LSC Meeting
LIGO Laboratory Report

Barry Barish

LIGO

LIGO

news

- Project Status - M. Coles (Amaldi)
  - » construction: complete this year (except for LLO bakeout and computer systems)
  - » detector installation underway
- Transition from '*LIGO Project*' to '*LIGO Laboratory*'
  - » commissioning of LIGO
    - PSL stable; IOO attains first mode cleaner lock (Hanford 2 km)
    - plans: 1) one 2km arm 2) short Michelson
  - » data analysis systems for LIGO
    - LDAS being implemented by Laboratory (infrastructure)
    - end to end model
  - » preparations for LIGO II
    - advanced R & D on RSE; suspensions; thermal noise; sapphire, etc
    - costing; engineering; proposal to the NSF

LIGO Plans

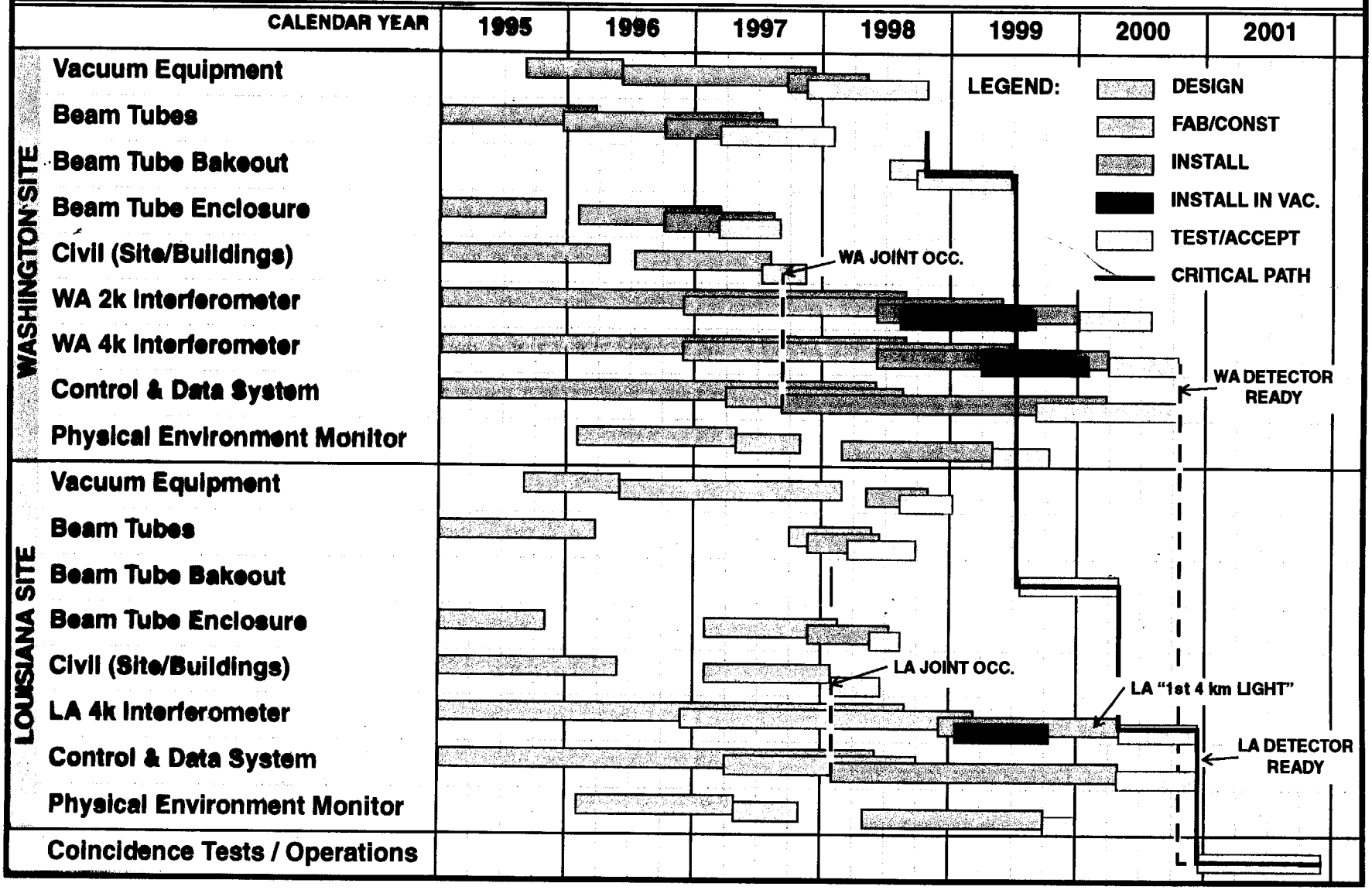
main activity

1996	**Construction Underway**
	-mostly civil
1997	**Facility Construction**
	-vacuum system
1998	**Interferometer Construction**
	-complete facilities
1999	**Construction Complete**
	-interferometers in vacuum
2000	**Commission Detectors**
	-first light; testing
2001	**Engineering Tests**
	-sensitivity; engineering run

