National Ignition Facility Quarterly Status Report— Fourth Quarter 2000, July–September 2000

November 1, 2000

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DISCLAIMER

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NATIONAL IGNITION FACILITY
FOURTH QUARTER STATUS REPORT SUMMARY
JULY–SEPTEMBER 2000

Project Name:	National Ignition Facility	Building No.	581, 681 at LLNL	
NNSA Line Item No.:	96 D - 111	**Project Manager:**	E. I. Moses	925-423-9624 925-423-2612 (fax)
Budget & Reporting No.:	39 DP 02 (PACE) DP 0213 (OPC)	**System Engineer:**	M. L. Spaeth	925-424-4940 925-422-4667 (fax)
Funding Source:	Weapons Stockpile Stewardship – ICF	**Program Sponsor:**	C. J. Keane	301-903-4323
Original Funding Year:	’96 (first quarter)	**Construction Manager:**	V. S. Roberts	925-424-3662 925-423-7588 (fax)
Project Summary Description:	The Project provides for the design, procurement, construction, assembly, installation, and acceptance testing of the National Ignition Facility (NIF), an experimental inertial confinement fusion facility intended to achieve controlled thermonuclear fusion in the laboratory by imploding a small capsule containing a mixture of the hydrogen isotopes deuterium and tritium. The NIF will be constructed at the Lawrence Livermore National Laboratory (LLNL), Livermore, California as determined by the Record of Decision made on December 19, 1996, as a part of the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS).			
Project Justification:	The mission of the National Inertial Confinement Fusion (ICF) program is to achieve controlled thermonuclear fusion in the laboratory. This program supports the National Nuclear Security Administration (NNSA) mandate of maintaining nuclear weapons science expertise required for stewardship of the stockpile, testing of nuclear weapons effects, and the development of fusion power by providing a database for inertial fusion ignition. This mission was identified in the NIF Justification of Mission Need, which was endorsed by the Secretary of Energy. Identification of target ignition as the next important step in ICF development for both defense and nondefense applications is consistent with the earlier (1990) recommendation of NNSA’s Fusion Policy Advisory Committee and the National Academy of Sciences Inertial Fusion Review Group. In 1995, the NNSA’s Inertial Confinement Fusion Advisory Committee affirmed the program's readiness for ignition experiments. A review by the JASONs in 1996 affirmed the value of the NIF for stockpile stewardship.			
Interfaces with Other Projects	The NIF is a key element of the Stockpile Stewardship Program. It will provide scientific data for secondaries and will complement hydrodynamic tests and material testing for primaries. The NIF will provide data to calibrate ASCI models.			
Risk Management:	The System Engineering group has been organized and chartered to identify and manage risk. Working Groups within this organization include Beampath, Flange to Flange (cleanliness), Alignment, Contamination Control, Laser and Target Area Building (LTAB) lighting, Test Plans, Activation, and Subsystem Design Requirement/Interface Control Document (SSDR/ IC) Update.			
Execution & Acquisition Strategy:	The model successfully employed to execute the Conventional Facility has been adapted for the Beampath Infrastructure Systems. This model relies on the services of an Architect/Engineer (A/E) for design and an Integration Management and Installation (IMI) Contractor to assist in managing the complex interfaces during installation and the commissioning of construction contracts. This quarter the IMI contract was approved by DOE OAK and awarded to Jacobs Engineering. The Acquisition Strategy for laser equipment will focus on the use of integrating contractors to the maximum extent possible to achieve the performance specifications and incorporate technology advances.			

Project Manager's Fourth Quarter 2000 Progress Report

Summary Status

Category	Last Period	This Period	Projected Next Period
Overall cost	Major concern	Satisfactory*	Satisfactory*
Overall schedule	Major concern	Satisfactory*	Satisfactory*
Overall technical	Satisfactory	Satisfactory	Satisfactory
Overall Project	Major concern	Satisfactory*	Satisfactory*

*Based on approval of the rebaseline cost and schedule estimates by the DOE ESAAB on August 31, 2000, and acceptance by Congress via appropriation of the required FY01 rebaseline funding.

NIF Project Manager's Assessment

Overall Project Assessment

The NIF Project has been in the process of rebaselining its cost and schedule during this quarter. While working through the rebaseline process, the NIF Project has been tracking progress according to the Rebaseline and Transition Period Implementation Plan (TPIP) milestones. At the end of this quarter, all TPIP II milestones have been completed. The TPIP II milestones are provided in the schedules immediately following the Project Manager's Assessment section. This completes the TPIP II reporting for FY00. NIF Project progress in FY 2001 will be reported against the new baseline cost and schedule approved by the Energy Systems Acquisition Advisory Board (ESAAB) (Level 0 BCCB) at the end of the fourth quarter.

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The major activity for the NIF Project in this quarter was the preparation of rebaselined cost and schedule estimates and their review by the NIF Rebaseline Validation Review Committee as recommended by the Secretary of Energy Advisory Board (SEAB) Task Force on the NIF Project. This review consisted of an in-depth cost, schedule, technical, and management review by an independent team of experts with experience in large technology projects. The reviewers were enlisted from the government and private sectors under the leadership of Kathleen Carlson, Manager of the DOE Nevada Operations Office, and Daniel Lehman from the DOE Office of Science. In addition, Burns and Roe Enterprises, Inc. (BREI) independently reviewed the NIF cost estimate at the same time as the NIF Rebaseline Validation Review. The review took place between August 7 and August 11 and consisted of plenary sessions followed by nine parallel sessions. The parallel sessions consisted of subcommittees that reviewed large optics; line-replaceable units (LRUs); assembly, installation, and commissioning; integrated computer control systems; conventional facilities and beampath infrastructure systems; environmental health and safety; cost, scheduling, and funding; procurement; and management. The findings and results of the review were briefed to the NIF management, representatives from DOE/NNSA, LLNL, and the University of California. These review team's findings concluded:

1. There are no show stoppers within the NIF Project.
2. The NIF Project can be completed successfully within the cost and schedule defined.
3. The NIF Project management team is capable of bringing in the project successfully.
4. The NIF Project objectives can be met with current technology; technical improvements in optics more resistant to laser damage will improve future operating costs and availability.
5. The NIF is a frontier project. The contingency appears appropriate at this stage.

The BREI Independent Cost Review conclusions included assessments that processes used to estimate LRU costs are justified, methodology for arriving at beampath infrastructure system (BIS) costs are acceptable, overall contingency is adequate, schedule assumptions are reasonable, critical paths defined and adequate, and project end date is funding constrained.

Results of these reviews of the NIF rebaselined cost and schedule were presented to the Level 0 Baseline Change Control Board, as part of the

ESAAB meeting chaired by the Deputy Secretary of Energy, which was held on August 21 (pre-ESAAB) and August 31 (final ESAAB) at DOE. The ESAAB approved the new NIF baseline, which allowed the Secretary to submit his certification of the NIF Project baseline along with his recommendations for FY 2001 and out-year funding plans to Congress by September 15, 2000, as required by the Energy and Water Subcommittee. The acceptance of the new NIF baseline cost and schedule and the appropriation of funds by Congress completes the rebaseline process.

In late September, the budget for the NIF Project in the final conference language of the Energy and Water Bill reduced the TEC for FY01 by $10M from $209.1M to $199.1M. Also included in the language of the bill were six requirements for the Project to be satisfied by March 31, 2001. These requirements include showing progress on meeting project milestones in the first two quarters of FY01, implementing the earned-value system, studying options for 48- or 96- beam operation of NIF along with the identification of "off-ramps" tied to NIF performance, an assessment of how NIF fits in the Stockpile Stewardship Program, and alternatives to NIF. The bill requires that NNSA Administrator John Gordon certify the NIF Project by March 31, 2001, and that $69.1M of NIF Project funds be held by NNSA until this certification is provided to Congress. (Note: the President signed the combined Energy and Water and VA/HUD bill into law on October 27, 2000) The impact of the $10M reduction in funds on the FY01 plan is currently being evaluated.

Safety: The ES&H Subcommittee of the NIF Rebaseline Validation Review gave high marks for the Safety Authorization Basis and safety process and made specific recommendations to improve implementation of the Construction Safety Program (CSP). Many site safety specific improvements, including the Integration Management and Installation (IMI) Contractor taking site safety responsibility, update of the CSP, and initiation of a Directorate Lessons Learned Program, are nearing completion, and a follow-on review by the Subcommittee Chairperson is scheduled in the first quarter of FY 2001.

Technical Status: NIF Project technical status remains satisfactory. Progress this quarter included second pilot runs at commercial suppliers that confirmed yield and glass quality. Over 1000 pieces of glass are now available. Preparations are under way for first production. Substantial progress was made using a new technique to anneal damage sites and stop damage growth in ultraviolet (UV) optics.

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Schedule: The overall project schedule status is satisfactory. Completion of the BIS design, award, and start of the contract for the IMI Contractor are on schedule. The award of the IMI was approved by DOE and awarded in August (TPIP II milestone).

The construction status of the Conventional Facilities at the end of September is 94.4% complete.

Cost: Overall cost status is satisfactory. The Rebaseline Validation Review concluded that NIF could be completed within the rebaseline cost estimate. The step remaining is the approval of the FY 2001 appropriation.

Fourth Quarter Transition Period Implementation Highlights

Project Office: Activities to rebaseline NIF's cost and schedule were completed, and the rebaselined cost and schedule were approved by DOE and submitted to Congress on September 15, 2000.

Site and Conventional Facilities: The target bay roof and insulation were completed (TPIP II milestone).

Injection Laser System: The TPIP II Milestone "Release RFP for PABTS Vacuum Relay Telescope Design and Engineering Prototype" was completed one month ahead of schedule. Subsequently, responses from five interested subcontractors were received.

Amplifier: The key accomplishment in the amplifier area was the completion of the clean up and certification of the Class-100 clean room that will be used to assemble and align the amplifier enclosures (buses). The assembly stand transitioned from Class 100,000 to Class 100 in several controlled stages during the quarter, culminating in meeting the clean-room certification milestone on schedule (TPIP II milestone).

Beampath Infrastructure: The IMI subcontract was awarded August 29 (TPIP II critical path milestone). This was preceded by the LLNL Contract Review Board meeting for the IMI Subcontract held the first week in August and DOE Headquarters (HQ) approval August 23, 2000.

Integrated Computer Control: Timing System: TPIP II milestone "Award of Facility Timing System First-article Procurements" is complete.

Optics: LLNL Quality Assurance (QA) inspection completed on first laser bundle pilot vacuum windows (TPIP II milestone).

Laser Control Systems: A contract to procure lenslet arrays for the full quantity of Hartmann sensors for the NIF was placed with Wavefront Sciences. This completed a TPIP II milestone on schedule.

Target Experimental Systems: 300 J of 1ω light was generated on the Optical Sciences Laser in support of FOA 3ω damage studies (TPIP II milestone).

Operations Special Equipment: Amplifier docking structure was delivered and installed (TPIP II milestone).

ES&H and Supporting R&D: NIF Construction Safety Program was updated to guide the IMI activities (TPIP II milestone).

First Quarter FY 2001 Scheduled Activities

The major activities scheduled to occur in the first quarter are to:

- Initiate IMI contractor activities.
- Release the FEIST Version 3 software.
- Document the assessment of the first prototype crystal for the final optics.
- Conduct the NIF Program Review Oversight Committee meeting.
- Complete the Wavefront Verification System (WAVES) installation and acceptance testing.
- Complete the Final Supplemental Environmental Impact Statement (SEIS) supported by an analysis of the Congressionally mandated option review.
- Complete Management Prestart Review for Phase 1 of the Optics Assembly Building (OAB) (final TPIP II milestone).
- Continue the update of Project Administration documents and procedures.
- Approve the FY 2001 Cost Account Plans (CAPs).
- Select the product to replace Sherpa.

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1.1 PROJECT OFFICE

ACTIVITIES

Rebaseline Validation Review Committee presentations, ESAAB reviews of the validated cost and schedule, and TPIP II milestone implementation were the predominant activities during the fourth quarter.

Project Office

The major Project Office activities in the quarter were: (1) submitted the rebaseline cost and schedules for the NIF Balanced Program Plan in July; (2) conducted the August 7–11 Independent Rebaseline Validation Review of NIF costs, schedule, management, ES&H, and risk management; (3) after completing the Rebaseline Validation Review, supported the pre-ESAAB and ESAAB reviews of the cost and schedule baselines; (4) supported DOE's submittal of the rebaseline cost and schedule to Congress.

Congressional acceptance of the rebaseline and appropriation of FY 2001 funds will be the final approval of the rebaselined cost and schedules.

The key documents needed to support the rebaseline, such as the *Project Data Sheet*, *Project Execution Plan*, and NIF procedures, were all updated (TPIP II milestone).

The core set of 30 Project procedures was updated. New procedures covering activities such as Cost Account Plan preparation are in progress.

Assurances

The following site safety improvement tasks were accomplished: (1) an update of the Construction Safety Program (TPIP II milestone) for the upcoming IMI contract was completed and placed in the management approval cycle; (2) site safety surveillance and management safety walkabouts were stepped up; (3) after a near miss involving a cable break following vessel setting (CSP-13), a DOE Occurrence Report was filed, and the causes were evaluated by a team chaired by the Associate Project Manager for System Operations; (4) the OAB Hazards Analysis Report (TPIP II milestone) was issued; and (5) efforts to obtain independent safety reviewers were accelerated.

Two MPRs occurred in the quarter: (1) the Central Plant MPR, which was completed on schedule in June 2000 (this MPR marked the transfer of the Central Plant from construction to commissioning/operations) and (2) the MPR for Phase I of the OAB. This MPR, completed

in early October, permits the installation of assembly equipment and operation of cleaning equipment.

Engineering Services

The Engineering Services TPIP II milestone for September was completed on schedule. Four vendors have been selected to bid in the first round for the Sherpa Project Database Management System (PDMS) replacement. The products and vendors are: Metaphase by SDRC, eMatrix by MatrixOne, Windchill by PTC, and Enovia by IBM, which is sold by Advanced Enterprise Solutions, AES.

The next step in this process is to place a small-value, study/demonstration contract with each vendor in early October. The purpose of this contract is to pay for an in-depth analysis of the NIF's product data management requirements and business process, culminating in a demonstration of each vendors' product using NIF-supplied data and hardware. This demonstration will become the technical evaluation for a best-value contract expected to be placed early next year.

System Performance and Risk Analysis

A conceptual review of the goals and scope for the NIF Virtual Beamline project was prepared and presented. This effort described the changes and improvements required to the NIF's central laser amplifier/propagation code (Prop92) required to support various NIF design, deployment, and operations activities. This completed a TPIP II milestone.

The Prop92 code is used to predict laser performance. Parameters such as laser focal spot size, intensity uniformity, and scattered light are directly affected by the quality of the optics procured and installed in the laser. A simple Excel-based spreadsheet model was developed and validated against Prop92 for estimating these three parameters. This code is intended to be used by engineers for estimating the impact of accepting nonconforming optics. This spreadsheet may also be used by the Commissioning Team for selecting the initial set of optics.

System Integration and Requirements

The TPIP II milestone, "Top Two Product Data Structure Levels under Configuration Control," was accomplished this quarter. Fourteen general arrangements comprising the second tier (Level 1) were defined and the drawings entered the sign-off workflow.

The Requirements Revalidation Project made progress last quarter. About 70% of the System and Subsystem Design Requirements (SDR & SSDR) were sorted according to the NIF Work Breakdown Structure (NWBS), and about 25% of the new requirement documents were distributed as initial drafts for review and comment. In addition, the flowdown of performance requirements began when a draft of the first-

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tier requirement document and a second-tier were sent out for review. To facilitate the flowdown process and manage the requirements, a database application is being developed. This application will accept the requirements from Excel spreadsheets for configuration control and report generation. The Project Tracking milestone for accepting this application is on schedule for November release.

A style guide was written for developing interface control information as part of the requirement revalidation effort. This guide describes the process and format for generating the Interface Arrangement (IA) Drawings. These drawings define a system based on the NWBS and graphically show the interfaces with other systems. The guide additionally describes how to convert the existing Interface Control Document (ICD) information into a database-centered system and how to get the new information approved.

System Alignment

The precision survey of Laser Bay 2 was released at the beginning of the September. The residual errors (uncertainties) for any of the survey network monument locations does not exceed 300 μm. This network is now being used for precision setting of vessels in CSP-13. Form A's (precise location and tolerances) are being delivered "just in time," for the most part, to the CSP-13 contractor.

Transport mirror sizes and coating angle errors identified by the System Alignment Team were presented to the Change Control Board Level 4 (CCB4) board, and are in the process of being corrected. A significant number of LM7C mirrors will be replaced by LM7B mirrors. In addition, the angle ranges for all LM7s and all LM8s are being corrected on the fabrication drawings.

Contamination Control

The Conceptual Design Review for the Off-Normal Incident Cleaning System (ONICS) was held in September. The review addressed cleaning tool alternatives for meeting the cleanliness requirements. The tools may be also used by the infrastructure installation teams. This review completed a TPIP II milestone.

A trip to visit the French Ligne d'Integration Laser (LIL) team occurred in September. The purpose of the trip was to establish technical discussions. This trip included tours of various facilities, measurement of cleanliness and nonvolatile residue (NVR) in their various facilities, and setting up and measurement of laser slabs using the slab flatbed scanning system. Results from the Nova retrospective, which showed slab damage growth to be independent of number of shots, slab position, slab surface, and gas flow, were presented.

Configuration Management, Change Control Actions

The following tables list the formal actions completed by the CCB4 during this quarter. The fourth quarter Contingency Log in Attachment A, Financial Status, does not show all the actions completed in September, but instead lists only the four actions impacting the remaining contingency pool in FY00. Contingency impacts for FY01–FY08 for actions completed in September 2000 and beyond will be reported in the FY01 October Monthly Report against the revised baseline and contingency pool.

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ECR	Title	Resolution	Cost ($K)
1142	OAB Interferometer	Approved	60.0
1518	Video and Network Cable Additions	Approved	368.6
1849	Modify Amp Kinematic Mounts	Approved	0.0
1879	Functional System Description Revision C	Approved	0.0
1925	TCC Global Change Relative to Nif Global	Approved	82.2
1932	Target Area Vacuum System	Approved	104.8
1937	Tempered Water System	Approved	227.3
1939	Air System	Approved	117.3
1955	NIF PCS New Power Cables and Enclosure	Approved	-3445.0
2002	Corrosion of Spatial Filter Vessel Stainless Steel	Approved	0.0
2015	Target Area Utility Rework	Approved	340.0
2053	3-Omega & Diagnostic Updates	Approved	264.0
2171	Switch Pulse Generator, Switch Pulse Cables, RG217	Approved	10.4
2174	Initiate Study for RMDE Revisions	Approved	90.0
2186	Replace Final Optics Assembly Subsystem SSDR 1.8.7 with Final Optics Subsystem SSDR L-320	Approved	0.0
2247	TSG/CSF Tower Survey Alignment Window	Approved	187.0
2254	Establish NIF Work Breakdown Structure (NWBS)	Approved	0.0
2272	Modify VIV Body slots	Approved	9.1
2282	SY2 Changes on Floor @El. 0-0, Requested by PDS	Approved	150.0
2297	Revise Phase Codes, Rev. C to Rev. D	Approved	0.0
2327	Breadboard Bolts not Flush with Working Surface	Approved	30.0
2331	LTAB Switchyard Mezzanine Air Handlers	Approved	107.0
2374	PASS/Beamtube Interference	Disapproved	5.2

2380	Corrections to Stairs #1, 2, and 11	Approved	0.0
2402	Add Port for Local viewing of FOA 1w Window	Approved	–400.0
2428	Utilities Rework for FOA Revision #2	Approved	251.0
2432	LM7 and LM8 Angle Range Redefinition	Approved	0.0
2466	Update Lens/Window Production Plan at Tinsley – NPS Group 24F	Approved	487.0
2487	Update Amplifier Slab/Mirrors/ Polarizers, NIF Group 24a and 24c	Approved	-13.0

CTR	Title	Resolution	Cost ($K)
364	Stabilize Existing Duct Bank at Utility Building	Approved	75.0
367	STADCO Contract Engineering Change	Approved	47.0
374	Reconciliation of Direct Change Order 30, 49, 53, 60, 63, 73, 80, & 81 for SY Structure #1	Approved	496.0
375	Reconciliation of Direct Change Order 40, 42, 46, & 47 for SY Structure #1	Approved	250.0
376	Reconciliation of Direct Change Order 86, 87, 88, 89, 90, 91, 93, & 94 for SY Structure #2	Approved	257.0
377	Reconciliation of Direct Change Order #16, 23, 30, 31, 41, and 48 for SY Structure #1	Approved	300.0
378	Breadboard Assy-Group PAB NWBS 1.1.3	Disapproved	124.3
379	Parametric Technology Corp-Group ENA-N.M.4	Disapproved	35.0
380	Labor Only Support to Address Housekeeping Tasks, Lighting, and Temporary Power around the NIF Construction Site.	Approved	200.0
382	N.L.1.2 - BML Cost Basis Book Reconciliation	Approved	382
384	N.L. 1.2.3 - BOM Increase of Funds for LM3 Electrical Panel Requisition (GFE for CSP-16)	Cancelled	384
387	Mirror Mount Testing	Approved	387
388	Additional Title II/III Engineering	Approved	388
389	PEPC Honeywell, K.C.	Approved	389
390	Return $150k to Contingency from Group OAB	Approved	390
391	Returned $3,379k to Contingency for OAB job RTQ in FY07, until more detailed plan is developed	Approved	391
392	$294k for Group OSE	Approved	392

393	Remove FY00 Contract Labor Costs Projected to Cost in FY01 and eliminate FY01 CAP NL6.PACE.LL.LDM	Approved	393
394	Add Job "PAIR Integration" to Group PAQ	Approved	394
396	SAN & SIS Corrections	Approved	396
398	SA Automatic Alignment and Optics Inspection Supervisory System	Approved	398
399	SIT - Integrated Timing System - Scope Increase for Testing	Approved	399
400	Supervisory Control (Group SSC) - PACE	Approved	400
401	FY01 CAP Reconciliation for Control Testing Group (SCV)	Approved	401
402	FY01 CAP Reconciliation for Control Integration Group (SIC)	Approved	402
404	BST-N.L.2.1 - Color of Money Change	Approved	404
405	Return NPGO Contingency in FY01-03 for Administrator Manpower	Approved	405
406	Request PACE Contingency in FY01-03 for Administrator Manpower	Approved	406
407	Request NPGO Contingency in FY04-05 for Administrator Manpower	Approved	407
382	N.L.1.2 - BML Cost Basis Book Reconciliation	Approved	382

Problems / Impacts / Corrective Actions

An error was discovered in the input to the radiation transport model that calculates the temperature decay in the amplifier slabs following the firing of the main laser. When the error is corrected, the temperature decay is slower than previously predicted, and the residual thermally induced optical distortion is correspondingly larger. This is a significant model improvement that appears to move the model closer to previous AMPLAB slab wavefront measurements. The improved model will be utilized over the next months in the model validation effort.

