.1.1	50,000			50,000
Shop Tools	CR-980009	1.1.1	50,000			50,000
Site Forklift (Livingston)	CR-980009	1.1.1	50,000			50,000
Stiles/Scaffolding (Access over VE Doors/Covers)	CR-980009	1.1.1	50,000			50,000
LA Additional Tube Cleaning FTIRs		1.1.2	5,000			5,000
LA Baffle Installation Cleaning		1.1.2	20,000			20,000
LA Module End Conditions	CR-980010	1.1.2	22,700			22,700
Mount GNB Valves Early on Y Arm		1.1.2	25,000			25,000
Purchase Leftover GPS Equipment		1.1.2	50,000			50,000
Receive Reimbursement for LN2 Dewars		1.1.2	(180,000)			(180,000)
Reimburse CB&I for Y1, Y2 Leak Location Tests		1.1.2	150,000			150,000
Taxes (WA B&O and Additional Sales)	CR-980010	1.1.2	36,868			36,868
Potential Loss of Woodrow Wilson Tax Reduction	CR-970020	1.1.3	332,500			332,500
Potential Gain of ACME Tax Reduction (under litigation)		1.1.3	-			-
Bid Package Costs		1.1.4	50,000			50,000
Building Customization - both sites	CR-980002	1.1.4	896,000			896,000
Cleaning Procedure for HVAC System at Livingston		1.1.4	250,000			250,000
Corner Station Telephones (both sites)		1.1.4	300,000		14,363	314,363
Erosion Control/Landscaping Hanford	CR-970034	1.1.4	68,000		-	68,000
Extend Parsons Representative at Hanford	CR-980005	1.1.4	50,000		14,363	64,363
Extend Parsons Representative at Livingston		1.1.4	40,000		14,363	54,363
Site Cleanup (both sites)		1.1.4	200,000		28,725	228,725
In-House Labor Rate Variances		1.1.4	100,000	25,000	71,813	196,813
Modifying Water Systems at Hanford		1.1.4	300,000		14,363	314,363
New Well Installation		1.1.4	35,637		14,363	50,000
Hanford Power 1998		1.1.4	130,000			130,000
Beam Tube Bake		1.1.5	150,000		28,725	178,725
Beam Tube Bake Electrical Power	CR-980011	1.1.5	202,000			202,000
<b>Facilities Total</b>			<b>4,042,946</b>	<b>25,000</b>	<b>201,075</b>	<b>4,269,021</b>

# Analysis of Potential Contingency Needs for Detector

Description	CR	WBS	Direct	Benefits	Overhead	Total
Absorption Measurements Labor and Materials		1.2.1	110,000	15,000	71,813	196,813
Schedule Contingency		1.2	2,476,238	619,060	1,778,249	4,873,546
Beam Steering Input Optics		1.2.1	140,000	25,000	94,793	259,793
CDS Spares		1.2.2	300,000		14,363	314,363
Test Stands at Sites for Suspending Test Masses, etc.		1.2.2	100,000		14,363	114,363
Cleaning Investigation and Equipment		1.2.1	140,000	15,000	54,578	209,578
Extended ISC/ASC Fabrication		1.2.1	200,000	50,000	143,625	393,625
High Power Electro Optic Modulation/Faraday Isolation		1.2.1	130,000		74,685	204,685
High Powered Diode Protection		1.2.1	260,000	15,000	157,988	432,988
Higher Quality COS Telescope		1.2.1	200,000		14,363	214,363
Increased Baffling		1.2.1	300,000		172,350	472,350
Increased Damped Metal Spring Cleaning	CR-980006	1.2.1	40,000		14,363	54,363
IO Mode Matching Sensor		1.2.1	150,000		14,363	164,363
More Complex LSC Design		1.2.1	200,000	50,000	143,625	393,625
Possible Gross Backscatter		1.2.1	180,000	15,000	112,028	307,028
Re-Coat Six Core Optics		1.2.1	100,000			100,000
Re-Polish Six Core Optics		1.2.1	140,000			140,000
Rework SEI First Article		1.2.1	400,000			400,000
Servo Electronics		1.2.2	280,000	32,500	179,531	492,031
Spare HAM/BSC Bellows	CR-980006	1.2.1	100,000			100,000
Spare Lightwave Lasers		1.2.1	200,000			200,000
Tidal Motion Actuator for SEI		1.2.1	300,000		14,363	314,363
CDS Travel to sites		1.2.2	50,000		28,725	78,725
Unidentified Detector Change Orders		1.2	885,544		14,363	899,907
<b>Total</b>			<b>7,381,782</b>	<b>836,560</b>	<b>3,112,526</b>	<b>11,330,868</b>