LIGO

APRIL 1999

SUMMARY INTEGRATED SCHEDULE



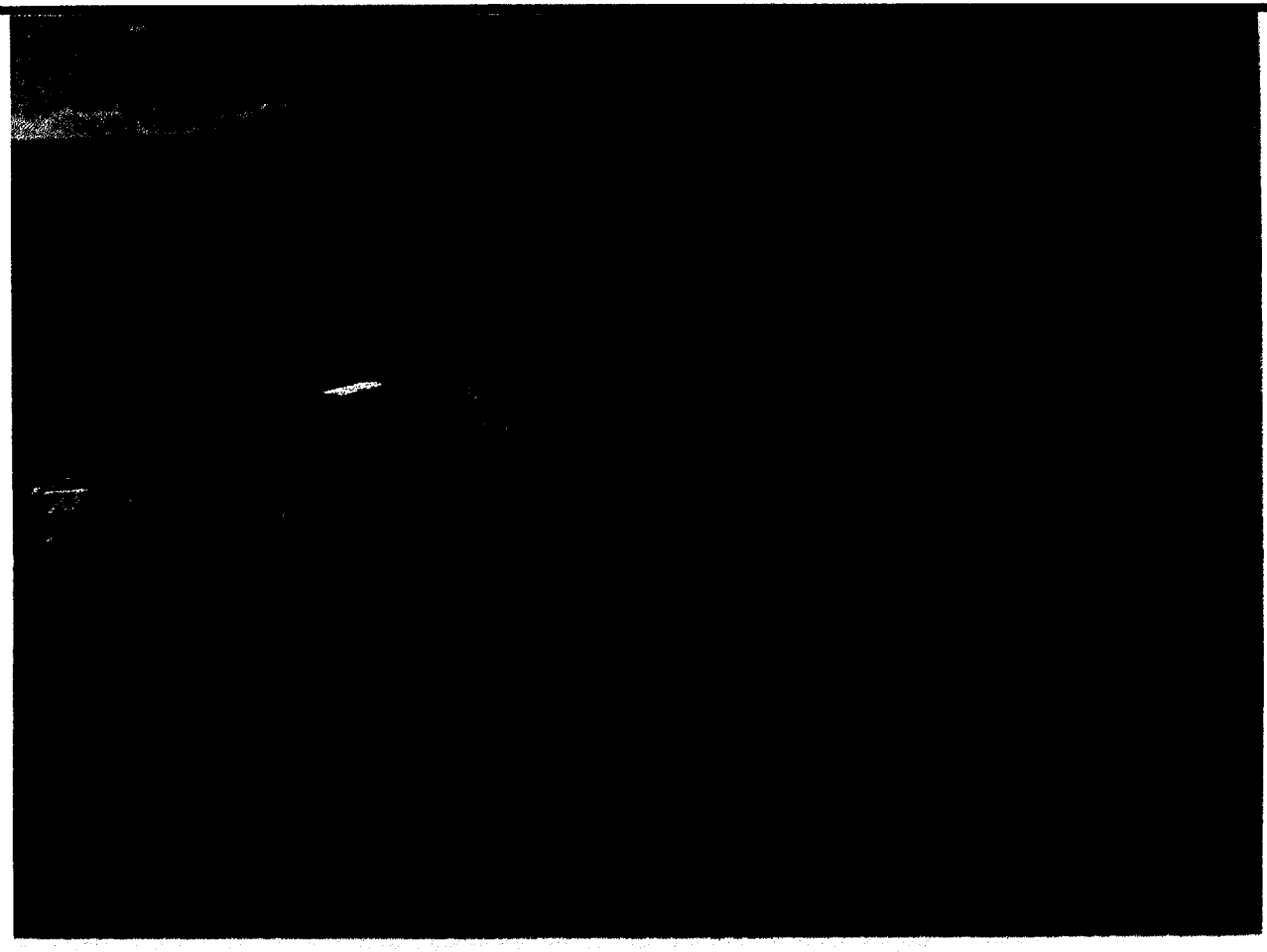
LIGO Science

physics schedule

- First Physics Run (~2002-2004)
  - » begins after h ~ 10^{-21} attained
  - » two year run allows first neutron binary search (live time ~ 1 yr)
  - » LIGO I Collaboration
- Implement LIGO II (~2004-07)
  - » Advanced R&D underway to reach h ~ 10^{-22}
  - » LSC White Paper (detector and data analysis) to set out plan
  - » implemented from ~2004 over several years
  - » physics runs interleaved
- Advanced Detectors (> 2007-)
  - » new optical configurations, new vacuum chambers, floor space, etc

LIGO

Hanford



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LIGO

Hanford
activities

- Staffing continues to grow on schedule
- Bakeout complete
- Optics and Vacuum preparations fully operational and now a central activity
- Laser and prestabilization installed in 2K and performance studied
- Input Optics mode cleaner locked
- HAM Seismic Isolation tables installed