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Clearance problems in the Periscope uncovered by the System Alignment Team were the subject of an Engineering Change Request (ECR) in September. Within the period of one week, the problem was identified and the ECR implemented with significant support by the area integrators, preventing a significant cost and schedule liability.

PROCUREMENTS

None.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. A TPIP II September milestone, Top Two Product Data Structure Levels under Configuration Control, was completed one week late, and the Phase I OAB MPR scheduled for September 30 was completed one week late. These delays do not affect the Project schedule. All other TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

In the first quarter FY2001, the following will be accomplished:

- Implement the Construction Safety Program in October for all IMI work.
- Release the new Project status report.
- Conduct coordination meetings with the French Commissariat a L'Energie Atomique (CEA).
- Issue the NIF Program Training Plan.
- Complete OAB Phase I MPR (final TPIP II milestone).
- Issue the QA audit schedule.
- Issue the Quality Assurance Program Plan for NIF Programs (e.g., QA for supporting development).
- Initiate the update of the Mitigation Action Plan.
- Develop Requirements Database Software—the application software for managing the system requirements will be ready for use.
- Revalidate NIF Clear Aperture/Tolerance—the current alignment tolerances and their affect on system clear apertures will be documented.
- Release 300-micron Network for LB1—the survey network monument locations will be published for LB1.

WBS 1.2 Site and Conventional Facilities

Activities

Conventional Facilities work reached approximately 94.4% completion in September.

Site work for the quarter continued with the installation of fire line and underground utilities. Removal of excess dirt and lime-treated soils was completed. Roadway excavation, compaction, and aggregate base rock were completed. Curb and gutter layout began. Asphalt paving and curb/gutter placement will begin in October.

Progress in the Laser Building included the completion of commissioning of Laser Bay 2. The overall forecast completion for Laser Bay 2, including the target bay lift and life safety testing, is the end of December 2000. Progress in Laser Bay 1 included the completion of drywall finishing/painting, the final coating of epoxy resin floor, and wire termination at terminal panel boards and the elevator lobby. Clean-room certification testing and performance testing of the heating, ventilation, and air conditioning (HVAC) system will take place in mid-October. Work on Elevator #2 continued with a projected early December completion. The control room was commissioned on September 29. Life-safety testing for the control room is scheduled for completion by the end of November. Work forecast to be performed within the preamplifier module maintenance area (PAMMA) next month includes the installation of floor expansion joints, the completion of partition walls and the installation of light fixtures.

Capacitor Bay 3 was substantially completed on September 29, with the completion of floor finishes and the owner-generated punchlist through final inspection. The final commissioning and the execution of the owner-generated punchlist for Capacitor Bay 4 continued and are scheduled for completion in October. Progress in Capacitor Bay 1 and 2 for the month of September included the installation of shrapnel protection, wire pulling, and light fixture installation.

Installation of drywall, wire pulling, and door hardware continued in the OAB Corridor. Floor finish work will commence upon the completion of drywall and other finish work scheduled in October, when traffic can be excluded and the doors kept shut.

Progress on the roof of the Diagnostics Building continued with the installation of Environmental Protection System exhaust fans, stainless-steel ducts, and sheet metal flashing work. Progress in the Diagnostics Building included the completion of sanitary sewer piping at

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the 17.5' level and drywall installation at -3.5', 17.5', 29.5' levels. The installation of stainless-steel piping from grade to 50.5' level and the process piping at -3.5' and 40.0' levels continued.

Progress in Switchyard 2 included the completion of interior conduits and fire sprinkler lines. Preparation of exterior concrete surfaces for panel installation continued for the exterior of Switchyard 2. Installation of Switchyard 2 air-handling unit supply fans, silencers, coils, and panels continued.

Progress in Switchyard 1 included the placement of the final section of roof slab. The installation of ductwork at the 70.0' level and of process piping (vacuum and compressed air) at levels
-21.75' and -3.5' continued.

Completion on the roof of the target bay (TPIP II milestone) included the installation of the built-up roof. Completion in the target bay included the interior painting at the 17.5' and 29.5' levels; the installation of electrical conduits and junction boxes at the 17.5' and 29.5' levels; the installation of process piping at the 17.5', 29.5', and 40.0' levels; and the installation of utility supports at the 29.5' and 50.5' levels. Repair of HVAC chase walls were completed on the east side of the target bay to prepare for the installation of acoustic liner panels.

Major Construction Events in the Fourth Quarter

Roof guides for Switchyard 1 started (TPIP II milestone).

Capacitor Bay 4 inspection complete (TPIP II milestone).

Laser Bay 2 inspection complete (TPIP II milestone).

Target Bay roofing and insulation were completed (TPIP II milestone).

Laser Bay 1 air-handling unit start-up and testing began.

Removal of excess dirt and lime-treated dirt from the site began.

Switchyard 1 and 2 steel structures were substantially completed.

PROBLEMS / IMPACTS / CORRECTIVE ACTIONS

Timely completion of CSP-6/10 continues to be of concern. As the Project approaches completion of conventional facilities construction, the management team is working closely with the subcontractors for close-out documentation and finalization of change orders. The executive management level of both Nielsen Dillingham Builders, Inc. (CSP-6/10) and Hensel Phelps (CSP-9) has heen engaged to address adequate craft and field office staffing to complete work on time and to ensure successful completion of the subcontracts. There is confidence that the milestone, End Conventional Construction, is not threatened.

Site congestion, material storage and proper housekeeping among different subcontractors around the Laser Building, OAB corridor, switchyard, and Diagnostic Building, continued to be a major focus and required close coordination due to ongoing site work and installation of site utilities.

Safety continued to be a major focus during September. Safety-related improvements were made in logistics planning, site housekeeping, and lighting.

PROCUREMENTS

None.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

- Substantially complete Capacitor Bay No. 1.
- Substantially complete Laser Bay 1 with clean-room certification testing.
- Substantially complete Asphalt paving and curb/gutter placement along the west of Diagnostic Building.
- Substantially complete Diagnostic Building elevator machine room roofing/insulation.

WBS 1.3 LASER SYSTEMS

ACTIVITIES

Completion of the rebaseline plan and preparation and presentation of material for the NIF Rebaseline Validation Review was a dominant activity during the past quarter. In addition, all TPIP II milestones planned for this quarter were completed on or ahead of schedule.

Optical Pulse Generation System

New production and first-article chassis have been deployed in the Bldg. 381 integrated system test facility throughout the quarter. These included the oscillator, double-pass amplifier, radio frequency (RF) source, phase modulation, and four dual attenuator-detector chassis. For the most part operation of these chassis has been around-the-clock, seven days a week. Wavelength and output power stability were improved with the production oscillator and double-pass amplifier. Stimulated Brillouin scattering (SBS) and smoothing by spectral dispersion (SSD) phase modulation were achieved in the system for the first time with the RF source and phase modulation chassis. Programmable arbitrary waveshapes are now generated routinely in the system by the amplitude modulation chassis (AMC) that was deployed in the previous quarter. As part of the front-end system integrated test (FEIST TPIP II milestone), laser pulses from the master oscillator room (MOR) system are now being delivered on a regular basis to the prototype preamplifier module (PAM) in another laboratory.

During the next quarter, all four amplifier chassis, the ultra-trigger timing system, and a second AMC will be deployed. This will permit integrated testing of the system at full, 1-bundle output power and timing capability.

Some alignment issues have been resolved in the PAM regenerative amplifier, which increased the cavity transmission from 2% to 60%, meeting the conformance test specification. The regenerative amplifier is now being configured to test long-term pointing and energy stability.

The TPIP II milestone “Complete installation of PASS in Bldg. 381 ILS Risk Mitigation Area” was finished one week ahead of schedule. What was learned during the course of the preamplifier support structure (PASS) installation has greatly facilitated the CSP-13 PASS installation, both in terms of identifying problems ahead of time and improving the installation procedures.

The TPIP-II Milestone “Release RFP for PABTS Vacuum Relay Telescope design and engineering prototype” was completed one month

ahead of schedule. Subsequently, responses from five interested subcontractors were received. An award is anticipated in November.

Amplifier Assembly

The key accomplishment in the amplifier area was the completion of the clean up and certification of the Class-100 clean room (TPIP II milestone) that will be used to assemble and align the amplifier enclosures (buses). The assembly stand transitioned from Class 100,000 to Class 100 in several controlled stages during the quarter, culminating in meeting the clean-room certification milestone on schedule. In addition, the precision cleaning vendor, Astropak, delivered the first precision-cleaned amplifier subassemblies (minibuses) that are being used to test assembly and alignment procedures and hardware under clean-room conditions. These tests are being used to tune the assembly procedures and will continue until early November when the assembly of the amplifier first-bundle hardware is scheduled to begin.

The amplifier bus storage facility in Bldg. 493 (TPIP II milestone) was completed during the past quarter and is now ready to receive assembled amplfiers.

A key step toward completing the production development of the protected silver reflectors (TPIP II milestone) was the demonstration of application of the coating to the diamond-shaped reflectors that separate flashlamps in the central LRUs. This represents verification of the production coating technique on the second of three shapes required for the NIF. The remaining shape, the curved side flashlamp reflectors, will be coated by the vendor during the next quarter.

Amplifier Power Conditioning System (PCS)

The facility for performing the integrated electrical testing and reliability verification for the amplifier system was completed during the past quarter. The test stand includes a prototype PCS module, produced from final drawings, operating into a prototype amplifier enclosure with flashlamp LRUs. Besides testing the new, transportable PCS design, this facility provides the first operation of the actual electromechanical configuration of the amplifier. Testing began in August (TPIP II milestone), and over 100 full-power shots were completed by the end of the quarter. The equipment activation went very smoothly, and no failures have been observed to date.

All other TPIP II milestones were completed on or ahead of schedule.

PROBLEMS / IMPACTS / CORRECTIVE ACTIONS

Several system issues requiring attention have now been revealed by the integrated testing of the master oscillator system. Optical damage has occurred in the fiber amplifier. Although the causes are still being

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investigated, it appears that epoxy used in bonding fiber connections in some of the components is particularly vulnerable to optical damage. These components are being redesigned to eliminate the epoxy.

It has been determined that the ability to produce optical pulse shapes with high contrast is limited by a number of hardware and software factors. Three more AMCs have just been received with modifications that should improve their ability to produce high contrast pulses.

Conversion of frequency modulation to amplitude modulation at the output of the system (referred to as FM-to-AM conversion) was observed when phase modulation was applied. Although the magnitude was approximately 60% of the MOR requirement, it is expected to be significantly reduced by a redesign of the isolator in the fiber amplifier. The diagnostics needed to measure this effect quantitatively are currently being developed.

The cause of the failure of the capacitor charging power supplies from General Atomics (GA) was traced to manufacturing problems with a diode board in the high-voltage section of the supply. The vendor identified a solution to the problem as well as a “screening” test to avoid installing bad diode boards in the future.

Tests on five corrected units at GA and the testing subcontractor revealed no further problems with this failure mode. LLNL and GA representatives met to negotiate a new production and testing schedule, and shipment of production units will resume in October.

The production problems with the Big-T manifolds reported over the past few months appear to be resolved. The vendor, Everson Electric, resolved the potting problems early in the quarter only to find that the parts failed to meet the stringent dimensional tolerances on the electrical connections for the flashlamps. A temporary solution to this problem was identified (post-casting machining the surfaces of the electrical connections) and demonstrated during this quarter, resulting in acceptance of the first production Big-T from the vendor. In addition, the LLNL-produced “back-up” process also produced a an acceptable part in September. It is expected that the 18 Big-Ts required for the first bundle will arrive from a combination of the two sources in November. The LLNL plastic shop effort will be terminated once the vendor has demonstrated their ability to deliver parts reliably.

Efforts are continuing with GA to identify the causes of reduced lifetimes in the production capacitors. Test results and analysis indicate that the problem is due, at least in part, to a reduction in the quality of the dielectric material in the capacitor. GA is working with their sup-

plier to resolve this problem and production is on hold pending resolution of this problem.

Essentially all of the preamplifier beam transport system optical breadboards ordered from one vendor were rejected pending the resolution of labeling and serialization nonconformances. Irregularities in product labeling made it extremely difficult for the warehouse staff to verify that the breadboards that were actually shipped were those stated on the packing lists. The vendor rented a nearby warehouse where the breadboards were transported and proceeded to inventory and correct all labeling on the breadboards. In this process, it was found that the delivery was short by three breadboards, which was corrected. All deliveries of the vendor's breadboards are now complete.

There are no technical issues for optical breadboard production at the other supplier. However, breadboard production at this vendor over the last two months has slowed significantly due to an increased workload from other customers. The production rate has diminished by a factor of three from what it was in early June. Based on the company's recent production rate and projections, the availability of the third of four lots of breadboards needed for CSP-13 is of concern to the Project.

Production of flashlamps at Perkin-Elmer was temporarily halted during this past quarter due to a quality problem with the quartz tubing used to produce the flashlamps. LLNL engineers are working with Perkin-Elmer and their subcontractor to resolve the problem and to determine whether the material is still acceptable for use in the NIF. This problem does not affect project milestones at this time.

PROCUREMENTS

The contract for precision cleaning of the components for the first bundle of amplifier enclosures (minibuses) was awarded last quarter to Astropak. The final shipment of amplifier alignment rails, installed by the IMI contractors, was received and is available for the BIS organization. Procurement reviews for the last amplifier bus components, flashlamp window seals, and plastic insulating curtains were completed during this quarter.

Before the production halt, Perkin-Elmer delivered over 400 of the 8000 flashlamps required for the NIF and most of these have been inspected, tested, and accepted at LLNL.

A contract was awarded to DSI to coat the curved reflectors used in the side flashlamp LRU to prove the production coating process meets NIF requirements. This is the last of the three shapes needed to demonstrate manufacturability of the protected silver reflector coatings.

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Capacitors (~250) for more than one bundle have been received from ICAR. Lifetime tests on samples from this order indicate that the lifetime far exceeds NIF requirements.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

- Begin assembly of the first bundle of NIF amplifier buses in Bldg. 381.
- Receive deliver of the second bundle of capacitors.
- Review procurement for first two bundles of PCS modules.
- Demonstrate protective silver on curved side reflector.
- Receive first bundle of “Big-Ts.”

WBS 1.4 BEAM TRANSPORT SYSTEMS

ACTIVITIES

NIF rebaseline activities and the on-schedule accomplishment of the TPIP milestones were the predominant activities this quarter. All TPIP II milestones were completed on schedule.

The IMI subcontract was awarded August 29 (TPIP II critical path milestone). This was preceded by the LLNL Contract Review Board meeting for the IMI Subcontract held the first week in August, DOE Headquarters (HQ) approval August 23, LLNL issue to Jacobs on August 24, and Jacobs signature on August 29.

Since the award, progress has been made toward issuing a "Notice To Proceed" for the IMI subcontract, expected in early October. Jacobs Facilities Inc. (JFI) submitted the required Safety Plan, Task Identification Process list, and certificates of insurance. Review of the Safety Plan is under way. Additionally, JFI submitted Pro Formas for Purchase Orders, continued procurement planning, and made progress in preparing updated versions of the Project Management Plan and other supporting plans that are due in early October.

Prior to award, technical analysis of the JFI IMI proposal was completed. A "Fact Finding" team composed of JFI and BIS personnel worked through late July and came to joint agreement on the appropriate scope and cost estimates for each element of the IMI contract in good agreement with the Independent Estimate. Agreement was also reached on the terms and conditions, fee structure, and award fee plan. In July, DOE OAK was briefed on completion of these activities and the remaining steps for award of the IMI.

Spatial Filter Vessels/ Enclosures

Connector and Extension Tubes: Fabrication of the straight connector tubes is well under way at SyncroVac with over 160 being fabricated during the quarter, bringing the total complete to over 200. The NIF Cleanliness group is evaluating a number of fluids proposed for use in fabrication of the tubes. Results of the evaluation should be available during the first week in October. This will allow SyncroVac to complete the tubes that have "tees" formed in them. A first article is scheduled for October. The precision cleaning subcontractor for the connector tubes (TMPI) will complete an upgrade of their clean-room work areas by the end of October and will begin cleaning the connector tubes upon completion of this upgrade.

Lukas Machining has delivered most of their contract submittals to LLNL. Still to be delivered are the cleaning and passivation proce-

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dures. Because Lukas has subcontracted this to the same vendor as the connector tubes (TMPI), no problems are anticipated with the remaining submittals. Material has been ordered and fabrication of the tube sections is under way. First-article fabrication is expected to be complete in October.

Spatial Filter Vessel Kinematic Actuator Tower Bellows: Fabrication of the Tower Bellows is complete. The revised passivation/cleaning procedure from TMPI has been approved. A first-article cleaned piece has passed the NVR test. A second test piece is being tested for particulate levels.

Interstage Docking Frames (ISDF) and Enclosures (LBISE): Thirteen of sixteen ISDFs have been received by the end of September, with six being received during this quarter. Unit fourteen will be shipped in early October. The final two units are expected by mid-November.

LBISE: All the Yuba City Steel fabrication procedures and several Deviation Requests were approved and their leak check process witnessed. Technical assistance to the vendor was provided by ATT in September to correct issues with inspection gauging. First-article dimensional inspections for each of the enclosure types is planned for early October.

Enclosures Dielectric Break: A procurement review was completed on August 17 and all material issues raised during previous manufacturability reviews were resolved. A requisition was released in early September and bids are due October 6.

Enclosure Rupture Panels: Design and drawings should be complete in early October, with a procurement review in mid-October. The technical specification is being reviewed for use in the procurement of the target area rupture panels.

LB/SY Enclosure Bellows: Contracts for the fabrication of the laser bay and switchyard beam enclosure bellows were awarded in September. It was decided to split the fabrication between Teflon bellows in the laser bays and stainless-steel bellows for the switchyard. The Teflon bellows order was awarded to Senior Flexonics/Pathway. The stainless-steel bellows order was awarded to Yuba City Steel. Precision cleaning was not included in either contract and will have to be performed after delivery. First articles from both vendors are expected in late October.

LB/SY Enclosure P-Gaskets: All first-article p-gaskets were completed and accepted by the end of September. Roughly a quarter of the production gaskets were received. The deliveries are running about two

weeks behind the contract schedule, but this should not produce any construction schedule delays. Baking and precision cleaning of the gaskets started the last week of September.

Switchyard (SY) Enclosures

Fabrication contract B505128, Straight Switchyard Enclosures, is complete with the final enclosure delivered to LLNL on August 10.

Switchyard Elbows: Responses to the Switchyard Elbow Enclosures RFP that went out on September 22 are due by October 6. The first article has been requested by December 8 with SY2 enclosures complete February 1, 2001, and SY1 enclosures April 2, 2001.

The switchyard 45-degree LM4 and LM5 bellows design is complete. The detail drawings should be completed by mid-October, with a procurement review and requisition release by the end of October.