# Analysis of Potential Contingency Needs for Project Office

Description	CR	WBS	Direct	Benefits	Overhead	Total
Project Controls - Property Management		1.4.1.2	150,000			150,000
Project Controls - Scheduling		1.4.1.2	300,000			300,000
Schedule Contingency		1.4.1.2	100,000	25,000	71,813	196,813
General Computing		1.4.4.2	760,000			760,000
Infrastructure Computers for Hanford	CR-970035	1.4.4.2	245,000			245,000
Infrastructure Computers for Livingston	CR-970036	1.4.4.2	250,000			250,000
Travel		1.4.4.2	50,000		28,725	78,725
<b>Total</b>			1,855,000	25,000	100,538	1,980,538

•Planning Package established for LIGO Data Analysis Systems (LDAS) - \$5.5 million

# Cost Schedule Status Report - Facilities

End of February 1998  
(All values \$ Thousands)

Reporting Level	Cumulative To Date					At Completion		
	Budgeted Cost of Work Scheduled (BCWS) (1)	Budgeted Cost of Work Performed (BCWP) (2)	Actual Cost of Work Performed (ACWP) (3)	Schedule Variance (2-1) (4)	Cost Variance (2-3) (5)	Budget- at- Completion (BAC) (6)	Estimate- at- Completion (EAC) (7)	Variance- at- Completion (6-7) (8)
1.1.1 Vacuum Equipment	35,607	36,610	33,905	1,003	2,705	42,739	43,617	(878)
1.1.2 Beam Tubes	37,378	39,815	38,681	2,437	1,134	47,050	47,147	(97)
1.1.3 Beam Tube Enclosure	16,663	17,565	15,261	902	2,304	19,796	19,244	552
1.1.4 Facility Design & Construction	48,025	48,964	48,930	939	34	50,605	51,774	(1,169)
1.1.5 Beam Tube Bake	999	999	779	-	220	3,564	3,744	(180)
Subtotal	138,672	143,953	137,556	5,281	6,397	163,754	165,526	(1,772)
Contingency						4,269	2,497	1,772
Total	138,672	143,953	137,556	5,281	6,397	168,023	168,023	-



# Cost Schedule Status Report - Detector

End of February 1998  
(All values \$ Thousands)

Reporting Level	Cumulative To Date					At Completion		
	Budgeted Cost of Work Scheduled (BCWS) (1)	Budgeted Cost of Work Performed (BCWP) (2)	Actual Cost of Work Performed (ACWP) (3)	Schedule Variance (2-1) (4)	Cost Variance (2-3) (5)	Budget- at- Completion (BAC) (6)	Estimate- at- Completion (EAC) (7)	Variance- at- Completion (6-7) (8)
1.2.1 Interferometer Design and Fabrication	19,110	15,464	13,375	(3,646)	2,089	37,709	37,107	602
1.2.2 Control and Data Systems	7,150	4,969	4,973	(2,181)	(4)	12,731	12,671	60
1.2.3 Physics Environment Monitoring	833	853	231	20	622	2,195	2,154	41
1.2.4 Support Equipment	260	112	119	(148)	(7)	1,564	1,567	(3)
Subtotal	27,353	21,398	18,698	(5,955)	2,700	54,199	53,499	700
Contingency						11,331	12,031	(700)
Total	27,353	21,398	18,698	(5,955)	2,700	65,530	65,530	-

# Cost Schedule Status Report - R&D

End of February 1998  
(All values \$ Thousands)

Reporting Level	Cumulative To Date					At Completion		
	Budgeted Cost of Work Scheduled (BCWS)	Budgeted Cost of Work Performed (BCWP)	Actual Cost of Work Performed (ACWP)	Schedule Variance (2-1)	Cost Variance (2-3)	Budget- at- Completion (BAC)	Estimate- at- Completion (EAC)	Variance- at- Completion (6-7)
Work Breakdown Structure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.3.1 Laboratory Operations	6,340	6,340	5,187	-	1,153	6,880	6,880	-
1.3.2 R&D Tasks	15,872	15,805	15,165	(67)	640	16,610	16,610	-
Subtotal	22,212	22,145	20,352	(67)	1,793	23,490	23,490	-
Contingency								-
Total	22,212	22,145	20,352	(67)	1,793	23,490	23,490	-