- BSC Seismic Isolation tables underway
- Control room becoming a 'control room'
- Outreach (REU, High School teachers, etc)

Hanford

optics preparation/installation

LIGO

Livingston
activities

- Developing site infrastructure
- Beginning installation
- Preparing for bakeout
- O-ring problem and refit
- Environmental measurements satisfy design
- Seismic measurements - levels, transients, etc being studied
- Road construction underway
- Mitigation for shooting incidents

Livingston

vacuum systems

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facilities milestones

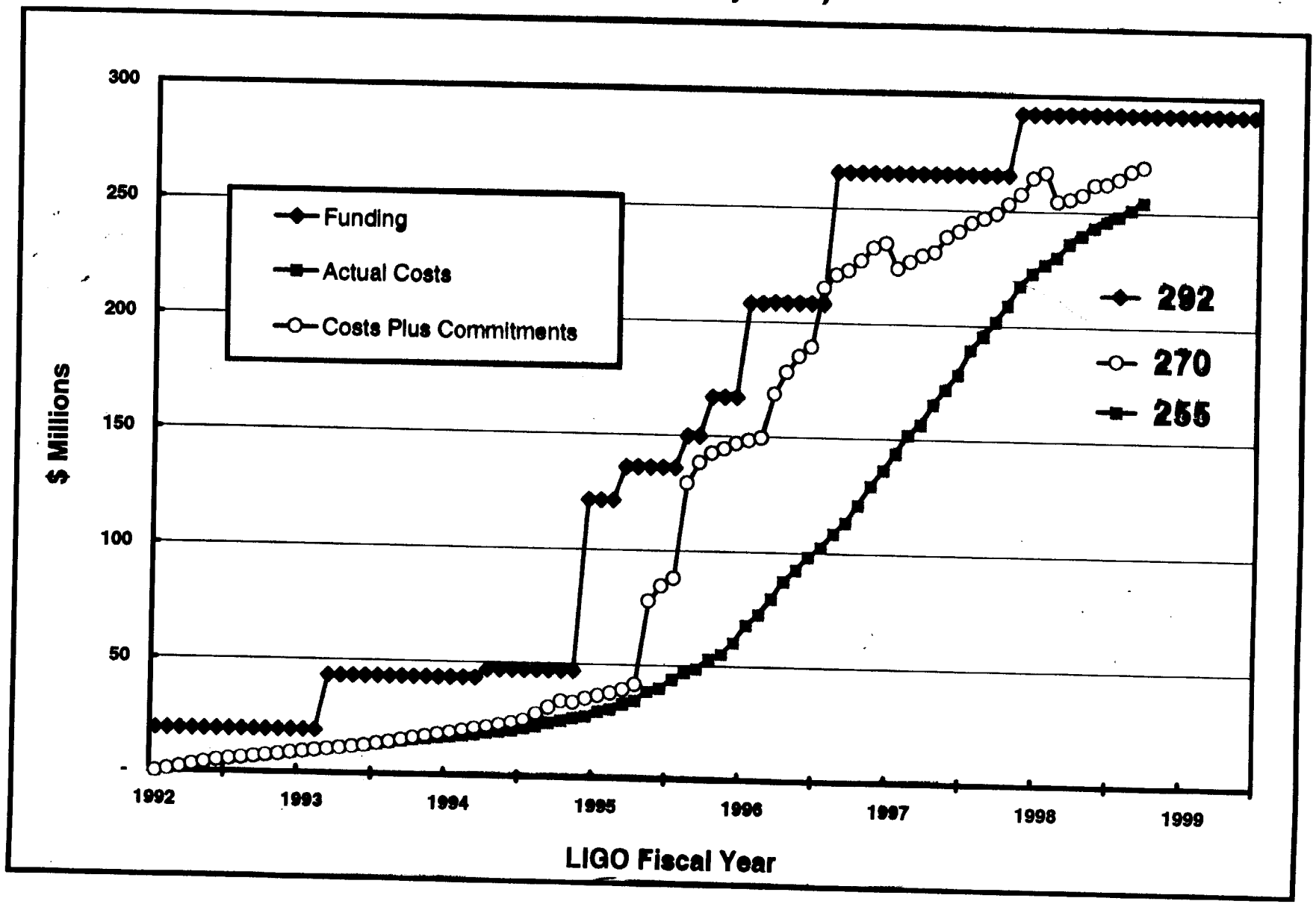
Milestone Description	PMP	Projection/ Actual	PMP	Projection/ Actual
	Hanford		Livingston	
Initiate Site Development	Mar-94	Mar-94	Aug-95	Jun-95
Beam Tube Final Design Review	Apr-94	Apr-94	Apr-94	Apr-94
Select A&E Contractor	Nov-94	Nov-94	Nov-94	Nov-94
Complete Beam Tube Qualification Test	Feb-95	Apr-95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