Switchyard Gate Valve: Due to the size of the valves, no vendor capable of both fabricating and conducting precision clean assembly and testing has been identified. Additional vendors will be investigated in October. The capability of the OAB to clean and assemble the gate valves is being studied. Meanwhile, drawing final checks are expected to be complete by October 23. Drawing packages have been submitted for value engineering and manufacturability reviews.

Design review close out is awaiting seal and drive testing completion. The estimated closure date for both of these is October 17. The Procurement review is now estimated to be on November 1 with the RFP out November 22.

Roving Mirror Diagnostic Assembly (RMDA): During the quarter, all required RMDA interface data was provided by the Beam Transport and Diagnostics organization. The roving mirror kinematic mount (RMKM) GFE hardware design used this data to design support hardware compatible with shared space and installation access limitations. In general, the unresolved interface details involve minor features. All design of RMKM is complete with detail drawings to be ready for review in early October. Progress on GFE hardware design (independent of impact on RMDE CSP-19 installation issues) met the September 20 date originally proposed for the RMDA system design review.

CSP-19 100% Design Review (TPIP II milestone) was completed.

Laser Bay Support Structures

In late August, a decision was made to gross-clean and passivate the sheetmetal cladding of the major components of the Periscope structures prior to installation into NIF. AstroPak increased to a third shift to help mitigate any schedule impact on the CSP-13 Contractor. Passivation for Cluster 3 and Cluster 4 was completed for all the major

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components, including the plasma electrode Pockels cell (PEPC), the LM2, the array frames, and the horizontal inboard beams.

All four of the LM1 support frames completed stainless sheetmetal cladding and were delivered during the quarter. Installation of LRU kinematic actuator hardware for Clusters 4 and 3 is under way. The sheetmetal cladding is being gross-cleaned and passivated prior to installation of this hardware. Installation of precision-cleaned electrical and utility hardware for the actuators will occur at AstroPak beginning in mid-October.

CSP-13: Mortenson key submittals were received (TPIP II milestone), and the contractor was mobilized and is working with BIS GFE (see Section: Spatial Filter Vessels/Enclosures).

CSP12 / Preinstallation Assembly

All 48 of the “536 series” beam tubes have been passivated, precision cleaned, and assembled by AstroPak. All the “534,” “535,” and “536 series” beam tubes are complete. Cleaning the last of the round beam tubes, “544” and “545 series” will begin the first week in October. The delivery of ghost mitigation hardware has greatly improved and should allow cleaning and clean assembly to proceed apace.

Problems / Impacts / Corrective Actions

Integrated CAD model analysis has shown that interference exists between the planned light propagation path and structural elements in the periscope array frames. A proposed solution has been developed to modify the array frames, and an ECR to implement this solution is being prepared.

The location of the switchyard argon system connections is being discussed with BIS Utilities. The current connection on the switchyard gate valve body appears to be difficult, to install in the field. A number of alternate locations are under consideration. An ECR to change to one of these locations is expected prior to the gate valve procurement review in early November.

A number of minor GFE hardware issues were worked in response to observations by the CSP-13 contractor. A number of the weld stud support plates for the Pinhole Tower Support Tables required modification due to the concrete embedments not being the proper height. The plates were ground to proper thickness based on survey data and returned to the CSP-13 contractor for reinstallation. Steam cleaning of structural steel GFE for the relay optics support frames, the output sensor supports, and the LM1 outriggers was required to remove plas-

tic shipping material adhered to the painted surfaces before delivery to the CSP-13 contractor.

PROCUREMENTS

None.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

– Identify a vendor that can clean the switchyard gate valves to level 83 or better and perform clean assembly and testing.

– Complete Title II GFE and CSP designs and place orders for remaining beampath systems GFE, under this WBS, as designs are completed.

– Continue GFE preparation activities to support CSP-13 installation activities.

– Issue RFB for the following items:
  - Switchyard gate valves.
  - Switchyard 45-degree bellows.
  - Roving mirror kinematic mounts.
  - Laser bay enclosure rupture panels.

– Award contracts for the following items:
  - Switchyard elbow enclosures.
  - Laser bay/switchyard dielectric breaks.

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WBS 1.5 INTEGRATED COMPUTER CONTROL

ACTIVITIES

The Rebaseline Validation Review was a major accomplishment for the fourth quarter. Fourteen management and technical presentations covering all aspects of the control system were given to the review team, including the Integrated Computer Control System (ICCS) overview, software engineering, controls testing, software configuration management and QA, hardware deployment, safety systems, industrial controls, computers and networks, laser physics simulation and modeling, supervisory software, software frameworks, automatic alignment, and the timing system. A white paper was prepared that addressed 24 technical questions submitted by the review team. Findings of the review team were that the ICCS design and team were credible and in excellent condition for moving forward; no major deficiencies were noted.

An audit to assess ICCS team compliance with software QA and Configuration Management (CM) plans was completed, and documented findings were presented to the ICCS team. An action plan to respond to concerns raised in the audit is in preparation and will be issued October 2000.

All TPIP II ICCS milestones for the quarter including rebaselining front-end processor (FEP) software requirements, award of facility timing system first-article procurements, and interim Main Laser/CW software release were completed on schedule. Milestones for early FY01, including software development and testing, are on schedule with the exception of a minor delay in the anticipated delivery of timing system delay generators due to a temporary shortage of certain components.

Front-End Processor Software

Rebaselining FEP software requirements was completed on schedule following internal peer and ICCS management review. A process is now under way to review the documents within the controls test group for verifiability. Specifications will subsequently be corrected as necessary and placed under configuration control in accordance with LRU engineering and operations engineering feedback.

Software development was completed and delivered to formal test for the TPIP II milestones entitled “Industrial Controls Main Laser/CW version 1 FEP software released” and “Wavefront/Hartmann Image Processing Main Laser/CW version 1 FEP software released.” An initial version of the Target Diagnostics FEP was also released to formal test.

The release is comprised of an Industrial Controls FEP with t-1 functionality (i.e., support for the shot abort system). Specifically, the FEP monitors the position and participation state of t-1 devices through an Allen-Bradley programmable logic controller (PLC). A graphical user interface (GUI) provides the capability to monitor the data read by the FEP, and to set the participation state of any t-1 device. It also requests and displays the data stored by the PLC at the shot trigger. The Wavefront/Hartmann FEP release delivers capability to acquire, track and control wavefront on multiple beams simultaneously. The Target Diagnostics FEP communicates with general-purpose embedded controller software that runs on a Bright Star controller and implements initial functionality for a high-resolution camera.

Work continues to progress satisfactorily on upcoming software releases for delivery of a Power Conditioning FEP to support testing of the Power Conditioning Single Capacitor Bank Module Test. Development of the PEPC FEP also continued toward an interim release scheduled for December 2000.

Supervisory Software

Supervisory and graphical user interface code for two of the three Master Oscillator Subsystems required for the FEIST 3 release have been coded. Early integration testing of the user interface, supervisor, and FEP verified the design strategy employed. Coding was completed for the Power Conditioning Supervisor Single Module release that will provide supervisory control of a complete Bank Module Unit. Laser Diagnostics graphical user interfaces have been coded.

Frameworks to support FEIST and Power Conditioning development were released on schedule. Included are the first releases of the Machine History and Alert frameworks, plus enhancements to the System Manager, Message Log, Status Monitor, Application, and Graphical User Interface frameworks. Stress testing of the alert framework demonstrated proper operation under overload conditions, and a maximum throughput of 30 alerts per second was measured, which meets requirements.

Significant progress was made this quarter on software manuals. Enhanced documentation of the ICCS Reference Architecture is progressing, which now includes an overview chapter; use case descriptions that demonstrate the application of each of the frameworks; principal design patterns; framework service programming interfaces; a description of the configuration database; and instructions for using the configuration editor. A GUI programming reference manual was also completed. Software design review procedures and forms were established and documented for use in future development cycles.

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Controls Testing

The controls test group released the test summary report for the FEIST 2 deployment (NIF-0051622). Test incidents were analyzed for trends, which were reviewed with development management and assigned to working groups. The test group subsequently completed integration of FEIST 2 controls with Injection Laser System hardware (MOR, PAM, ISP and Integrated Timing System) in B381 laboratories. Tests culminated with successful execution of repetitive rod shot cycles. Integration surfaced several hardware and software issues, which are being worked by NIF engineers and vendor personnel. The integrated system formal test report will be issued in October.

Design reviews were completed for upcoming tests of the Wavefront Control/Hartmann Processor, Target Diagnostics, and Industrial Controls, and planning was initiated for Power Conditioning, PEPC, and Transport and Handling canister tests.

Progress continues in the remodeling of Bldg. 490 computer rooms to be used for the new ICCS testbed. Seismic foundations, racks, and power were installed in September in preparation for installing computers, controllers, and representative devices. Workbenches and operator stations will be installed starting in October. This new facility will house in test equipment to be used for verifying that ICCS hardware and software development meets requirements prior to deploying in the LTAB.

Software Quality Assurance Audit

An independent audit of quality control measures employed during production of the FEIST 2 software deployment was performed by the LLNL Software Technology Center. As part of this annual audit, auditors examined ICCS documentation, observed management and development activities, interviewed team members, and issued a report. Several positive findings associated with software engineering processes such as configuration management, integration, and system testing were noted. The report made recommendations to improve requirements documentation, increase the number of design reviews and code inspections, and add test staff. The audit team briefed the ICCS staff in September and a management action plan addressing software quality improvement will be issued in October.

Laser Performance Operations Model

The first draft of the requirements specification for the Laser Performance Operations Model (LPOM) was completed and distributed for review. The LPOM will be used during operations to predict laser equipment set points required for specific target power profiles, to assess equipment operating margins, and to perform shot data analysis

and storage. A requirements review will be held at the end of October, with a conceptual design review to follow one month later.

Integrated Timing System

An independent assessment was conducted for the timing system specifications and equipment. The assessment indicates that the architecture is solid and the selection of components will support all documented trigger requirements (surveillance report NIF-0054188-0A).

The system test plan was revised to better simulate multiple zones as well as the thermal environment expected in LTAB tempered, water-cooled racks. The new setup requires assembly of two distributed timing systems, rather than one as previously planned. Software modification to support the revised configuration was started. Timing hardware was installed and activated to support the PAM and ISP in the FEIST laboratory.

Nonlinear fiber optic effects caused by high optical power in the fiducial cross-timing cables were investigated. The master oscillator group evaluated samples of single-mode and multi-mode fiber optic cable. Test results indicate that reduced fiber optic power levels are necessary to ensure propagation of the fiducial signal over longer fiber runs. Additional post-distribution amplification will be needed to boost signals to levels required by user equipment. A commercial regenerative laser amplifier purchased for use by the Target Diagnostics group will be evaluated as a candidate solution during planned system tests.

Integrated Safety System

The first production run of permissive transmitter modules was completed and the units were received. These units will be installed in each capacitor module to grant the permissive to generate high voltage. The 60-channel permissive transmitter was also received. Drawings were completed and assembled to support the CSP-14B submittal. Work began on final approval of drawings to be submitted for CSP-15B in October. Several issues relating to the safety system interface to the elevators were resolved with facility subcontractors that involved relay functions, lockout position of elevators, and cable types to be routed to the elevators.

Optics Damage Inspection

A small database of optics damage inspection images was generated from specific lab experiments that will now be used to assess the detection capability of a broad range of inspection scenarios. The TPIP II milestone “Optics Damage Inspection Image Analysis Report Complete” was completed as scheduled. The report addresses the current detection capability of several inspection scenarios. No significant concerns were generated.

PROBLEMS / IMPACTS / CORRECTIVE ACTIONS

Industrial Controls: Cable design problems reported in August were presented to the Beamline Infrastructure Change Control Board Level-5. Corrective action taken by the board will be entered during the CSP contract addendum process.

Supervisory Software: Initial stress testing of the prototype machine history server unexpectedly found that transaction performance degrades as the number of connections increase. Investigation of the performance bottleneck and development of a design solution are scheduled for the June 2001 release cycle that follows FEIST 3. The framework is functionally capable of supporting current releases.

PROCUREMENTS / CONTRACTS

Timing System: TPIP II milestone "Award of facility timing system first-article procurements" is complete. Delivery of the first production run of delay generators from Highland Technology will be delayed until January 2001 due to late delivery of components from one of its vendors.

Industrial Controls: A draft statement of work to bring an Allen-Bradley engineering consultant on site was completed and is being reviewed with procurement. Preparation of a sole source justification has started.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

- Issue the FEIST 2 integration test report in October.
- Issue the software QA audit management action plan in October.
- Begin work on the utility controls portion of the IMI contract in October.
- Complete FEIST 3, PEPC, and Single-Module Power Conditioning test software development in November with delivery to formal testing starting in December.
- Complete facility remodeling of the new ICCS testbed in November, followed by installation of computer equipment starting in December.

WBS 1.6 OPTICAL COMPONENTS

ACTIVITIES

KDP and DKDP Crystal Growth

The final conventional growth crystal was planted at Cleveland Crystals Incorporated (CCI) in July, thus completing Option 1 of the conventional growth contract. The first three runs (Set 1 growth runs) have grown beyond 50% size and all other runs continue without incident.

Three KDP rapid-growth runs were ended in August and one run was begun. The polycarbonate tank growth run successfully completed and produced a switch crystal boule with an estimated yield of 14 switch crystals. One KDP run produced a doubler boule with a projected yield of eight doublers.

There are now enough rapid-growth KDP crystals to produce 177 switch crystal plates and 92 doubler crystal plates. In addition, 36 tripler crystal plates have been completed to date.

The low-temperature KDP growth run was completed, and the crystal will be used to compare the occurrence of crazing in low-temperature KDP as compared with low-temperature DKDP.

A draft statement of work for FY01 rapid-growth production of KDP was prepared and distributed to the vendors for comment. The target date for placement of the FY01 production contract is November 2000.

Optical Testing

The first-bundle optics from Tinsley SVG were tested at LLNL to verify compliance with NIF optical wavefront specifications. These measurements are part of the quality verification effort conducted on the incoming optics for the first bundle. These optics have been produced during pilot operations. The NIF optical wavefront is specified by long-range (≥33 mm), mid-range (~3 to 33 mm), and short-range (~0.1 to 3 mm) regions. In addition, there is also a microroughness specification for scale lengths less than about 100 μm. The NIF optics tested to date as part of this verification program have met the mid-range and long-range specifications. Also, nearly all the optics have passed the short-range and microroughness specs, both of which are the most difficult to meet. Work to monitor these measurements at the vendor and at LLNL will continue during pilot operations and into early production runs to ensure continued compliance.

All TPIP II milestones for optical components were completed on or ahead of schedule.

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PROBLEMS / IMPACTS / CORRECTIVE ACTIONS

Two crystals cracked early in the growth runs due to equipment failures. The malfunctioning equipment has been replaced. One of the cracked crystals was replanted in August and the second in September.

PROCUREMENTS / CONTRACTS

None.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP II schedule milestones. All TPIP II milestones were completed on schedule.

UPCOMING MAJOR ACTIVITIES

– Test modifications to the rapid-growth process to produce DKDP meeting bulk damage specifications on full-scale (1000-L tank) rapid-growth runs at LLNL. This activity will begin in the first quarter FY01 and continue through the fiscal year.

– Place contracts for rapid-growth production of KDP for doubler and switch crystals in first quarter FY01.

WBS 1.7 LASER CONTROL

ACTIVITIES During the Fourth Quarter, the prime focus has been on completing the NIF rebaseline planning activities, including the Rebaseline Validation Review and the CAP planning process to establish the FY01 spending plan. In addition, technical work continued in all areas to finish designs, provide equipment to the Infrastructure Construction team, and to build first articles of selected pieces of equipment.

Alignment Systems

The TPIP II Milestone: "Tower Test Stand ready for initial operation" was completed. The spatial filter tower test stand has been assembled and installed. All required mechanical hardware, opto-mechanical packages, and control systems are in place and functional testing of the test stand initiated. After the basic functional checkout of the test stand, it will be used to test the engineering prototypes of the spatial filter towers. It will then be dissembled, cleaned, moved to the OAB, and reassembled late next summer.

The surrogate tower platform design layouts are continuing, with the diagnostic model complete and the alignment model 95% complete. Detail drawings have started for the diagnostic, with approximately 50% completion.

The prototype transport spatial filter (TSF) alignment and CSF platform packages are currently in the procurement cycle. Approximately 95% of the hardware has been received. The procurement for platform optics is now under way, with 20% of the components received. Due to incomplete specifications and drawings, many of the optical component drawings have required rework. Prototype platform and tower harnesses are being built per the released drawings.

Beam Diagnostics

The 3ω fiber-to-photodiode coupler, cassette, and chassis drawings are 100% complete and under Configuration Management. ECR 0002369 was issued to modify drawings and parts in the 3ω cassette package to reduce manufacturing costs; completion is expected in October. The 1ω fiber-to-photodiode coupler drawings are 100% complete; this package is in checking and should be in Sherpa by the end of October. The 1ω chassis and cassette drawings are 100% complete. These packages are in drawing checking and should be in Sherpa by the end of October.

A final design review was held for the PM10 mirror enclosure and optical mount that is located in the Precision Diagnostics area. This mirror enclosure is typical of all the optical turning stations in the Pre-

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cision Diagnostics System (PDS). The review was completed with minor action items, and the project expects to release the procurements to buy a first article in October to test the design. Since the PDS mirror stations are very similar, this may be the only first article necessary for all the PDS mirror stations.

In the RMDA area work is nearing completion to define all the interfaces with the enclosure and the installation documentation needed for the construction contract CSP-19, where the equipment will be installed. The enclosure and the mounting rails for the traveling mirror system are scheduled to be installed by the CSP-19 contractor.

Wavefront Control Systems

All LRU mounting hardware for Laser Mirror 1 (LM1) has been received and cleaned. This completes the TPIP II milestone: "All LM1 LRU mounting system hardware are available for installation in CSP-12."

A contract to procure lenslet arrays for the full quantity of Hartmann sensors for the NIF was placed with Wavefront Sciences. This also completed a TPIP II milestone.

Testing was completed on the Hartmann processor code for startup and initialization from the configuration database. An emulation test of the image processor acquisition and tracking of multiple lenslet arrays was successfully completed. The test included using a real dual-illuminated-array Hartmann sensor. This work supported a TPIP II software milestone.

A system to test deformable mirror actuators and actuator drive amplifier cards is being developed; initial functionality to support pilot deformable mirror (DM) initial assembly (prelapping) was completed.

Four documents to guide and control DM manufacturing were released. These are the NIF DM Assembly Plan, the NIF DM Assembly Travel Card, the NIF DM Faceplate Travel Card, and the NIF DM Actuator Travel Card. This sets the stage for the assembly of the first DMs by LLNL and LLE (Laboratory for Laser Energetics).

Damage Inspection

Effort for the quarter was directed toward generating lab and computer modeled images of damage sites imaged by optical systems, lab and computer modeled data from acoustic inspection systems, and processing algorithms for both optical and acoustic data. Two reviews of damage inspection work were presented, and preparations for a third review scheduled for October were largely completed.

An initial laboratory implementation of dedicated optical inspection of the FOA window was reviewed and demonstrated in July. The use of

illumination sources on two of the window edges and a charge-coupled device camera viewing the window from approximately two meters away appears to be a viable candidate for inspection of this vacuum-loaded optic. A generic camera interface was added to the beam enclosure design to support the possible selection of this approach.

A year-end review of Acoustic Inspection as related to the FOA window, was presented in September. It included a demonstration of an eight-element commercial transducer array and initial analysis of data recorded shot by shot as laser damage sites were formed on a 40 × 40 × 4-cm piece of glass. An ability to detect, locate, and estimate the size of isolated defects has been established. Effort must now focus on the more complicated task of interpreting the acoustic signals generated by larger numbers of damage sites, some of which are closely spaced.

Problems / Impacts / Corrective Actions

A minor shock incident occurred in August involving a motor control used for raising and lowering the tower test stand base in the Tower Test Stand Lab. No injuries occurred, and the technicians involved were taken to medical for evaluation and released. The incident was investigated, the source of the problem determined, and the responsible equipment removed. Faulty equipment was determined as the root cause and is currently being replaced with a new motor and control system.

Dispersion (i.e., bandwidth) tests were conducted on 1ω fiber-optic cable in the LLNL Optical Sciences Laboratory (OSL). An 80-m-long (worst case) fiber was wound on 140-mm- and 400-mm-diameter spools and subjected to 20-ps full-width at half maximum, 1053-nm laser pulses. Uncorrected preliminary results show an overlapping double-pulse spread out by about 140-ps on the output. This preliminary result is consistent with meeting the power bandwidth requirement using a transient digitizer, but limits the Portable Sensor measurement using a streak camera. Dispersion tests were also conducted on 3ω fiber-optic cable in the OSL. In addition to testing of individual fiber lengths (10, 20, 30, 24, and 27 m), testing of four composite lengths (31 to 64 m) planned for use on NIF was tested. The raw data appeared good; data reduction has not been completed.