# Cost Schedule Status Report - Project Office

End of February 1998  
(All values \$ Thousands)

Reporting Level	Cumulative To Date					At Completion		
	Budgeted Cost of Work Scheduled (BCWS)	Budgeted Cost of Work Performed (BCWP)	Actual Cost of Work Performed (ACWP)	Schedule Variance (2-1)	Cost Variance (2-3)	Budget- at- Completion (BAC)	Estimate- at- Completion (EAC)	Variance- at- Completion (6-7)
Work Breakdown Structure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.4.1 Project Management	12,609	12,609	12,774	-	(165)	14,208	14,560	(352)
1.4.2 Support Services	707	707	604	-	103	848	700	148
1.4.3 System Engineering	4,257	4,257	4,009	-	248	5,238	5,273	(35)
1.4.4 Office Operations	6,029	6,029	6,713	-	(684)	7,280	8,037	(757)
Subtotal	23,602	23,602	24,100	-	(498)	27,574	28,570	(996)
Contingency						1,981	985	996
Total	23,602	23,602	24,100	-	(498)	29,555	29,555	-

# LIGO Project Contingency Analysis

End of February 1998  
(Costs, Estimates, and Contingency in \$ Thousands)

	Percent Complete	Percent "Costed"	Actual Costs	Estimate-to-Complete (ETC)	Estimate-at-Completion (EAC)	Contingency relative to Estimate-at-Completion	Total	Contingency as percent of Estimate-to-Complete
Work Breakdown Structure	(BCWP/BAC)	(3) / (5)	(ACWP)	(5) - (3)	(EAC)	(6)	(5) + (6)	(6) / (5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.1 Facilities	88%	83%	137,556	27,970	165,526	2,497	168,023	9%
1.2 Detector	39%	35%	18,698	34,801	53,499	12,031	65,530	35%
1.3 Research and Development	94%	87%	20,352	3,138	23,490	-	23,490	0%
1.4 Project Management	86%	84%	24,100	4,470	28,570	985	29,555	22%
<b>LIGO Data Analysis Planning Package</b>						<b>5,500</b>	<b>5,500</b>	
<b>TOTALS</b>	<b>78%</b>	<b>74%</b>	<b>200,706</b>	<b>70,379</b>	<b>271,085</b>	<b>21,013</b>	<b>292,098</b>	<b>30%</b>

- Facilities - 88 percent complete, \$28 million ETC, nine percent contingency
- Detector - 39 percent complete, \$35 million ETC, 35 percent contingency
- Project Management - 86 percent complete, \$4.5 million ETC, 22 percent contingency
- \$5.5 million Planning Package established for LIGO Data Analysis System (LDAS)