LIGO

detector milestones

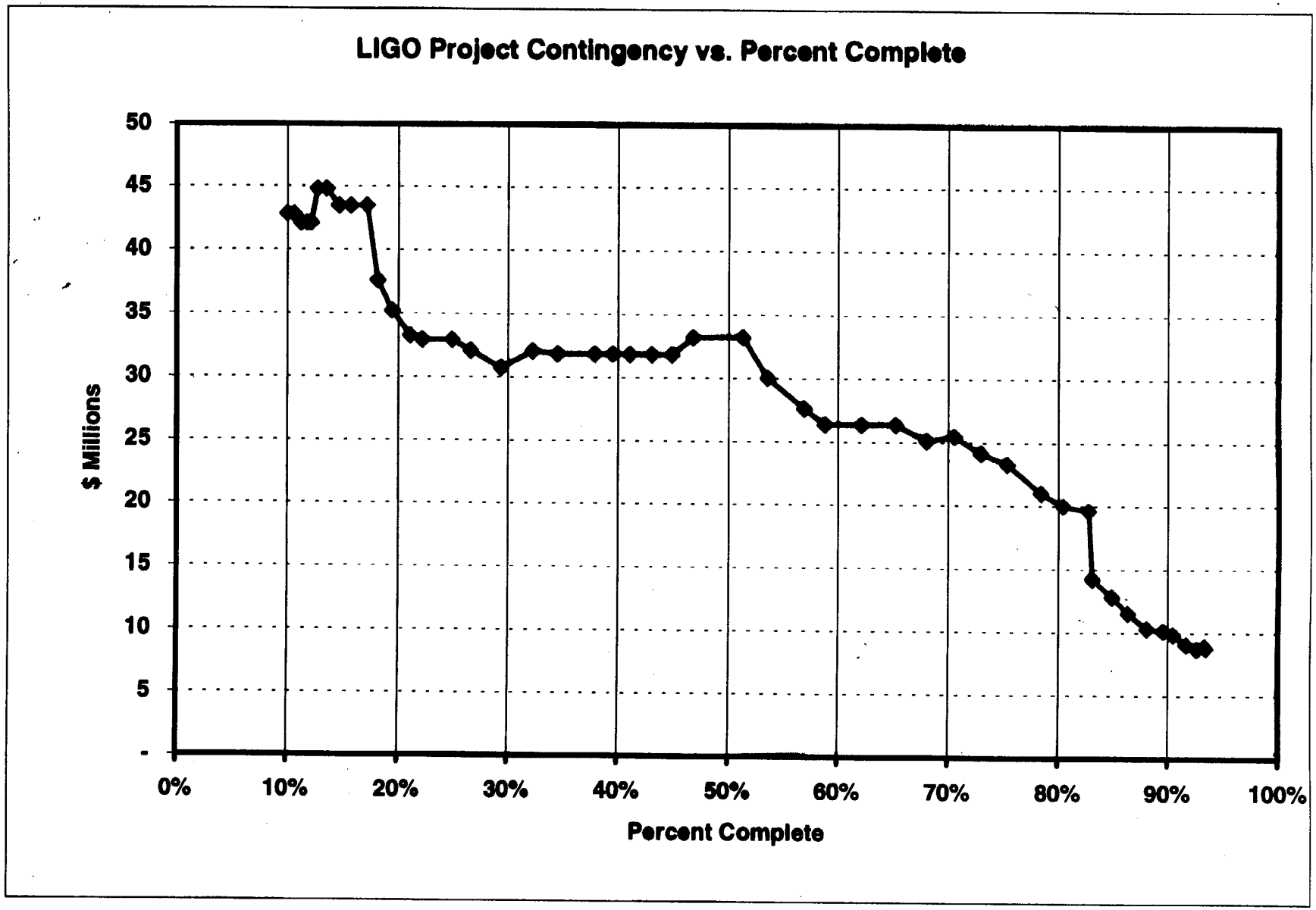
Milestone Description	PMP	Projection/ Actual
Beam Splitter Chamber Stack Final Design Review	Apr-98	Aug-98
Core Optics Support Final Design Review	Feb-98	[illegible]
Horizontal Access Module Final Design Review	Apr-98	[illegible]
Core Optics Components Final Design Review	Dec-97	[illegible]
Input/Output Optics Final Design Review	Apr-98	[illegible]
Pre-Stabilized Laser Final Design Review	Aug-98	Mar-98
Alignment Sensing Final Design Review	Apr-98	Jul-98
Length Sensing Final Design Review	May-98	Jul-98
Washington Controls Area Net Ready to Install	Apr-98	Mar-98
Control and Data System (CDS) Data Acquisition Fi	Apr-98	May-98
Physics Environment Monitoring Final Design Revie	Jun-98	Oct-97
Detector System Preliminary Design Review	Dec-97	Oct-98
Begin Washington Interferometer Installation	Jul-98	Jul-98
Begin Louisiana Interferometer Installation	Jan-99	Jan-99
Begin Coincidence Tests	Dec-00	Dec-00