Only one optic with specified laser damage on it has been obtained so far, primarily due to competition with other activities for time on the slab lab laser. More samples are needed to develop confidence that the damage inspection software is being optimized for realistic NIF-like damage sites.

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PROCUREMENTS

The 3ω fibers for the Power Sensor were received on September 28 from the Vavilov Institute in Russia.

A contract for the procurement of lenslet arrays for the full production of Hartmann sensors was placed. This completed a TPIP II milestone.

An order was placed for TSF alignment and CSF platforms. Prototype delivery is 95% complete.

The TSF tower structure prototype weldment procurement was awarded August 15.

Detector packages for the tower test stand are being fabricated in the LLNL shop.

Procurements have been placed for the PDS: rotary table, belt drive, table supports, and seismic restraints for the Nova switchyard area, and the PM10 mirror mount.

Production is complete for the DAWN VME crates with all 106 units delivered. This order is ahead of schedule (final delivery scheduled November 30).

All procurements for pilot DMs, wavefront controllers, and Hartmann sensors have been placed.

The baseline plan requires production DM contracts (except the remaining actuators) to be placed by the LLE or the NIF Optics Group. A recent agreement will have LLNL make the production procurement(s) for mechanical parts and then assign the contract(s) to LLE; an ECR will be required.

About 2% of the inspected actuators appear to have imperfections in the coating when inspected at LLNL but have been judged to be acceptable when they were reinspected at Xinetics. Xinetics considers the coating abnormalities to be minor quality variations that will not impact performance based on their experience building DM systems.

Six 3ω spool assemblies were purchased for shipment to the Vavilov Institute in November.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

– Complete design of the lower injection systems.

- Build-up PDS assembly area in Nova switchyard through November.
- Prepare for assembly of the first two pilot DMs in December (safety notes and signatures for the handling fixture and lifting device are critical items). This is joint activity with LLE.
- Complete CSP-19 GFE equipment designs for Precision Diagnostics.
- Prepare for the RMDA design review.
- Model a PM-2 LRU in the switchyard CAD model.
- A review for detailed comparison of the acoustic and optical approaches for dedicated inspection of the FOA window is planned for January 2001. The review should provide information to choose between the two types of systems proposed for inspection of the FOA window.

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WBS 1.8 TARGET EXPERIMENTAL SYSTEM

ACTIVITIES

Target Chamber

The target chamber has been placed on the pedestal. Survey data indicates that it is within 1 mm of the desired location. Because of this, Pitt Des Moines will remove the jacking rings in October, as the chamber will not require repositioning. Plenum installation is complete. Seismic restraints for the chamber were machined and installed.

The target chamber has been gross-cleaned and the port covers reinstalled. The "permanent" covers have cleaned and baked Viton O-rings installed. The covers that will be removed in CSP-15A have temporary Buna N O-rings that will be replaced with cleaned Viton at that time.

Target Area Structures

Contracts for fabrication of 16 of the 48 LRU support frames were awarded to two fabricators (8 frames each). Design packages for the next group of 16 support frames was nearly complete at the end of September. The Request for Bid on these 16 is expected in October.

Target Area Beampath and Utilities

The target area structures organization continued to work to support the schedule of deliverables for Parsons to complete the CSP-15A and 15B design packages on an accelerated schedule.

Target Chamber Service System (TCSS)

Apex Design Technology, Inc. was awarded the design and fabrication contract for the TCSS utility lift in July. Apex has been working on the structural and seismic analysis, mechanical design of the pit covers and other hardware in the pit and the layout of the utility lift section. A schematic of the hydraulic system, including selection of most components, was completed.

During September, the LLNL design review committee was appointed and met to discuss the mechanics and schedule for reviewing the Apex design. The preliminary design review submittals were received from Apex, and were distributed to the design review committee. The formal Preliminary Design Review will be held at LLNL in early October.

During this quarter, the design work on the first wall components was minimal. Group members participated in TCSS reviews and worked with the TCSS group in defining the panel handling fixtures.

Target Positioner

The second target positioner tube was delivered as well as all ancillary components. This completes this major procurement action for the tar-

get positioner. Assembly continues on the tilt and roll mechanism. Assembly and test schedules are being detailed for the TARPOS/TAS-POS. The target positioner gimbal hardware was received, a TPIP II milestone. The TAS positioner support structure was received (TPIP II milestone). The assembly of the support structure will proceed in preparation of the assembly of the rest of the target positioner.

Boom Lift

The boom vendor submitted revised calculation summaries for the boom lift that addressed all design review seismic and structural issues. LLNL confirmed that PaR's analysis method was well understood, and that the highest stresses for the seismic case is within the allowable. PaR has shown (and LLNL has reviewed these results) that stresses resulting from other load cases are within the allowable. PaR was authorized to fabricate all remaining parts of the boom lift.

Target Area Mirror Handling

Initial "stay out zones" for the LM6, LM7, and LM8 mirror package removal in both the upper and lower mirror rooms were transmitted to Parsons Engineering for incorporation into the overall model. These zones are defined to ensure that adequate room exists to allow for LRU removal. The zones are sized to include the path of the LRU plus the space required for additional equipment needed in the installation and removal process. Several interferences were found with either as-designed utilities or beam tube support legs, which are being resolved.

Effort continued on the removal methods for the LM6 and LM7 LRU mirror packages in the both upper and lower mirror rooms. The goal is to use as much commercially available equipment for this removal and to minimize the amount of custom design hardware. It was determined that the removal of the upper room LM6 and LM7 LRUs can be achieved by using only slightly modified commercially available equipment along with custom made slings and fixtures. Conceptual design of an LM7 removal fixture has yielded a request to add two holes to the LM7 mirror package to allow a fixture interface that does not require tools or additional hardware.

Final Optics 3ω damage

The upgraded Optical Sciences Laser facility met its TPIP II milestone performance measure in July, producing 260 J of infrared light for a slightly reduced beam size. This scales to 6.5 J/cm^2 compared to the design point value of 6 J/cm^2. Installation of the 3ω optics was nearly complete in September.

The TPIP II milestone for testing baseline processes for crystal etch-pit mitigation was completed in August. Coated switch, doubler, and tripler crystals all remained free of etch pits for a minimum of 28 days

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at 55% relative humidity. The baseline processes are thermal annealing for switch crystals, a combination of thermal annealing and a silicone protective layer for doublers, and a hydrophobic-modified sol coating for triplers.

A new protocol was developed to provide standard damage test samples for 3ω damage tests. Rather than water jet slicing at a commercial vendor, parts are now being sectioned from full-sized NIF optics at the LLNL Optics Shop after the surfaces have been protected with a temporary coating. The sectioning process is being validated to ensure no degradation in 3ω performance is caused by the handling.

Samples of fused silica with varying concentration of water, chlorine, flourine and hydrogen were obtained from Corning, Schott, ML, and Heraeus. The parts have been polished by SESO and measured for water content. Damage testing on the SlabLab laser will allow evaluation of material composition impact on damage growth rate in fused silica.

A theoretical study of the possibility of using photo-acoustic signals to monitor laser energy absorption in optics was completed. The conclusion was that this approach is problematic for finding small initiators because of signal-to-noise issues, but it has potential for in-situ monitoring of progress in growth mitigation where unmitigated absorbed energy is larger.

Over 150 deuterated dihydrogen phosphate (DKDP) crystals were examined for surface crazing. Some conventional-growth crystals have cracks with various orientations, but crazing is most common for rapid-growth crystals, particularly in the pyramid growth sectors of those grown at the lowest starting temperatures for the growth solution. Crazing was found on natural growth faces of several rapid-growth DKDP boules, which indicates that diamond turning is not the primary cause of crazing. Measurements and calculations indicate crazing is caused by deuterium depletion due to exchange with hydrogen from atmospheric moisture, which can impart surface stresses that are a possible cause of crazing. Weaker mechanical properties of rapid-growth DKDP combined with a poorly understood influence of impurities or lattice defects on deuterium diffusion appear to be important.

Final Optics Engineering

The fabrication of the first-article calorimeter chamber was completed in September. The final inspection of the chamber will be performed in October, and then it will be shipped to LLNL.

All components needed to assemble the first-article utility distribution panel were received. Assembly of these components will begin in November.

Progress continues on the redesign of the hardware.

- A design for the housing and spool associated with the disposable debris shield system was initiated. The analysis of the strength and stability of the spool was completed in September.
- The design of the debris shield housing was modified to significantly reduce the distance between the debris shield and the disposable debris shield.
- A design for separately mounting the frequency conversion crystals and the focus lens was developed.

Balance of WBS 1.8

Components for the first-article the DIM were ordered. Delivery is expected next quarter with the start of the assembly.

The delivery of the Version 1 of the Target Area Data Acquisition System (DAS) FEP, Provisional Text User Interface, and Diagnostic Controller software was made on schedule in September, along with the other parts of the TPIP II ICCS software. Software testing plans were developed. The DAS FEP Software Requirements Specification and the Software Design Document are being revised in preparation of the DAS Title II 100% design review next quarter.

Considerable effort was expended working with the Architect and Engineering firm on the development of CSP-14 and CSP-15. Additionally, effort was made in supporting all of the rebaselining activities and preparation for the NIF Rebaseline Validation Review.

The drafts of the Administrative Information System and Classified Distributed Information Network Plan, both of which are required for classified operations, are being readied for review by DOE.

Problems / Impacts / Corrective Actions

A working group to characterize wedged-lens 1ω ghosts and target back-reflected 2ω and 3ω light is considering a requirement for ghost-absorbing glass lining in the target bay beam tubes from the LM8s to the FOAs. An ECR is being processed to add ghost-absorbing glass inside the retractable beam tube and the FOA for 1ω ghosts. Methods of attachment for the glass are under investigation. In addition, a change in the requirement from stainless-steel ghost baffles to glass or ceramic in the target bay beampath due to predicted high fluence levels is expected. Details of the target reflections and resulting design

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impacts on the target area LRUs and mirror support frames are being developed, but are still not well known. A redesign of the mirror support frames at this time, with two-thirds of the designs complete and one-third being fabricated, has the potential to seriously delay the delivery of these parts.

The target positioner worm gear has not yet been received and is now expected in mid-October. The installation of the TAS positioner support structure will be done first until these parts are received. By reordering tasks, no schedule impact is expected.

PROCUREMENTS

Target bay LRU mirror frame contracts, for eight frames each, were awarded to Aerobotics, Inc. and Apex Design Technology, Inc.

A design and fabrication contract for the TCSS utility lift was awarded to Apex Design Technology, Inc.

Orders for ball screw/nut assemblies and rails and bearings, anticipated for this month, were delayed pending further technical discussions with suppliers.

Procurements for the first-article DIM have been placed.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

- Complete the milestone "First Prototype Crystal Assessment Documented."
- Hold a preliminary design review of the Apex TCSS design effort to date scheduled for October 4. Apex to complete and deliver a final design package for review in December.
- Award fabrication contracts for an additional 16 mirror support frames in November and the final 16 in December.
- Provide final target area beampath and utilities information to Parsons for completion of the CSP-15A and 15B design packages.
- Award a contract to Tinsley to fabricate NIF-size flat optics using their 3ω finishing process. These flats will allow inclusion inspection of new fused silica from Schott ML and Heraeus and will provide subscale samples for damage mitigation experiments.

- Plan a second round of experiments for early November at Argonne National Laboratory to analyze debris from surface damage initiation events with an in-situ time-of-flight mass spectrometer (TOF-MS). The objective is to characterize the particulate material(s) that may be the source of initiation. Both fused silica and DKDP will be examined. Standards consisting of NIST glass specimens and fused silica parts, with gold nanoparticles and a silica overlayer, are being prepared to provide calibration of the TOF-MS instrument.
- Present the Target Area Data Acquisition System Title II 100% design review in October.
- Assemble the target positioner support structure in October.
- Start the assembly of the first-article DIM.
- Continue tracking all outstanding issues in CSP-6/10 and CSP-9 in preparation of these contracts being finished. Punch list walk through of the areas covered by these contracts has started and will be ongoing until all work is completed.
- Develop version 2 of the software for the diagnostic FEP and controller.

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WBS 1.9 Operations Special Equipment

Activities

NIF rebaseline planning and the TPIP II milestones were the predominant activities during the quarter. All Operations Special Equipment milestones were completed on schedule.

Optical Transport and Material Handling

Overall Assessment: The primary focus continues to be the design/drawing completion of the delivery systems and the testing of the first-article systems. The flashlamp canister system has completed its Phase 1 testing. Phase 2 testing, which includes docking and LRU installation in the FAU, begins next month. The canister frame for the Amplifier Slab delivery system has been received, and component assembly has begun. The docking structure for the amplifier systems has been completely assembled with blastshields and slab beamline covers installed. The installation of the flashlamp beamline covers will be completed next month. The fabrication for the second and third transporters is progressing.

All TPIP II milestones in FY00 for Transport and Handling have been completed.

Bottom-Loading (BL) Delivery Systems

Universal: The airflow system continues to be tested to maximize the airflow velocity and uniformity. Tests on the temperature rise in the canister are inconclusive until a full system is assembled and run continuously with all mechanisms and the airflow system.

The kinematic mounts for the LM3 LRU on the Docking Structure used for the Universal BL testing has been installed. The structure will be used for the LM3/Polarizer installation tests. The kinematic mounts will be aligned next month. The testing of the canister with this docking structure will begin after the mounts have been aligned.

Flashlamp: The mechanical and electronics Phase 1 assembly and testing of the flashlamp system has been completed (TPIP II milestone). This includes the three-cover removal systems and the three LRU insertion units. Cover removal testing using an FAU simulator has been completed. Phase 2 testing of the FAU docking structure will begin next month. This includes docking, cover removal, and installation of LRUs.

The amplifier systems docking structure has been assembled. Blastshields and amplifier slab beamline covers have been installed. Flashlamp beamline covers will be installed next month. This structure

will be used during the next phase of testing with the Flashlamp Delivery System.

Flashlamp FAU Covers: The issue with seal outgassing was resolved as noted in the universal cover section. The quality control issues for the material used in the seals was resolved, and production is well under way for the seals. Production of the cover assemblies is going slowly and working toward a first-article inspection in early October. This will validate the cleaning and assembly of the covers. This contract was slowed due to the unavailability of seals, which has been resolved.

Amplifier Slab: Completed assembly of the upper canister and started control system checkout. Received the LRU insertion frame, lower canister structure, and external panels. Inspected LRU lifting mechanism at the vendor. Placed order for inlet and exhaust valves and fittings. Started assembly of the lower canister. Continued work on assembly drawings.

Slab Cassette Covers: Completed acceptance tests on first-article FAU cover seals and started production. Approved new FAU cover delivery schedule. Scheduled delivery of first bundle of production covers for next month.

Transparent Covers and Cover Changers: Optical glass panes for the transparent universal cover prototype have been received from the vendor. During October, the prototype cover will be assembled and tested for leak tightness. Deflection under full NIF positive pressure loading (+10" water) will be measured and compared to calculated values.

A simplified concept for a cover changing system has been developed. It is expected that this system will accommodate cover changes for all bottom-load LRUs and may be used for certain ONICS activities. This concept is substantially lower in cost than the previous glove-box concept. It does, however, require that pressure in the beamline be reduced to atmospheric to effect a cover change and that the beamline contain breathable air. Further development of this concept is on hold while a determination is made on the possibility of operating under these conditions.

Top-Loading (TL) Delivery Systems

Assembled and started testing the canister pressure relief system. Started updating control system software. Started preparations for TL canister cleaning. Continued work on the TL canister safety note. Will start working on assembly drawings next month.

Side-Loading (SL) Delivery Systems	Finalized procedure for installation of SL docking brackets as part of CSP-14b. Sent specifications for a multipurpose forklift to LRU owners for review. Will start working on assembly drawings next month.
Laser Bay Transporter	The fabrication of Transporters 2 and 3 is continuing. The fabrication of one of the two frames has been completed and shipped to AGV Products in Charlotte, NC. The second frame will be completed and delivered to AGV Products the middle of next month. AGV Products has completed the assembly and wiring of the three electronics boxes that house the controls electronics. Four LLNL personnel have completed their software training at the vendor site. This training gives us the ability to program the transporter and to operate the system with the traffic management system. AGV Products visited LLNL to update and modify the on-board software in preparation for the Amplifier Systems testing. The testing of a pressure tank to be used with the air compressor has been successfully completed. This system will significantly reduce the change-out rate of the nitrogen gas bottles.
Switchyard and Target Bay	The Roving Mirror Transport Canister (RMTC) design continues to be developed. A conceptual design review for this system was completed.
OAB Facility	The OAB co-occupancy phase continues to work well, with activities occurring simultaneous by the CSP-17 contractor and LLNL personnel working on programmatic activities. CSP-17 construction is on schedule.
OAB Special Equipment	The slab LRU insertion can drawing package was completed. Assembly and installation of the first New Optic Insertion Device (NOID) production unit has continued, and the contract for the NOID boom weldments and pivot blocks was awarded. The documentation package for the airlock lift, the vertical lifts, and the ergotechs was completed, as part of the OAB MPR Phase I. Acceptance Test Procedures on the small mechanical parts gross and precision cleaner and large mechanical parts precision cleaner have been completed, and the use of OAB cleaners for process development and cleaning of NIF protoype parts began. NVR and particulate testing using OAB cleaners has also now begun (TPIP II milestone).
OAB Controls	Work with the CSP-17 contractor to clarify installation of electronic and controls cables has continued.

OAB T&H Equipment

The LRU transporter has been moved to the OAB and will be located within the Class-100 clean room. The spatial filter insertion tool and a mock spatial filter LRU are being located in the OAB for continued transporter testing. Orders for the remaining LRU transporters are in the system and are waiting for signatures to move forward.

Verification Equipment (LAVS)

Design for the tool rack/end effector for the LAVS robot was completed. This will allow the mounting of the diagnostic tools for measuring position and alignment of the LRU optics. The installation plan for LAVS in the OAB has been completed.

Wavefront Verification System (WAVES)

The WAVES Conceptual Design Review was held July 27. Comments and input were received during and after the review, and a formal response was sent on August 30.

It was decided to fabricate reference flat mounts based on a proven existing LLNL design, rather than order commercial mounts. The mount designs were modified for the WAVES centerline height, and they are now being fabricated in-house. They will use hand button-actuated air bearings and motorized tip-tilt controls.

A series of finite-element models of the WAVES optical table was completed in an effort to understand the effects of spanning a utilities trench in the OAB transfer area with the WAVES table. The model results confirmed that the effects should be negligible. Procurements of the granite table and the clean-room equipment are now proceeding; the table will be ordered next month, and the clean-room equipment will be ordered in October.

Major orders for the 16-inch fold-mirror mount, the 633-nm lasers and a spare 1064-nm laser, an alignment laser, and a variety of commercial translation and tip/tilt mounts for the WAVES optics were placed. Orders are nearly ready for three custom zoom lenses and a variety of commercial mirrors and beamsplitters.

Drawings for the WAVES table earthquake supports were completed, and the drawings are nearly ready to send out for bids. The NIF optics mount designs have progressed, and a scheme was devised for maneuvering the LM3/POL LRUs on top of the WAVES table.

Problems, Impacts, and Corrective Actions

Delivery of the second transporter has slipped from mid-December 2000 to late January 2001 due to the fabrication schedule of the frame. The first frame has been delivered to Charlotte. Wiring of the controls

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system has begun and should help reduce the slip. Mechanical assembly of some of the subsystems has also begun to help reduce the slip.

The test method for the universal beamline covers used by the contamination control group was faulty and created false positive test results for outgassing. A cold cathode gauge has been successfully used, and all gaskets pass the conservative 100-hour ambient temperature vacuum test. Issues remain with the NVR cleanliness of the universal covers. Attempts were made to clean the covers using the LLNL Specifications at Astropak, and the NVR levels did not pass the requirements. The fabricator made multiple attempts and sent us 10 covers as a first article. All 10 failed the test. The covers are needed in early October to support CSP-12 for the LM1 structure.

PROCUREMENTS

The contract for the laser bay transporter system TRACE installation in B432 was liened.

The granite table for the WAVES was procured this quarter. Delivery is expected in February 2001.

Orders were placed for three LRU transporters to use in the OAB during mock build period.

VARIANCES

During the rebaseline period, activities are measured against the Rebaseline Plan and TPIP schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

- Start Phase 2 testing of the flashlamp delivery system with the FAU docking structure.
- Continue to assemble and test the amplifier slab delivery subsystems during the next few months as fabrications and hardware are received.
- Start cleaning the TL delivery system in preparation for the OAB interface testing.
- Prepare universal BL delivery system and docking structure for the start of the testing with the LM3 LRU.
- Complete the following milestones during the next quarter for Assembly and Refurbishment:
  - WAVES design review.
  - Activation of mechanical parts cleaning facility.
  - OAB special equipment ready for T&H TL tests.

WBS 1.10 START-UP ACTIVITIES

ACTIVITIES

The main activities of the Laser Commissioning group this quarter focused on the NIF re-baselining and the completion of the first version of the laser commissioning plan.