# Staffing Summary

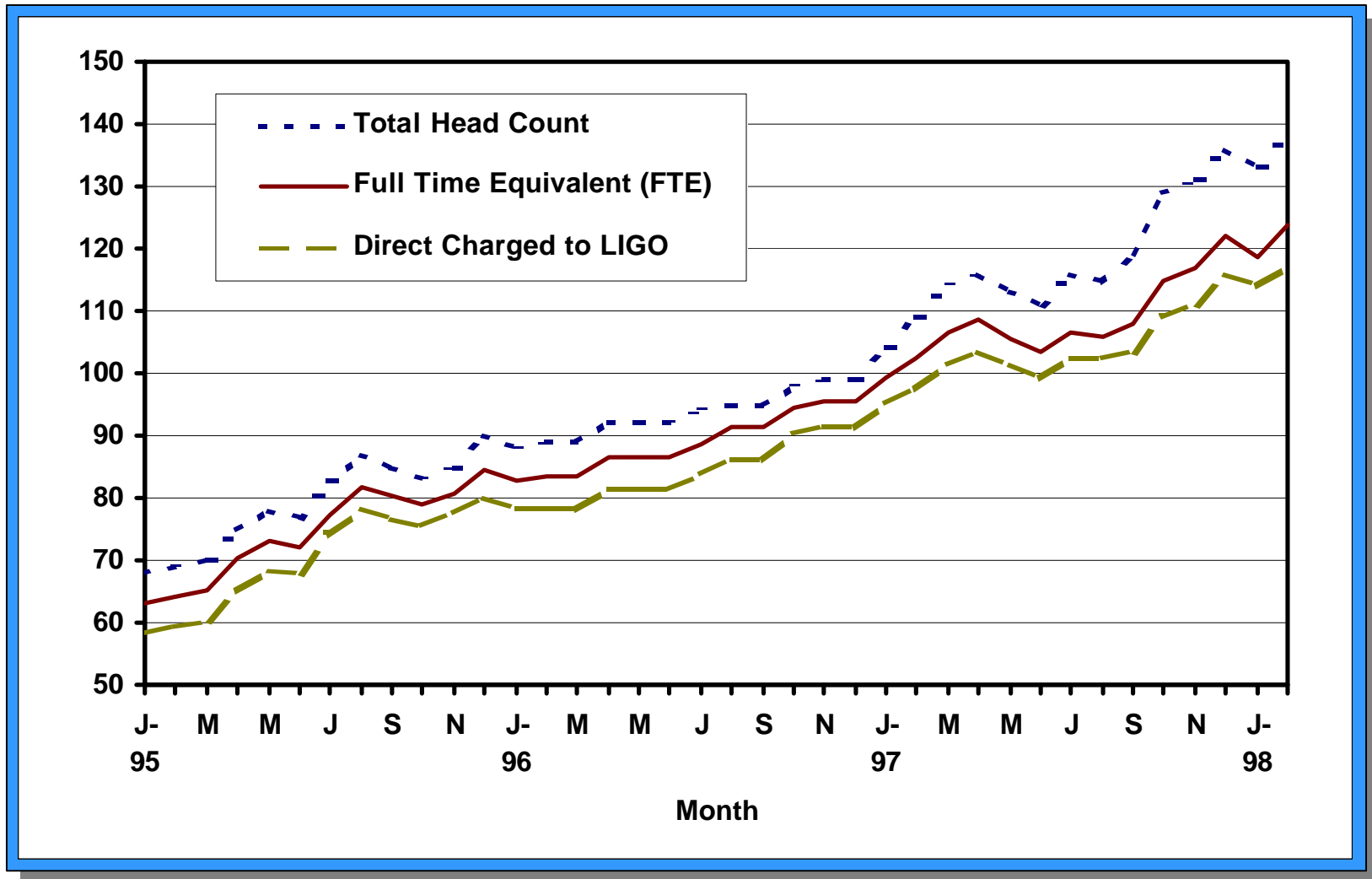
As of the end of February 1998  
(Excluding Undergraduates)

		Caltech	MIT	Washington	Louisiana	Total
<b>Direct</b>	<b>Headcount</b>	<b>59.0</b>	<b>21.0</b>	<b>11.0</b>	<b>5.0</b>	<b>96.0</b>
	<b>FTEs</b>	<b>53.0</b>	<b>18.1</b>	<b>11.0</b>	<b>5.0</b>	<b>87.1</b>
<b>Contract</b>	<b>Headcount</b>	<b>38.0</b>		<b>3.0</b>	<b>1.0</b>	<b>42.0</b>
	<b>FTEs</b>	<b>33.7</b>		<b>3.0</b>	<b>1.0</b>	<b>37.7</b>
<b>Total Headcount</b>		<b>97.0</b>	<b>21.0</b>	<b>14.0</b>	<b>6.0</b>	<b>138.0</b>
<b>Total FTEs</b>		<b>86.7</b>	<b>18.1</b>	<b>14.0</b>	<b>6.0</b>	<b>124.8</b>

<b>Graduate Students</b>	<b>Headcount</b>	<b>7.0</b>	<b>4.0</b>	-	-	<b>11.0</b>
<b>(included above)</b>	<b>FTEs</b>	<b>7.0</b>	<b>4.0</b>	-	-	<b>11.0</b>

<b>Visitors</b>	<b>Headcount</b>	<b>9.0</b>	<b>1.0</b>	-	-	<b>10.0</b>
	<b>FTEs</b>	<b>8.1</b>	<b>0.5</b>	-	-	<b>8.6</b>

# Staffing Chart



# Summary

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- LIGO Construction Project status supports the December 2000 and December 2001 Project milestones
- LIGO will complete the Construction Project within the \$292.1 Approved Funding
- LIGO has the management systems in place to monitor progress and assure success
- LIGO has hired the technical staff (and other staff) needed to support the Construction effort