LIGO Construction Costs and Commitments
(End of February 1999)



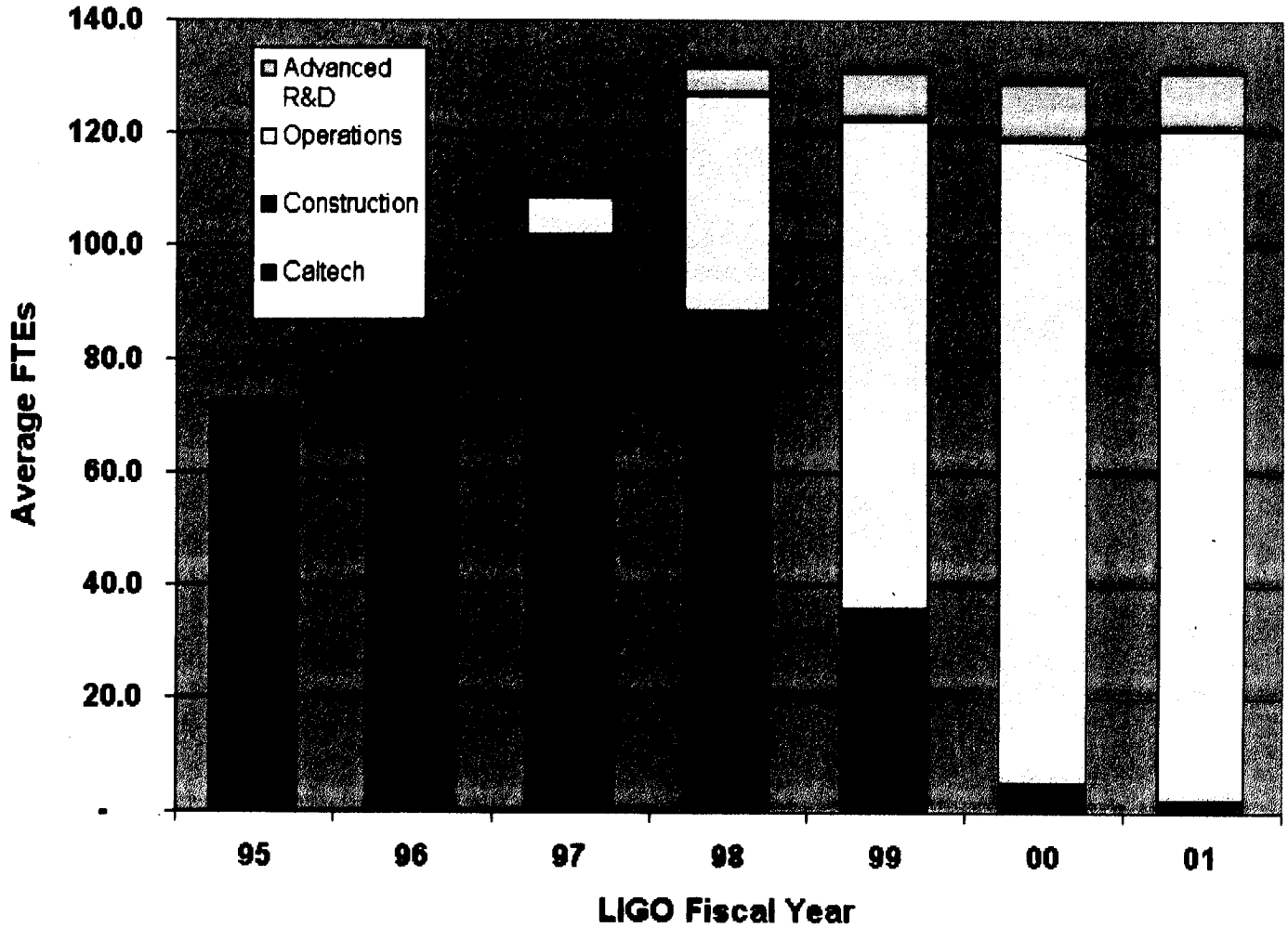
LIGO FY Chart Chart 5

4/7/99


LIGO Project Contingency vs. Percent Complete
$ Millions
50
45
40
35
30
25
20
15
10
5
-
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent Complete

Staffing

labor distribution projections



LIGO

Detector

construction and installation

- Production Status:
  - » Seismic Isolation well along
  - » Large Optics Suspensions under production
  - » Small Optics - most are fabricated
  - » Sensor/Actuator - sufficient quantity fabricated
  - » Core Optics Components - most polished and coated
  - » Lasers - 5 received
  - » Pre-stabilized laser - installed in 2K at Hanford
  - » Input optics - all polished and coated; installation in progress for Hanford 2K
  - » Core optics support - production underway
  - » Interferometer sensing and control (ISC) installation underway
  - » CDS - installation proceeding
- Overall about 2-3 months behind schedule

Interferometers
commissioning plan

- Management organized
- Subsystem testing and commissioning
  - » functionality demonstrated and independent performance
- 2 km IFO commissioning
  - » Integration of PSL and modecleaner
  - » Single arm cavity (2 km)
  - » Power-recycled (short) Michelson
  - » Power-recycled Fabry-Perot Michelson
- Brings together all our expertise - subsystems, interferometers, modeling, diagnostics and data analysis

Data Analysis

- LIGO Laboratory building underlying systems
  - » On site and off site data analysis hardware
  - » Data analysis architecture and non science software development
  - » Subsystem and end to end simulation systems
- LSC organizes the data analysis
  - » White paper describing the goals, organization, responsibilities and schedule being written
- LSC Working groups
  - » Detection Confidence and Statistical Analysis
  - » Detector Characterization
  - » Astrophysical Source Identification and Signature

LIGO

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LIGO Scientific Collaboration (LSC)

- **Research organization for LIGO**
  - » includes LIGO Laboratory and outside community
  - » about 25 institutions and 250 researchers
  - » open to anyone in the world community desiring to do research on LIGO
- **Scientific Data Analysis for LIGO will be conducted through the LSC**
  - » white paper by fall 1999
- **LIGO I - 2002-2004 data run and science**
  - » LIGO I group is a subset of LSC, includes LIGO Laboratory and other LSC members who make *'comparable contribution to LIGO Laboratory members - technically or in data analysis'*.
- **LIGO II concept developed through the LSC**
  - » Conceptual proposal and review at NSF (fall 99)

Note 1, Linda Turner, 08/17/99 07:23:29 PM
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