In support of the rebaselining planning, several sections of the Laser Commissioning module of the Integrated Project Schedule (IPS) were updated and improved together with the product line organizations. Comprehensive personnel guidance was developed for the Operations and Product Line organizations by resource loading the IPS commissioning schedule and outlining the commissioning support activities.

A draft commissioning step management plan has been prepared and distributed for review and comments to the associate project managers.

The commissioning group participated extensively in the preparation for the Assembly, Installation, and Commissioning subcommittee of the NIF Rebaseline Validation Review.

A major effort was devoted to the completion of the update of the Laser Commissioning Plan (TPIP II milestone). This plan describes the overall commissioning strategy for the NIF and the detailed sequence of steps required to complete commissioning of an individual bundle of eight beamlines. For each of the steps, the plan provides a brief description, the preliminary acceptance criteria, assumptions, and special requirements. The plan was released on time in Sherpa, (NIF-0053422).

Meetings of the Commissioning coordinating team continued to develop a common approach and standards for the various NIF commissioning activities, especially the BIS and Laser commissioning.

PROBLEMS / IMPACTS / CORRECTIVE ACTIONS

None.

PROCUREMENTS

None.

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VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. The TPIP II milestone was completed on schedule.

UPCOMING MAJOR ACTIVITIES

None this next quarter.

WBS 1.11 ES&H AND SUPPORTING R&D

ACTIVITIES

NIF rebaseline planning and the TPIP milestones were the predominant activities this quarter. All ES&H and Supporting R&D (TPIP II) milestones were completed.

Assurances

The NIF Quality Assurance (QA) Program Plan was approved by DOE/NNSA. Assurances reviewed the complete ES&H and QA Programs with the Rebaseline Validation subcommittee headed by Richard Hislop. The procedure update (TPIP II milestone) is described in WBS 1.1).

The environmental activities included support for the SEIS, which is behind the rebaseline schedule. The Final SEIS is in its concurrence review at DOE HQ. The other environmental activities were: (1) update the NIF Storm Water Pollution Prevention Plan on schedule (TPIP II milestone), (2) update the NIF Mitigation Action Plan on schedule (TPIP II milestone), and (3) provide a supplement to the NIF Pollution Prevention and Waste Minimization Plan adding energy efficiency. This supplements the original issue of the plan submitted as a DOE Level 2 milestone in 1998.

Technical Support

The Hoya Pilot II melting campaign, which began in April, continued through this quarter. Phase I of the campaign was completed in August, and an estimated 194 NIF-quality laser glass amplifier blanks were produced. Twenty slab blanks have been post-processed; all show major improvement relative to Pilot I with respect to optical homogeneity and hydroxyl content. Toward the end of the quarter, some difficulties were experienced with the melting system that required a temporary shutdown. The melting system will be repaired and made operational during first quarter FY01 (November). Sufficient raw material remains to produce more than 300 additional slabs during this Phase II operation. The expectation is that the Hoya Pilot II melting campaign will continue until second quarter FY01. The calciner system that is used to dry the raw materials continues to operate successfully.

Post-processing is continuing on the Schott laser glass amplifier blanks that were melted during the Pilot II campaign. The 60-slab lot requested by the CEA has been delivered; this is an advance against their share of the Pilot II Production. The remaining slabs have been temporarily warehoused at Schott, awaiting shipment to Zygo for finishing operations. The quality of the homogeneity of the slabs tested to

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date exceeds the NIF specification, and the slab yield will be greater than any melting campaign in the history of the ICF program.

The melter and forming equipment have been dismantled and inspected and are being rebuilt/refurbished for use in the upcoming Schott Production I run that is scheduled to begin in second quarter FY01.

Zygo has continued to improve their throughput of amplifier slabs plus mirror and polarizer substrates. Recently they achieved a rate of nearly 50 per month. Thus, the Project is now well positioned to begin the process leading to a firm fixed price production contract.

Production of NIF optics continued at Tinsley with 16 switch windows and 19 target chamber vacuum windows delivered to full NIF specification during this past quarter. Two focus lenses were also completed and delivered to LLNL for use in 3ω damage mitigation experiments.

The lens optical test system (LOTS) has been successfully completed at Tinsley, and final acceptance testing will begin during the first quarter FY01. This extremely complex and precise metrology system will allow the measurement of focal properties of the NIF lenses more accurately than ever achieved in the past. Once acceptance testing of this system is complete the production of the NIF lenses will proceed at the projected production rate. This will allow us to negotiate with Tinsley a firm fixed price contract in accordance with the schedule for completion of the current bridge contract.

In August, LLE coated a prototype NIF polarizer for full characterization. The data from this optic dictated the run parameters for the first-bundle polarizer that was coated in September, thus successfully completing the associated DOE milestone.

Spectra-Physics has coated the first transport mirror to evaluate the impact of coating design on damage threshold. They completed damage tests of this mirror in September.

Also during this quarter the repairs to the “cleanline robot” were completed, and the unit is fully operational. In addition, the photometer systems to be used in measuring the transmissions and reflections of the coated optics are undergoing final testing and soon will fully be operational at both Spectra Physics and LLE.

The work at Kodak on finishing slabs debris shields and polarizers is going exceptionally well. During this past quarter, Kodak’s proprietary small tool polishing equipment was used to correct wavefront aberrations in fourteen amplifier slabs. These slabs failed the homogeneity

specification required for the raw blank. By using small-tool figuring, this amplifier slab has been "saved" from being rejected. Thus, Kodak's small-tool effort will allow the acceptance for finishing of nearly 100% of the slabs produced from the melting campaigns. The cost increment for the small-tool-finishing step adds only about 10% to the price of the finished slab. Kodak also completed 19 polarizers using their proprietary iron figuring technique to correct for wavefront aberrations in this material. The polarizer blanks are the largest substrates on the NIF and will be used to make the world's largest polarizers; therefore, the ability to correct the small wavefront aberrations in these enormous optics is a great advantage for the NIF. Finally, Kodak also demonstrated completion of three debris shields to validate that Kodak can successfully finish debris shields to the NIF 3ω damage and wavefront specifications.

KDP facilitization

All of the initial process equipment for KDP plate manufacture (saw, horizontal axis fly-cutting machine, and profiling machine) have undergone extensive machining trials and are being worked to the required specifications. The semi-finishing machine has undergone machining trials to give us confidence that it is working to the required NIF specification. Work continues with Moore Tools on correcting problems with the in-feed slide on the final finishing machine. In September, Moore Tool and LLNL completed the last checks on the in-feed slide and then proceeded with cutting tests.

Based on these tests, the operational stability is continuing to improve, and intermittent "yaw" and position errors are being corrected. Moore Tool has also provided software to overcome these errors in the short term, and LLNL is proceeding with additional cutting tests.

Problems, Impacts and Corrective Actions

During this past quarter, some slab loss was experienced at Schott due to fracture. Schott has worked with LLNL opticians to develop improved handling procedures and slab fixturing. This has reduced the fracture loss to the NIF goal.

In July, Zygo observed the formation of a blue haze on the surfaces of some of the amplifiers slabs. This blue haze has been identified as submicron pitting of the glass surface. Zygo and LLNL conducted a number of experiments to identify the origin of the surface pitting and ultimately traced it to a faulty water purification filter. That problem has now been corrected, and Zygo is once again producing haze-free surfaces.

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PROCUREMENTS

The $2M raw materials contract for the first Schott laser glass production run was awarded on August 29, meeting the original TPIP II milestone date.

The contract for the Crystal Finishing Facility has been placed with CCI. CCI is obtaining the necessary permits before beginning construction. Target completion date for the facility is December 2000.

The contract to purchase platinum to replace processing losses was awarded this quarter.

A $2.07M modification was awarded in July on B507150 contract to Zygo Corporation for a planned extension of the pilot production of optical mirrors.

VARIANCES

The Project is tracking to the Rebaseline Plan and to the TPIP and TPIP II schedule milestones. All TPIP II milestones were completed on or ahead of schedule.

UPCOMING MAJOR ACTIVITIES

- Complete calibration and acceptance testing of the LOTS (Lens Optical Test System) and begin final figuring of NIF spatial filter lenses (by Tinsley).
- Award a contract to Tinsley to fabricate NIF-sized 3ω development optics. These will include special low-inclusion blanks from Schott ML and Heraeus.
- Construct the KDP Finishing Facility during the first quarter FY01. The facility is scheduled to be ready to begin receiving major equipment by January, 2001.
- Demonstrate the crystal finishing process on the Moore Final Finishing machine in the first quarter FY01. Results of this process demonstration will be used as the final acceptance criteria for the Moore machine.
- Award a pilot transition contract for small-tool polishing of amplifier slab blanks and ion figuring of polarizers to Kodak by November.
- Take delivery of the first round of pilot optics (fused silica, mirrors, and amplifier slabs) from Kodak by the end of December.
- Restart Hoya Pilot II Phase II melting campaign.
- Acceptance test Nd shipments for Production.
- Conduct the DOE Construction Safety Audit.
- Prepare key input data for the NEPA document preparer to complete the SEIS.

ATTACHMENT 1: FINANCIAL STATUS

The financial status includes (1) 4Q00 cumulative-to-date Project financial summaries by WBS Level 2 and by participant; (2) FY00 Plan-to-Actual Cost and Cost plus Commitments monthly for Total Project Cost (TPC), Total Estimated Cost (TEC), Other Project Cost (OPC), and each WBS Level 2 element; (3) the 4Q00 Contingency Log; and (4) FY00 monthly Manpower Plan to Actual.

PROJECT PLAN-TO-ACTUAL COST AND COST PLUS COMMITMENTS

FY00 NIF Cost and Cost and Commitment plans are presently shown as straight-line estimates of the current year budget allocations conceived early in the fiscal year. The NIF Rebaseline Plan was approved by the ESAAB on August 31. When the budget is finalized, updated annual plans will be implemented and tracked for FY01. FY00 has been a transition period, and variance analysis against the original baseline is inappropriate.

Financial conservatism during the rebaselining this fiscal year resulted in lower Costs and Costs plus Commitments at completion of FY00 than originally planned. FY00 Actual Costs were under plan by 17% for TEC, 61% for OPC, and 18% for TPC. Actual Costs and Commitments were under plan by 2% for TEC, 36% for OPC, and 3% for TPC.

The “actuals” shown in the following financial tables are subject to slight corrections when DOE Financial Information System (FIS) data for FY00 fiscal year end is made available.

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National Ignition Facility (NIF) - Project No. 96-D-111

Cumulative-to-Date Project Financial Summary by WBS Level 2 through September 2000 ($K)

WBS Element	Approved Baseline Budget (a)	Planned Commitments to Date	Planned Costs to Date	Current Cost Estimate (b)	Actual Obligations to Date (c)	Actual Commitments to Date	Actual Costs to Date
1.1 Project Office	66,700	78,521	77,891	78,653		95,189	91,210
1.2 Site & Conventional Facilities	213,700	251,598	245,223	250,019		247,113	231,426
1.3 Laser Systems	204,500	138,489	110,732	215,327		135,050	98,411
1.4 Beam Transport System	92,000	169,671	160,330	133,715		172,690	140,360
1.5 Integrated Computer Control	21,600	18,442	17,820	20,578		18,558	17,948
1.6 Optical Components	146,500	68,020	58,345	144,492		61,023	50,226
1.7 Laser Control	72,000	42,041	39,230	75,714		43,483	40,950
1.8 Target Experimental System	68,000	88,685	79,980	82,799		80,484	72,552
1.9 Operations Special Equipment	28,900	44,097	41,651	30,489		38,284	34,830
Subtotal	913,900	899,565	831,203	1,031,787		891,874	777,914
Contingency	131,800			13,913			
Total Estimated Cost (TEC)	1,045,700	899,565	831,203	1,045,700	898,458	891,874	777,914
1.10 Start-up Activities	19,900	6,141	6,139	19,271		6,082	6,082
1.11 ES&H and Supporting R&D	133,300	136,276	135,749	133,929		134,101	132,277
Other Project Cost (OPC)	153,200	142,417	141,888	153,200	144,978	140,183	138,359
Total Project Cost (TPC)	1,198,900	1,041,982	973,091	1,198,900	1,043,436	1,032,057	916,273

(a) Baseline Budget consistent with NIF Project Execution Plan (Appendix D) as of August 1997.

(b) A rebaselining effort was completed which, when accepted by Congress, will revise this estimate.

(c) Actual Obligations to Date = cumulative to date NIF Project funds obligated by DOE to Contractors, consistent with actual contract modifications.

National Ignition Facility (NIF) - Project No. 96-D-111

Cumulative-to-Date Project Financial Summary by Participant through September 2000 ($K)

Project Participant	Baseline Budget (a)	Planned Commitments to Date	Planned Costs to Date	Current Estimate (b)	Actual Obligations to Date (c)	Actual Commitments to Date	Actual Costs to Date
LLNL TEC	887,380	869,007	800,876	998,897	865,576	860,288	747,367
SNL TEC	21,536	21,444	21,444	22,800	22,798	21,907	21,773
LANL TEC	4,984	8,493	8,261	9,650	9,644	9,538	8,634
LLE TEC	-	621	621	390	390	93	93
HKC TEC	-	-	-	50	50	48	48
Subtotal TEC	913,900	899,565	831,203	1,031,787	898,458	891,874	777,914
Contingency TEC	131,800			13,913			
Total Estimated Cost (TEC)	1,045,700	899,565	831,203	1,045,700	898,458	891,874	777,914
LLNL OPC	146,480	135,040	134,511	145,747	137,580	132,802	130,979
SNL OPC	2,250	2,250	2,250	2,250	2,250	2,250	2,250
LANL OPC	1,895	1,894	1,894	1,893	1,895	1,894	1,894
LLE OPC	360	510	510	568	510	510	510
ANL OPC	2,099	2,605	2,605	2,625	2,625	2,609	2,609
NV OPC	116	117	117	117	119	117	117
Other Project Cost (OPC)	153,200	142,417	141,888	153,200	144,978	140,183	138,359
LLNL TPC	1,033,860	1,004,047	935,387	1,144,644	1,003,156	993,090	878,346
SNL TPC	23,786	23,694	23,694	25,050	25,048	24,157	24,023
LANL TPC	6,879	10,388	10,156	11,543	11,538	11,432	10,528
LLE TPC	360	1,131	1,131	958	900	603	603
ANL TPC	2,099	2,605	2,605	2,625	2,625	2,609	2,609
NV TPC	116	117	117	117	119	117	117
HKC TPC	-	-	-	50	50	48	48
Subtotal TPC	1,067,100	1,041,982	973,090	1,184,987	1,043,436	1,032,057	916,275
Contingency TPC	131,800			13,913			
Total Project Cost (TPC)	1,198,900	1,041,982	973,090	1,198,900	1,043,436	1,032,057	916,275

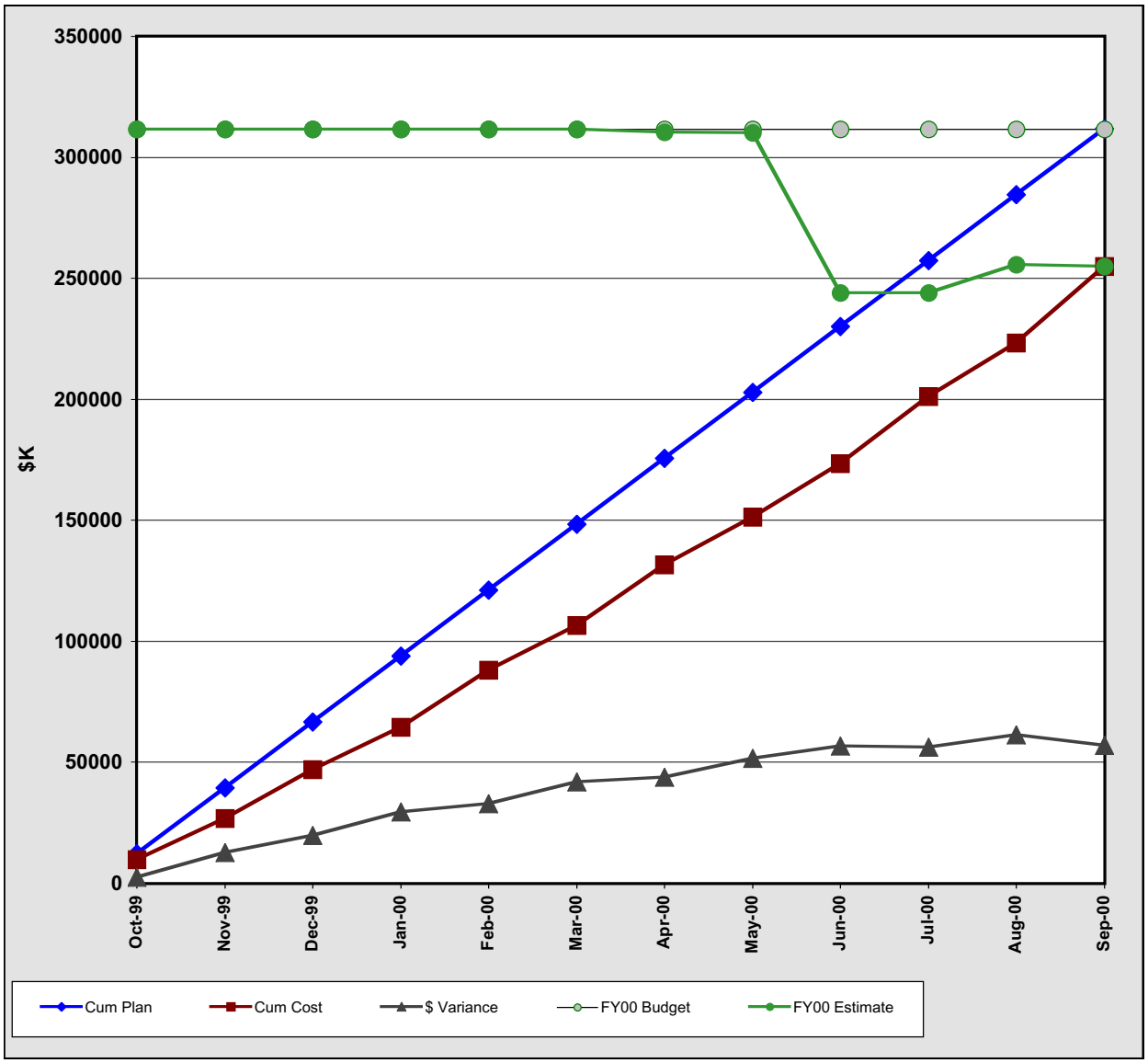
(a) Baseline Budget consistent with NIF Project Execution Plan (Appendix D) as of August 1997.

(b) A rebaselining effort was completed which, when accepted by Congress, will revise this estimate.

(c) Actual Obligations to Date = cumulative to date NIF Project funds obligated by DOE to Contractors, consistent with actual contract modifications.

FY2000 Cost Plan to Actual
as of September 2000
Total Project Cost (TPC) ($K)

Project Number 96-D-111
September 2000

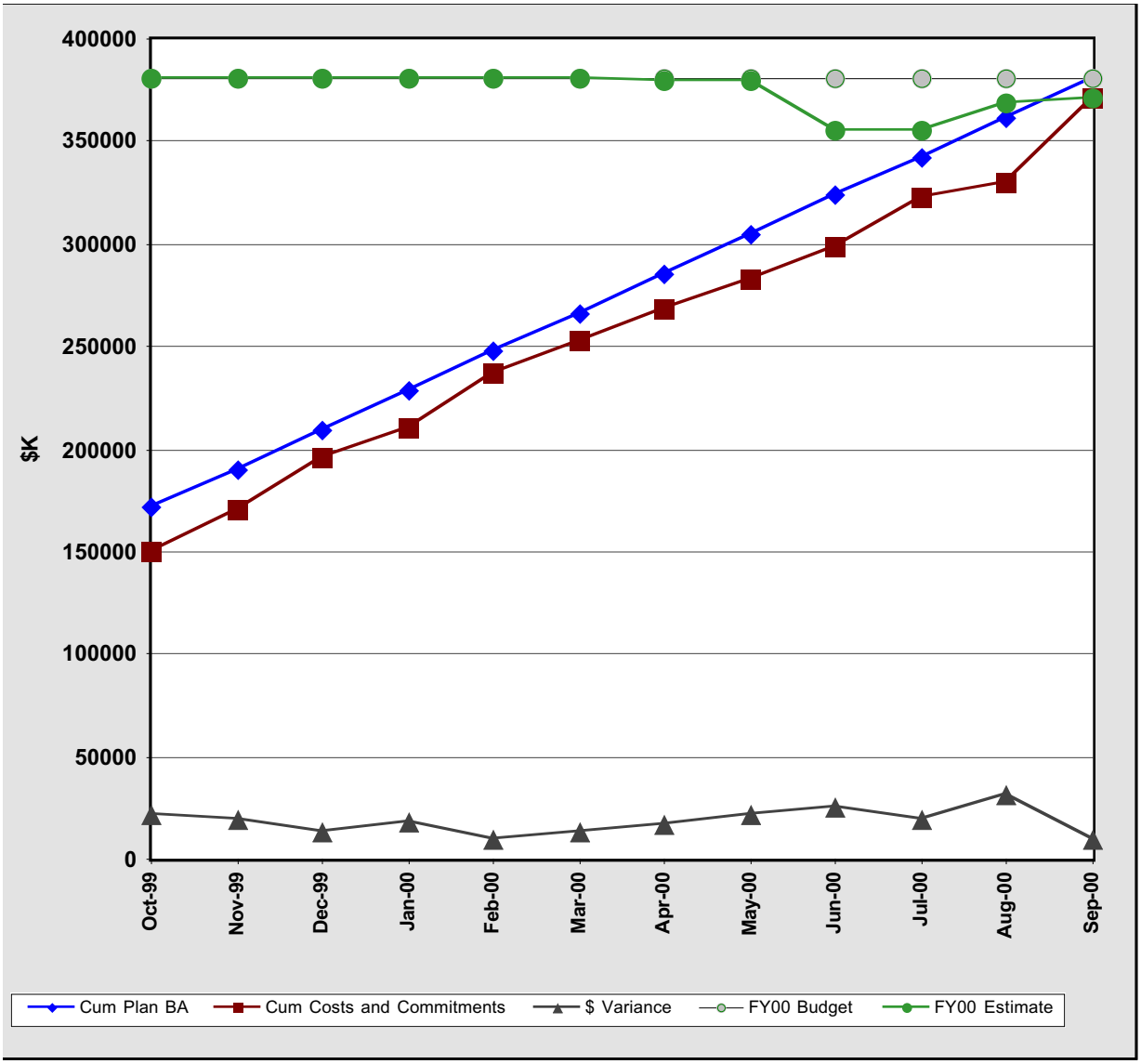


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget *	Estimate *
Oct-99	12,080	9,690	12,080	9,690	2,390	20%	311,520	311,520
Nov-99	27,247	17,043	39,327	26,733	12,594	32%	311,520	311,520
Dec-99	27,247	20,136	66,574	46,870	19,704	30%	311,520	311,520
Jan-00	27,247	17,601	93,821	64,471	29,351	31%	311,520	311,520
Feb-00	27,247	23,662	121,068	88,133	32,936	27%	311,520	311,520
Mar-00	27,247	18,329	148,315	106,461	41,854	28%	311,520	311,520
Apr-00	27,247	25,213	175,562	131,674	43,888	25%	311,520	310,282
May-00	27,247	19,679	202,810	151,354	51,456	25%	311,520	310,004
Jun-00	27,247	22,005	230,057	173,358	56,698	25%	311,520	243,882
Jul-00	27,247	27,684	257,304	201,042	56,261	22%	311,520	243,882
Aug-00	27,247	22,250	284,551	223,292	61,259	22%	311,520	255,677
Sep-00	27,247	31,688	311,798	254,980	56,818	18%	311,520	254,980

* Rebaselining will establish Project TPC BAC/EAC.

FY2000 Plan to Actual as of September 2000
Total Project Cost (TPC) - Cost and Commitments ($K)

Project Number 96-D-111
September 2000

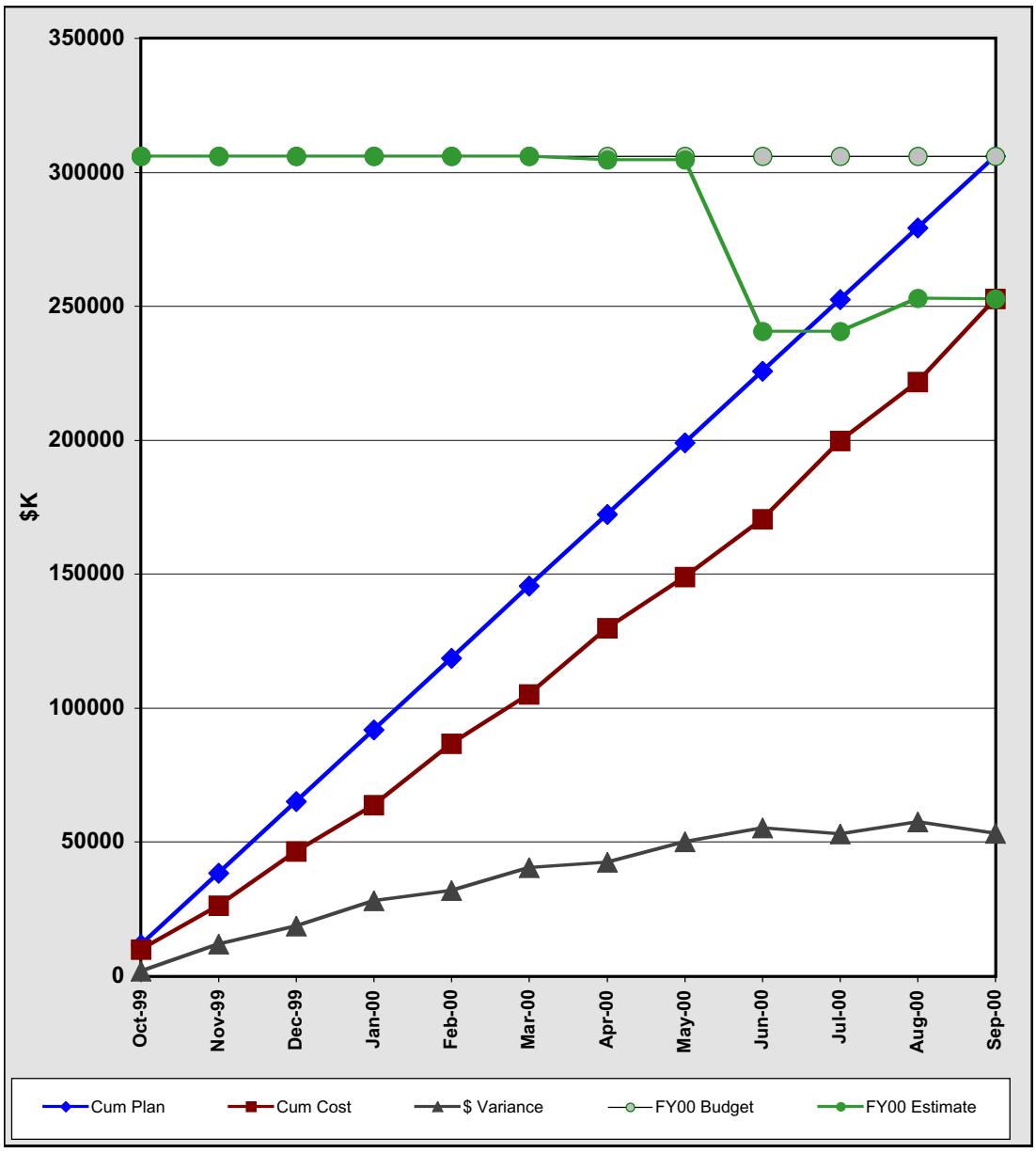


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget *	Estimate *
Oct-99	171,032 **	149,362	171,032 **	149,362	21,670	13%	380,689	380,690
Nov-99	19,068	21,090	190,100	170,452	19,648	10%	380,690	380,690
Dec-99	19,066	25,391	209,158	195,843	13,315	6%	380,690	380,690
Jan-00	19,066	14,699	228,217	210,542	17,676	8%	380,690	380,690
Feb-00	19,065	26,800	247,276	237,342	9,934	4%	380,690	380,690
Mar-00	19,128	15,326	266,398	252,668	13,730	5%	380,690	380,690
Apr-00	19,126	16,187	285,456	268,855	16,600	6%	380,690	379,149
May-00	19,063	13,372	304,452	282,228	22,225	7%	380,690	379,149
Jun-00	19,088	15,805	323,537	298,033	25,504	8%	380,690	355,118
Jul-00	19,086	24,627	342,595	322,660	19,935	6%	380,690	355,118
Aug-00	19,074	7,663	361,642	330,323	31,319	9%	380,690	368,016
Sep-00	19,062	40,443	380,690	370,766	9,924	3%	380,690	370,766

* Rebaselining will establish Project TPC BAC/EAC.
** Includes $126,612K of uncosted obligations from FY99.

Project Number 96-D-111
September 2000

FY2000 Cost Plan to Actual
as of September 2000
Total Estimated Cost (TEC) ($K)

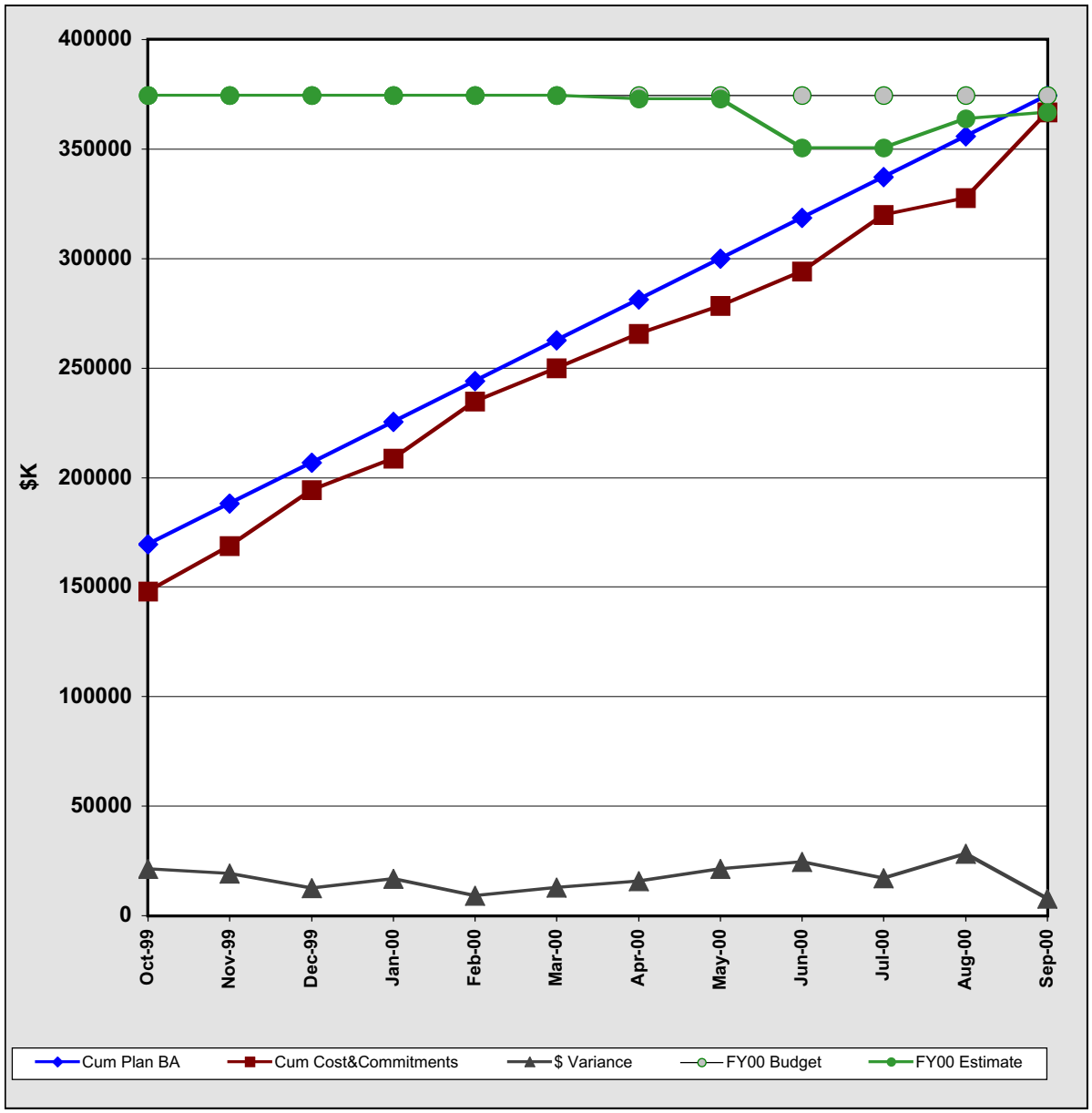


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget *	Estimate *
Oct-99	11,647	9,826	11,647	9,826	1,821	16%	306,054	306,054
Nov-99	26,764	16,570	38,411	26,395	12,016	31%	306,054	306,054
Dec-99	26,764	20,132	65,176	46,528	18,648	29%	306,054	306,054
Jan-00	26,764	17,295	91,940	63,823	28,117	31%	306,054	306,054
Feb-00	26,764	22,957	118,704	86,779	31,925	27%	306,054	306,054
Mar-00	26,764	18,325	145,468	105,104	40,364	28%	306,054	306,054
Apr-00	26,764	24,674	172,233	129,778	42,454	25%	306,054	304,538
May-00	26,764	19,141	198,997	148,920	50,077	25%	306,054	304,538
Jun-00	26,764	21,630	225,761	170,550	55,211	24%	306,054	240,600
Jul-00	26,764	29,056	252,526	199,605	52,920	21%	306,054	240,600
Aug-00	26,764	22,195	279,290	221,800	57,490	21%	306,054	252,862
Sep-00	26,764	30,965	306,054	252,765	53,289	17%	306,054	252,765

* Rebaselining will establish Project TEC BAC/EAC.

FY2000 Plan to Actual as of August 2000
Total Estimated Cost (TEC) - Cost and Commitments ($K)

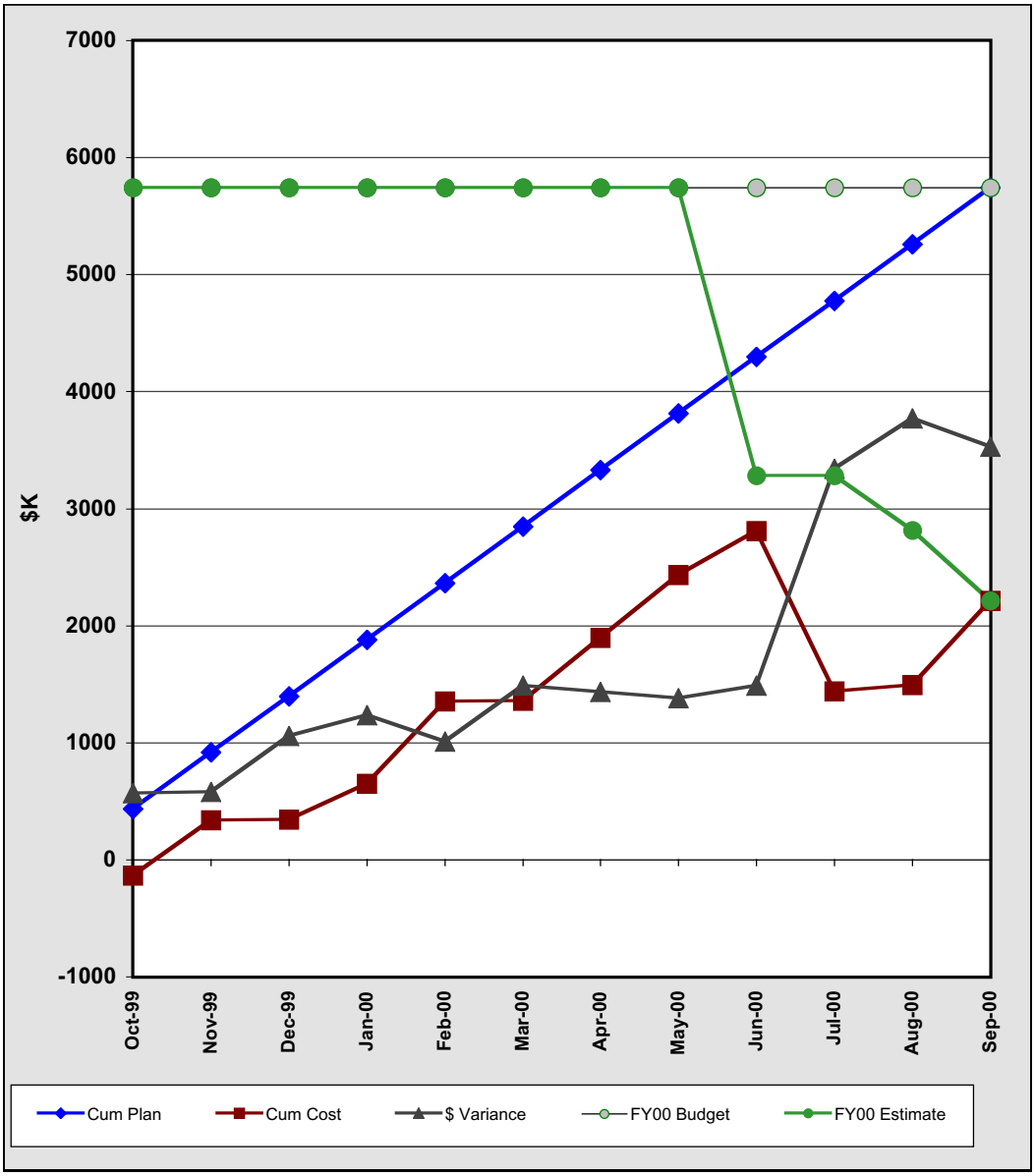
Project Number 96-D-111
August 2000



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget*	Estimate
Oct-99	169,417 **	148,023	169,417 **	148,023	21,394	13%	374,416	374,416
Nov-99	18,636	20,837	188,053	168,860	19,194	10%	374,416	374,416
Dec-99	18,636	25,315	206,690	194,175	12,515	6%	374,416	374,416
Jan-00	18,636	14,429	225,326	208,604	16,722	7%	374,416	374,416
Feb-00	18,636	26,251	243,962	234,855	9,108	4%	374,416	374,416
Mar-00	18,636	14,981	262,599	249,836	12,763	5%	374,416	374,416
Apr-00	18,636	15,742	281,235	265,578	15,657	6%	374,416	372,876
May-00	18,636	12,914	299,871	278,492	21,379	7%	374,416	372,876
Jun-00	18,636	15,457	318,507	293,949	24,558	8%	374,416	350,438
Jul-00	18,636	26,050	337,144	320,000	17,144	5%	374,416	350,438
Aug-00	18,636	7,614	355,780	327,614	28,166	8%	374,416	363,901
Sep-00	18,636	39,113	374,416	366,726	7,690	2%	374,416	366,726

* Rebaselining will establish Project TEC BAC/EAC.
** Includes $124,820K of uncosted obligations from FY99.

FY2000 Cost Plan to Actual
as of September 2000
Other Project Cost (OPC) ($K)

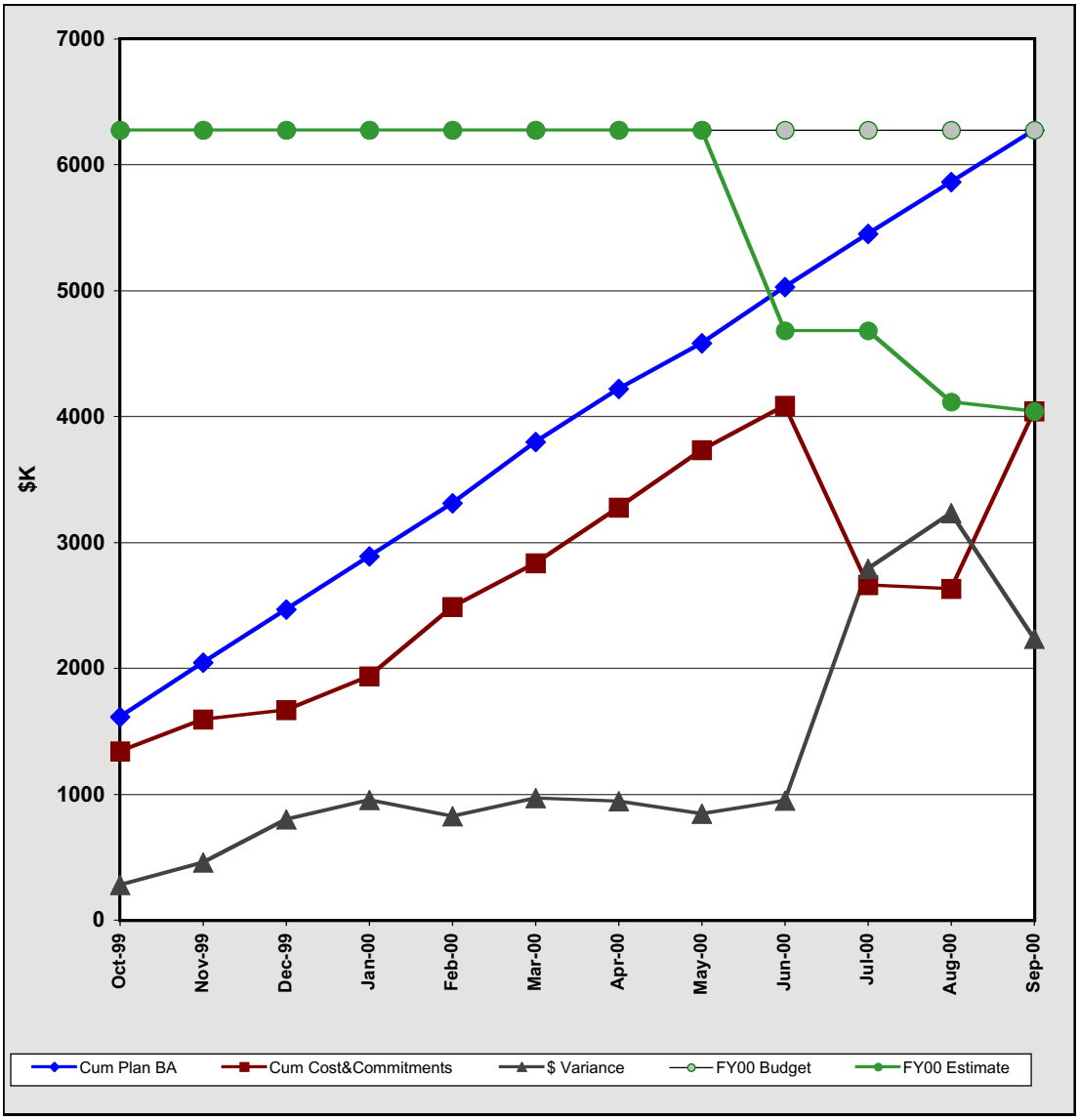


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget *	Estimate *
Oct-99	433	-135	433	-135	569	131%	5,744	5,744
Nov-99	483	474	916	338	578	63%	5,744	5,744
Dec-99	483	4	1,399	342	1,056	76%	5,744	5,744
Jan-00	483	306	1,881	648	1,234	66%	5,744	5,744
Feb-00	483	705	2,364	1,353	1,011	43%	5,744	5,744
Mar-00	483	4	2,847	1,357	1,490	52%	5,744	5,744
Apr-00	483	539	3,330	1,896	1,434	43%	5,744	5,744
May-00	483	538	3,813	2,434	1,378	36%	5,744	5,744
Jun-00	483	374	4,295	2,808	1,487	35%	5,744	3,282
Jul-00	483	-1,371	4,778	1,437	3,341	70%	5,744	3,282
Aug-00	483	55	5,261	1,492	3,769	72%	5,744	2,815
Sep-00	483	723	5,744	2,215	3,529	61%	5,744	2,215

* Rebaselining will establish Project OPC BAC/EAC.

FY2000 Plan to Actual as of September 2000
Other Project Cost (OPC) - Cost and Commitments ($K)

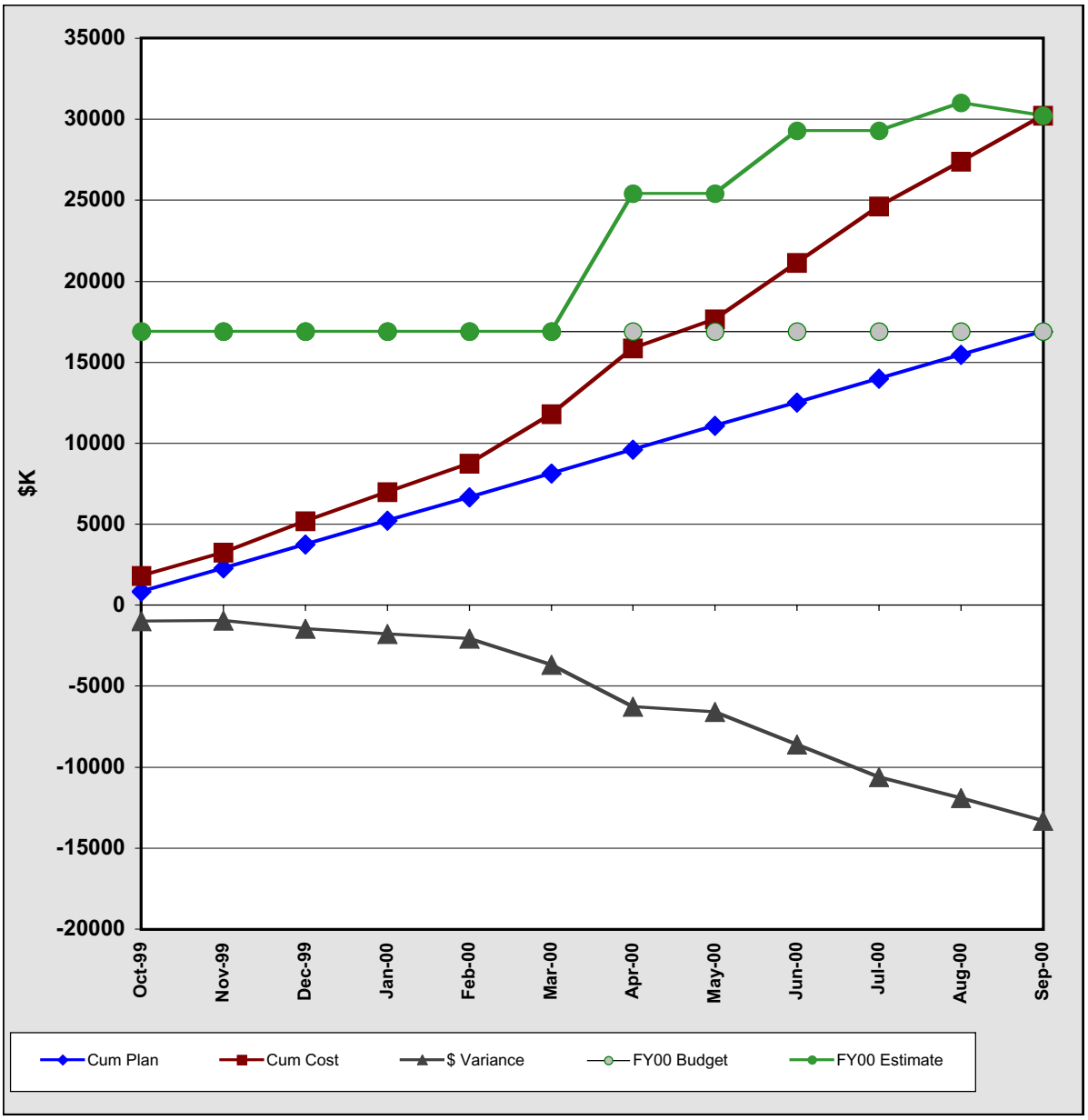
Project Number 96-D-111
September 2000



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget *	Estimate *
Oct-99	1,615 **	1,339	1,615 **	1,339	276	17%	6,273	6,273
Nov-99	432	253	2,047	1,592	454	22%	6,273	6,273
Dec-99	430	75	2,468	1,668	800	32%	6,273	6,273
Jan-00	430	270	2,891	1,938	953	33%	6,273	6,273
Feb-00	429	549	3,313	2,487	826	25%	6,273	6,273
Mar-00	492	345	3,800	2,832	967	25%	6,273	6,273
Apr-00	489	445	4,221	3,277	944	22%	6,273	6,273
May-00	426	458	4,581	3,735	846	18%	6,273	6,273
Jun-00	451	348	5,029	4,083	946	19%	6,273	4,680
Jul-00	450	-1,423	5,451	2,660	2,791	51%	6,273	4,680
Aug-00	437	-28	5,862	2,632	3,230	55%	6,273	4,115
Sep-00	425	1,407	6,273	4,039	2,234	36%	6,273	4,039

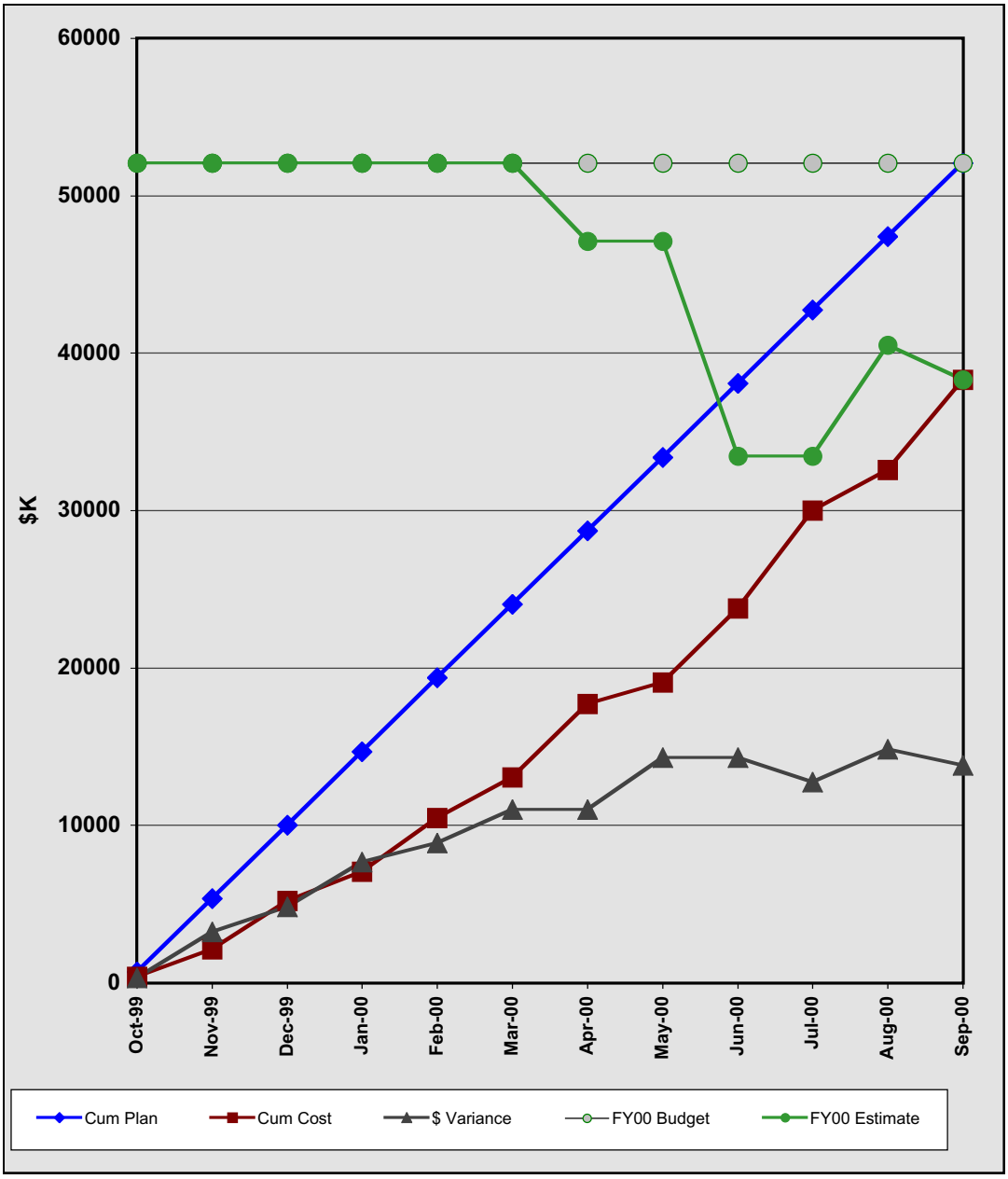
* Rebaselining will establish Project OPC BAC/EAC.
** Includes $1,792K of uncosted obligations from FY99

FY2000 Cost Plan to Actual as of September 2000
WBS 1.1 - Project Office Cost ($K)



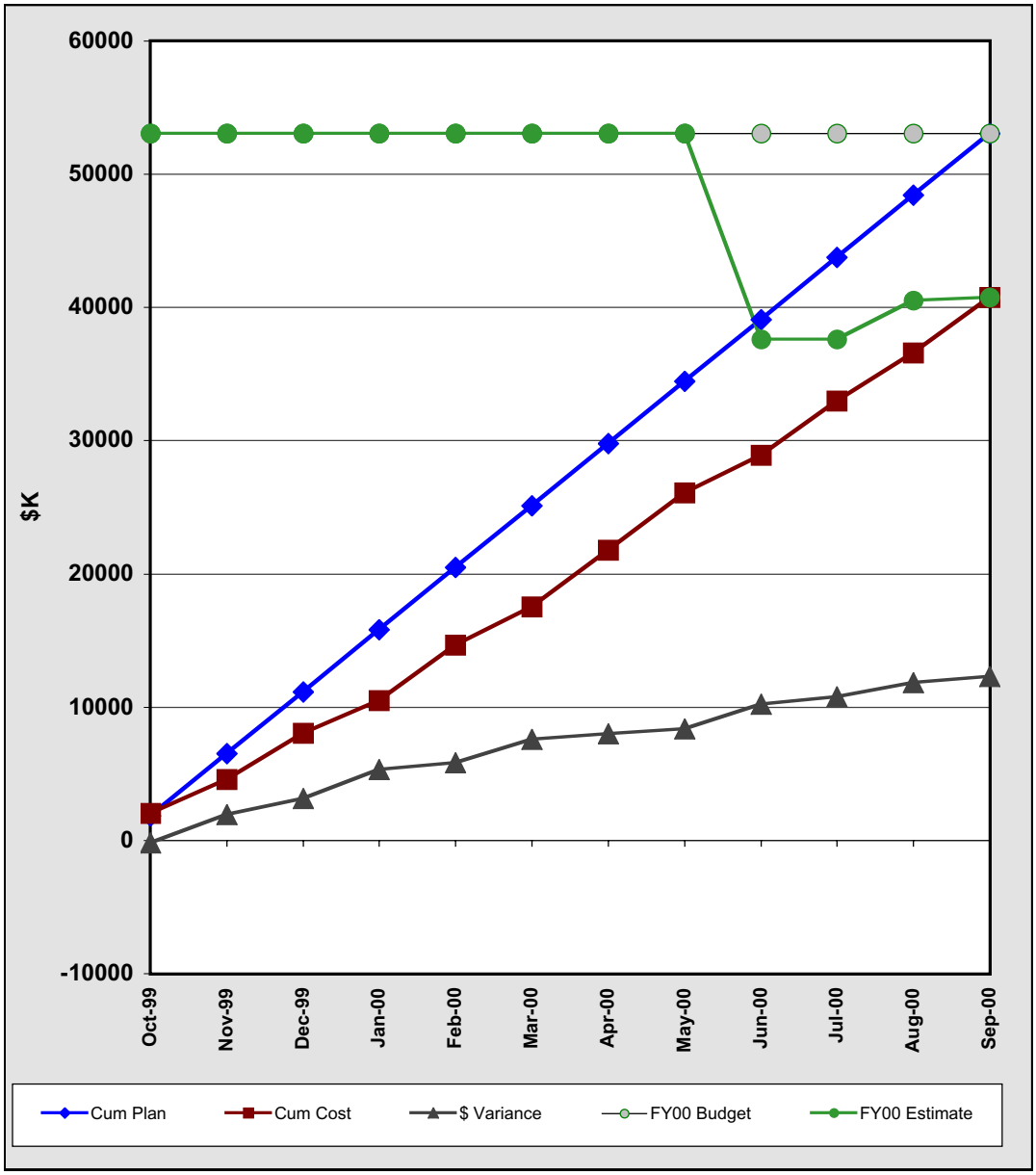
	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	821	1,812	821	1,812	-991	-121%	16,907	16,907
Nov-99	1,462	1,442	2,283	3,254	-970	-42%	16,907	16,907
Dec-99	1,462	1,943	3,746	5,197	-1,451	-39%	16,907	16,907
Jan-00	1,462	1,780	5,208	6,978	-1,769	-34%	16,907	16,907
Feb-00	1,462	1,772	6,671	8,749	-2,079	-31%	16,907	16,907
Mar-00	1,462	3,058	8,133	11,807	-3,674	-45%	16,907	16,907
Apr-00	1,462	4,055	9,595	15,862	-6,266	-65%	16,907	25,392
May-00	1,462	1,793	11,058	17,655	-6,598	-60%	16,907	25,392
Jun-00	1,462	3,484	12,520	21,139	-8,619	-69%	16,907	29,288
Jul-00	1,462	3,473	13,983	24,612	-10,630	-76%	16,907	29,288
Aug-00	1,462	2,766	15,445	27,378	-11,933	-77%	16,907	31,000
Sep-00	1,462	2,848	16,907	30,226	-13,319	-79%	16,907	30,226

FY2000 Cost Plan to Actual as of September 2000
WBS 1.2 - Site and Conventional
Facilities Cost ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	664	363	664	363	301	45%	52,090	52,090
Nov-99	4,675	1,767	5,339	2,130	3,209	60%	52,090	52,090
Dec-99	4,675	3,057	10,014	5,187	4,827	48%	52,090	52,090
Jan-00	4,675	1,852	14,689	7,040	7,650	52%	52,090	52,090
Feb-00	4,675	3,442	19,364	10,481	8,883	46%	52,090	52,090
Mar-00	4,675	2,568	24,040	13,049	10,991	46%	52,090	52,090
Apr-00	4,675	4,659	28,715	17,708	11,007	38%	52,090	47,090
May-00	4,675	1,387	33,390	19,095	14,295	43%	52,090	47,090
Jun-00	4,675	4,685	38,065	23,780	14,285	38%	52,090	33,442
Jul-00	4,675	6,209	42,740	29,989	12,751	30%	52,090	33,442
Aug-00	4,675	2,586	47,415	32,575	14,840	31%	52,090	40,500
Sep-00	4,675	5,719	52,090	38,294	13,796	26%	52,090	38,294

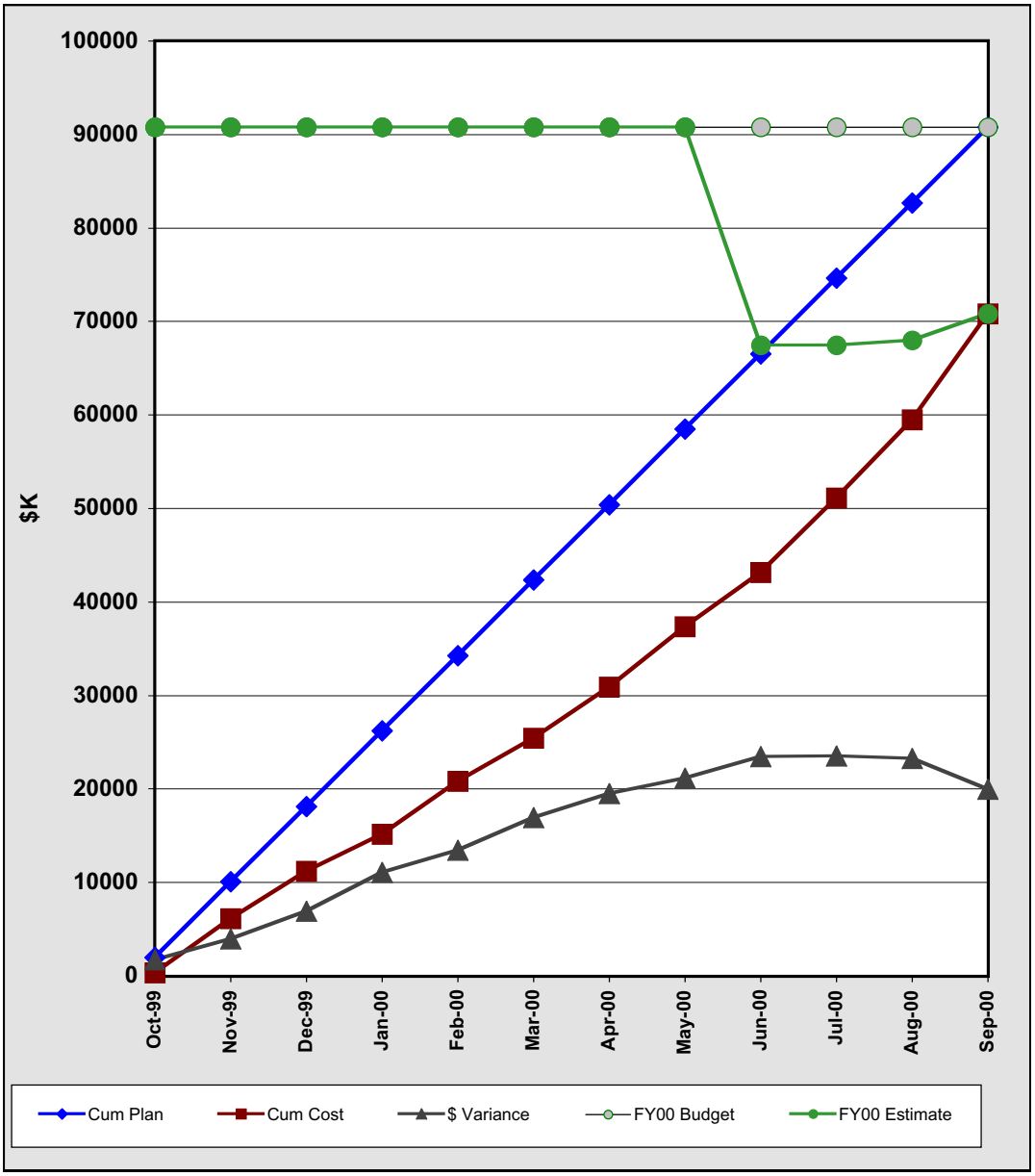
FY2000 Cost Plan to Actual
as of September 2000
WBS 1.3 - Lasers Systems ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,849	2,050	1,849	2,050	-201	-11%	53,083	53,083
Nov-99	4,658	2,517	6,507	4,567	1,939	30%	53,083	53,083
Dec-99	4,658	3,455	11,164	8,023	3,142	28%	53,083	53,083
Jan-00	4,658	2,463	15,822	10,485	5,336	34%	53,083	53,083
Feb-00	4,658	4,157	20,479	14,642	5,837	29%	53,083	53,083
Mar-00	4,658	2,904	25,137	17,546	7,591	30%	53,083	53,083
Apr-00	4,658	4,239	29,795	21,785	8,010	27%	53,083	53,083
May-00	4,658	4,296	34,452	26,081	8,371	24%	53,083	53,083
Jun-00	4,658	2,812	39,110	28,893	10,217	26%	53,083	37,597
Jul-00	4,658	4,086	43,767	32,979	10,788	25%	53,083	37,597
Aug-00	4,658	3,600	48,425	36,580	11,845	24%	53,083	40,500
Sep-00	4,658	4,183	53,083	40,762	12,320	23%	53,083	40,762

Project Number 96-D-111
September 2000

FY2000 Cost Plan to Actual
as of September 2000
WBS 1.4 - Beam Transport Systems($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,993	312	1,993	312	1,681	84%	90,764	90,764
Nov-99	8,070	5,793	10,063	6,106	3,957	39%	90,764	90,764
Dec-99	8,070	5,116	18,133	11,222	6,912	38%	90,764	90,764
Jan-00	8,070	3,928	26,203	15,150	11,054	42%	90,764	90,764
Feb-00	8,070	5,692	34,273	20,842	13,431	39%	90,764	90,764
Mar-00	8,070	4,586	42,344	25,428	16,915	40%	90,764	90,764
Apr-00	8,070	5,501	50,414	30,929	19,485	39%	90,764	90,764
May-00	8,070	6,439	58,484	37,368	21,116	36%	90,764	90,764
Jun-00	8,070	5,757	66,554	43,125	23,429	35%	90,764	67,477
Jul-00	8,070	8,010	74,624	51,135	23,489	31%	90,764	67,477
Aug-00	8,070	8,331	82,694	59,466	23,228	28%	90,764	68,000
Sep-00	8,070	11,329	90,764	70,795	19,969	22%	90,764	70,795

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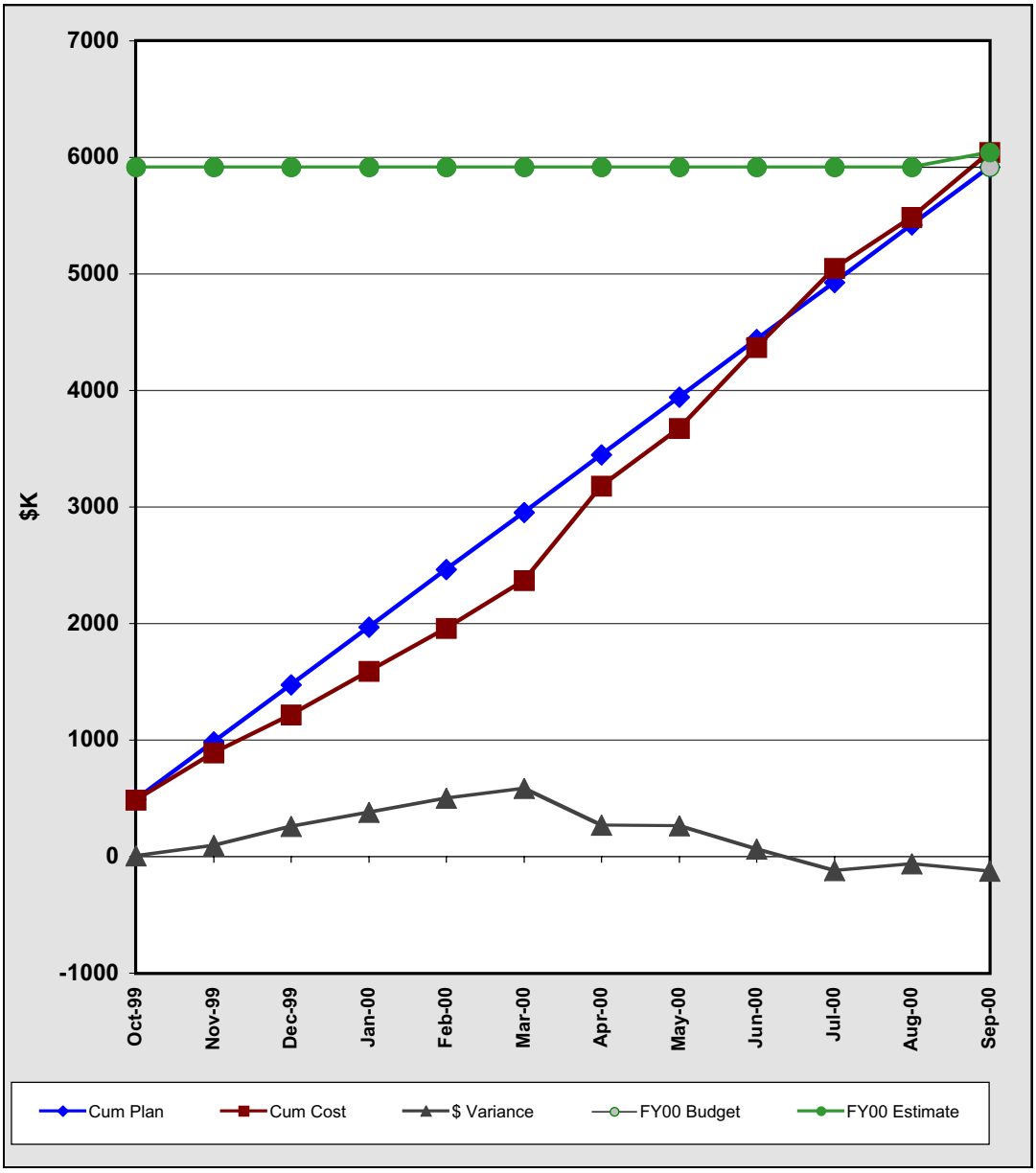
September 2000

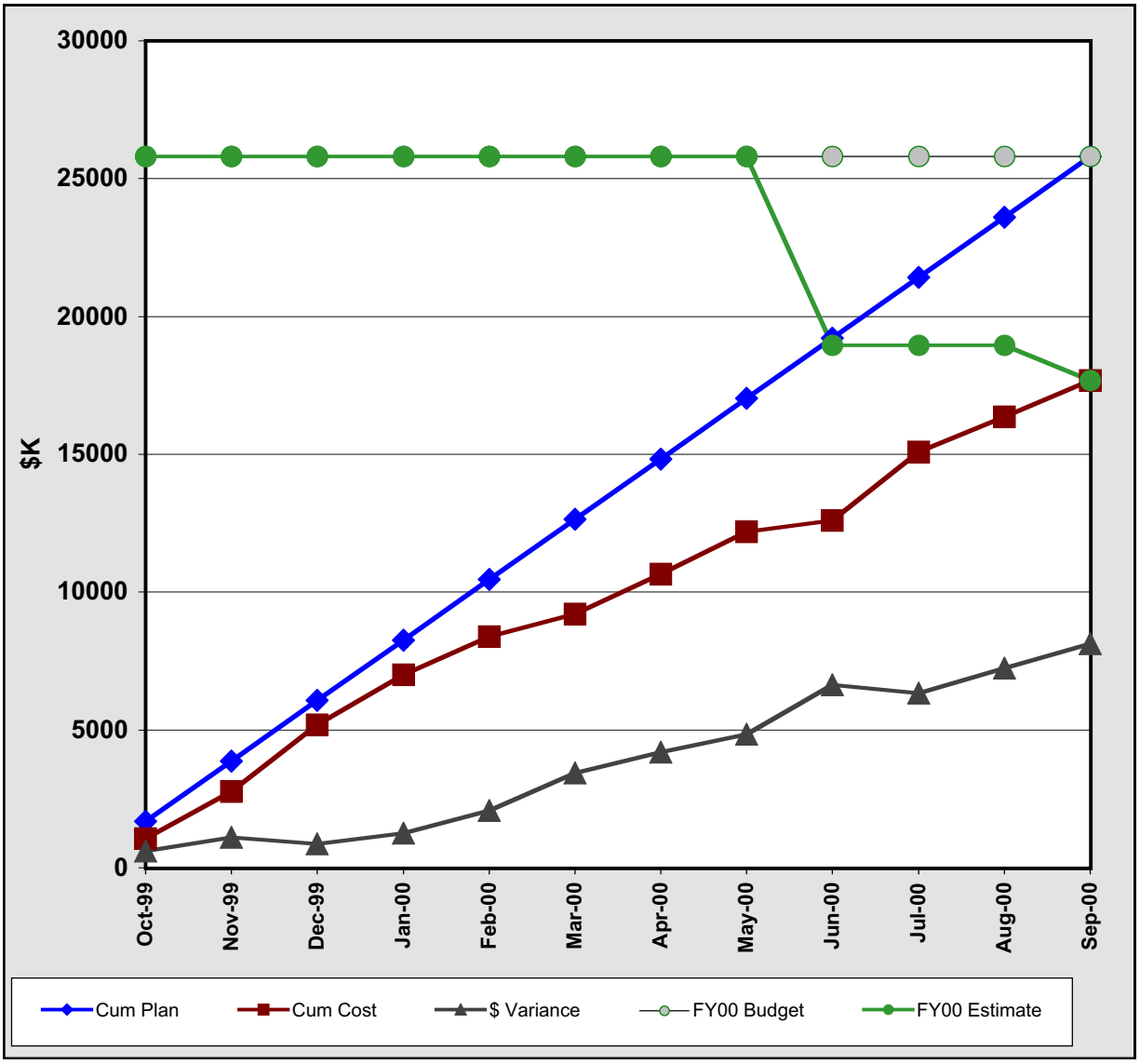
FY2000 Cost Plan to Actual
as of September 2000
WBS 1.5 - Integrated Computer Control ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	489	482	489	482	7	1%	5,914	5,914
Nov-99	493	407	982	889	93	10%	5,914	5,914
Dec-99	493	328	1,475	1,217	258	17%	5,914	5,914
Jan-00	493	374	1,969	1,591	377	19%	5,914	5,914
Feb-00	493	369	2,462	1,960	502	20%	5,914	5,914
Mar-00	493	409	2,955	2,369	586	20%	5,914	5,914
Apr-00	493	809	3,448	3,178	270	8%	5,914	5,914
May-00	493	498	3,941	3,676	265	7%	5,914	5,914
Jun-00	493	693	4,435	4,369	66	1%	5,914	5,914
Jul-00	493	678	4,928	5,047	-119	-2%	5,914	5,914
Aug-00	493	437	5,421	5,484	-63	-1%	5,914	5,914
Sep-00	493	558	5,914	6,042	-128	-2%	5,914	6,042

FY2000 Cost Plan to Actual
as of September 2000
WBS 1.6 - Optical Components ($K)

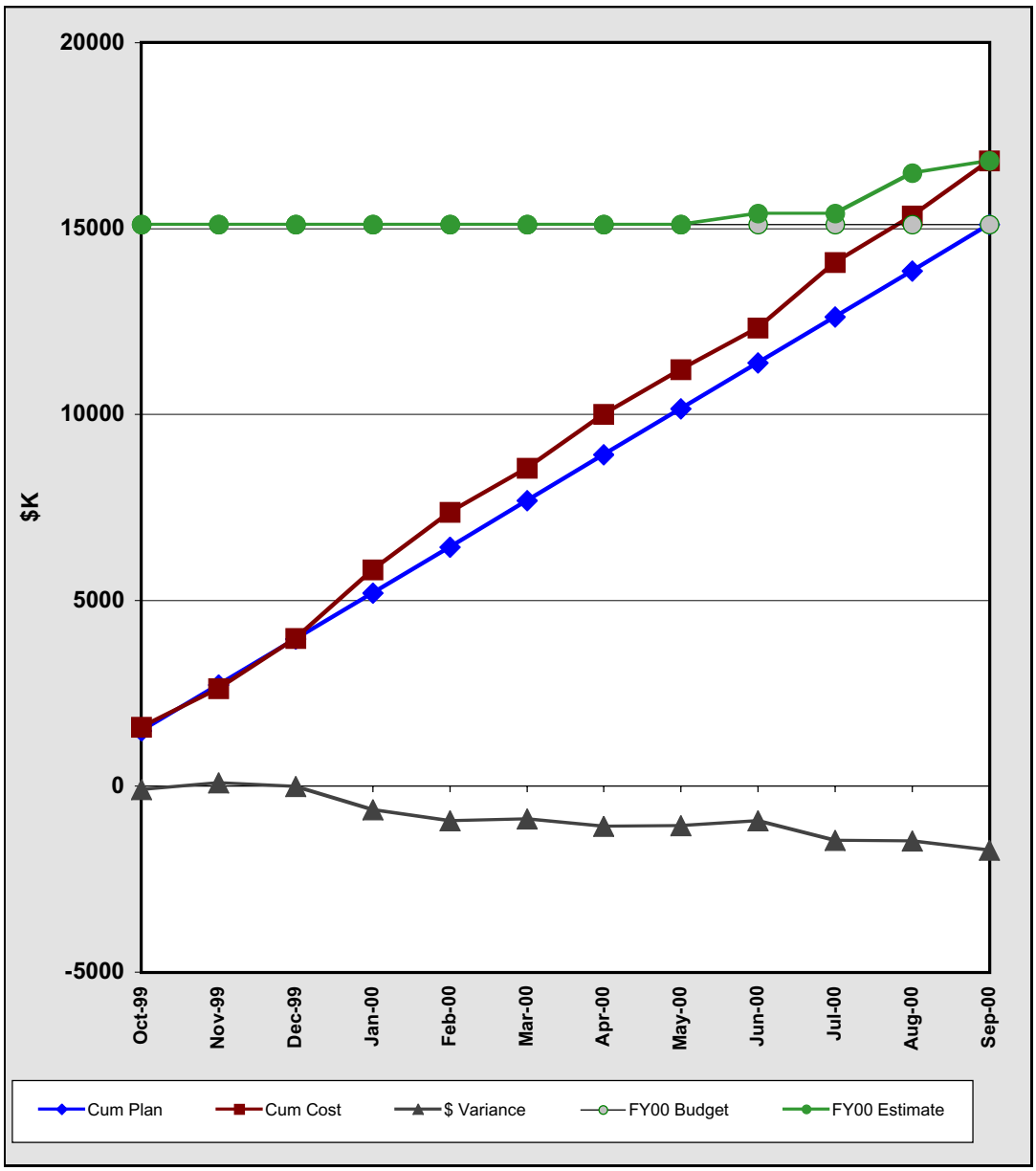
Project Number 96-D-111
September 2000



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,681	1,067	1,681	1,067	614	37%	25,798	25,798
Nov-99	2,192	1,704	3,873	2,771	1,102	28%	25,798	25,798
Dec-99	2,193	2,422	6,066	5,193	873	14%	25,798	25,798
Jan-00	2,193	1,810	8,258	7,003	1,255	15%	25,798	25,798
Feb-00	2,193	1,377	10,451	8,380	2,071	20%	25,798	25,798
Mar-00	2,193	824	12,643	9,204	3,439	27%	25,798	25,798
Apr-00	2,193	1,448	14,836	10,652	4,184	28%	25,798	25,798
May-00	2,193	1,531	17,028	12,183	4,845	28%	25,798	25,798
Jun-00	2,193	410	19,221	12,593	6,628	34%	25,798	18,948
Jul-00	2,193	2,489	21,413	15,082	6,331	30%	25,798	18,948
Aug-00	2,193	1,288	23,606	16,370	7,236	31%	25,798	18,948
Sep-00	2,193	1,309	25,798	17,679	8,119	31%	25,798	17,679

FY2000 Cost Plan to Actual as of September 2000
WBS 1.7 - Laser Control ($K)

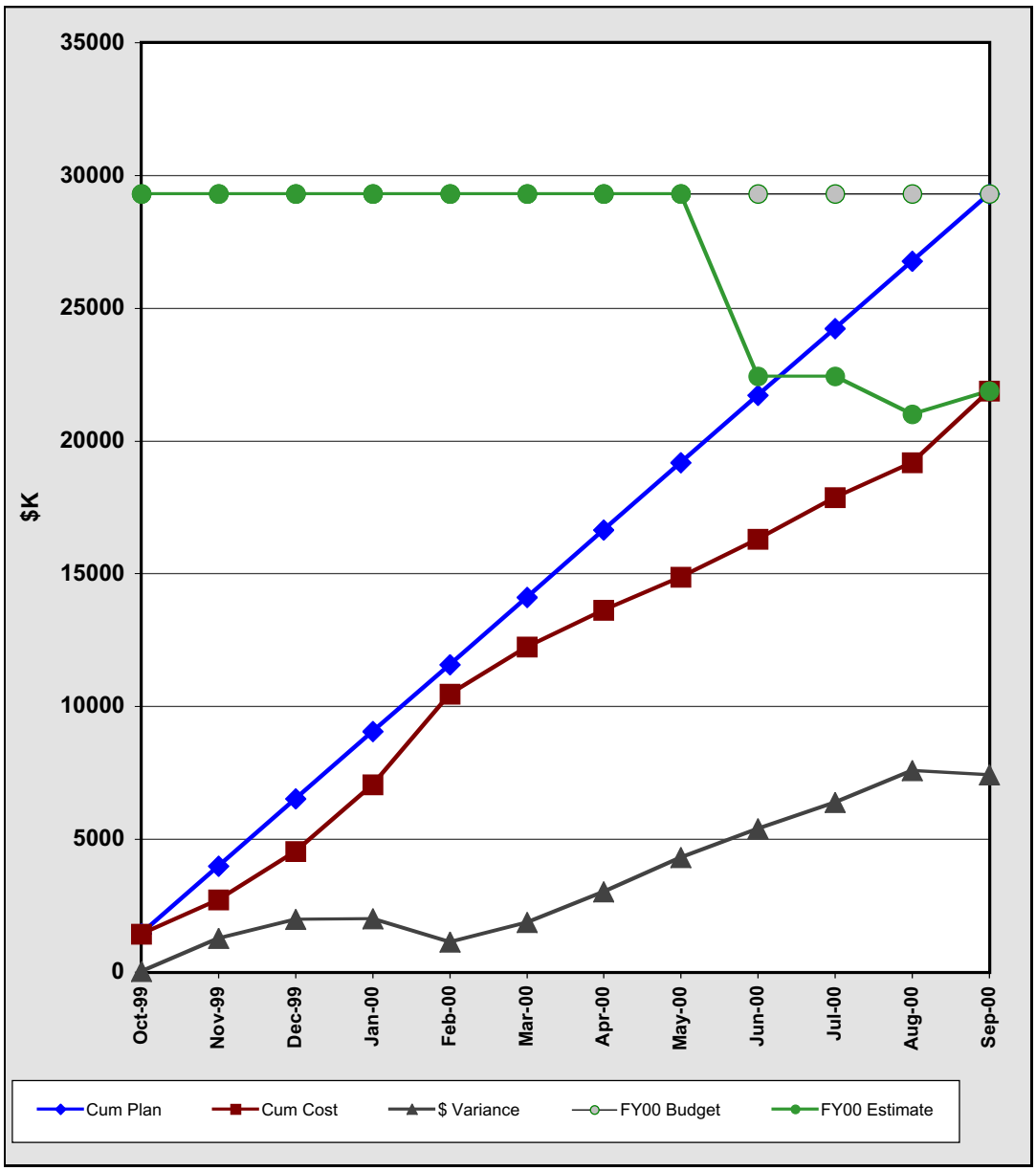
Project Number 96-D-111
September 2000



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,483	1,582	1,483	1,582	-99	-7%	15,103	15,103
Nov-99	1,238	1,042	2,721	2,625	97	4%	15,103	15,103
Dec-99	1,238	1,351	3,959	3,976	-17	0%	15,103	15,103
Jan-00	1,238	1,851	5,198	5,827	-629	-12%	15,103	15,103
Feb-00	1,238	1,547	6,436	7,374	-938	-15%	15,103	15,103
Mar-00	1,238	1,176	7,674	8,550	-876	-11%	15,103	15,103
Apr-00	1,238	1,449	8,912	9,999	-1,087	-12%	15,103	15,103
May-00	1,238	1,209	10,150	11,208	-1,058	-10%	15,103	15,103
Jun-00	1,238	1,109	11,389	12,318	-929	-8%	15,103	15,411
Jul-00	1,238	1,776	12,627	14,094	-1,467	-12%	15,103	15,411
Aug-00	1,238	1,240	13,865	15,334	-1,469	-11%	15,103	16,500
Sep-00	1,238	1,489	15,103	16,823	-1,720	-11%	15,103	16,823

Project Number 96-D-111
September 2000

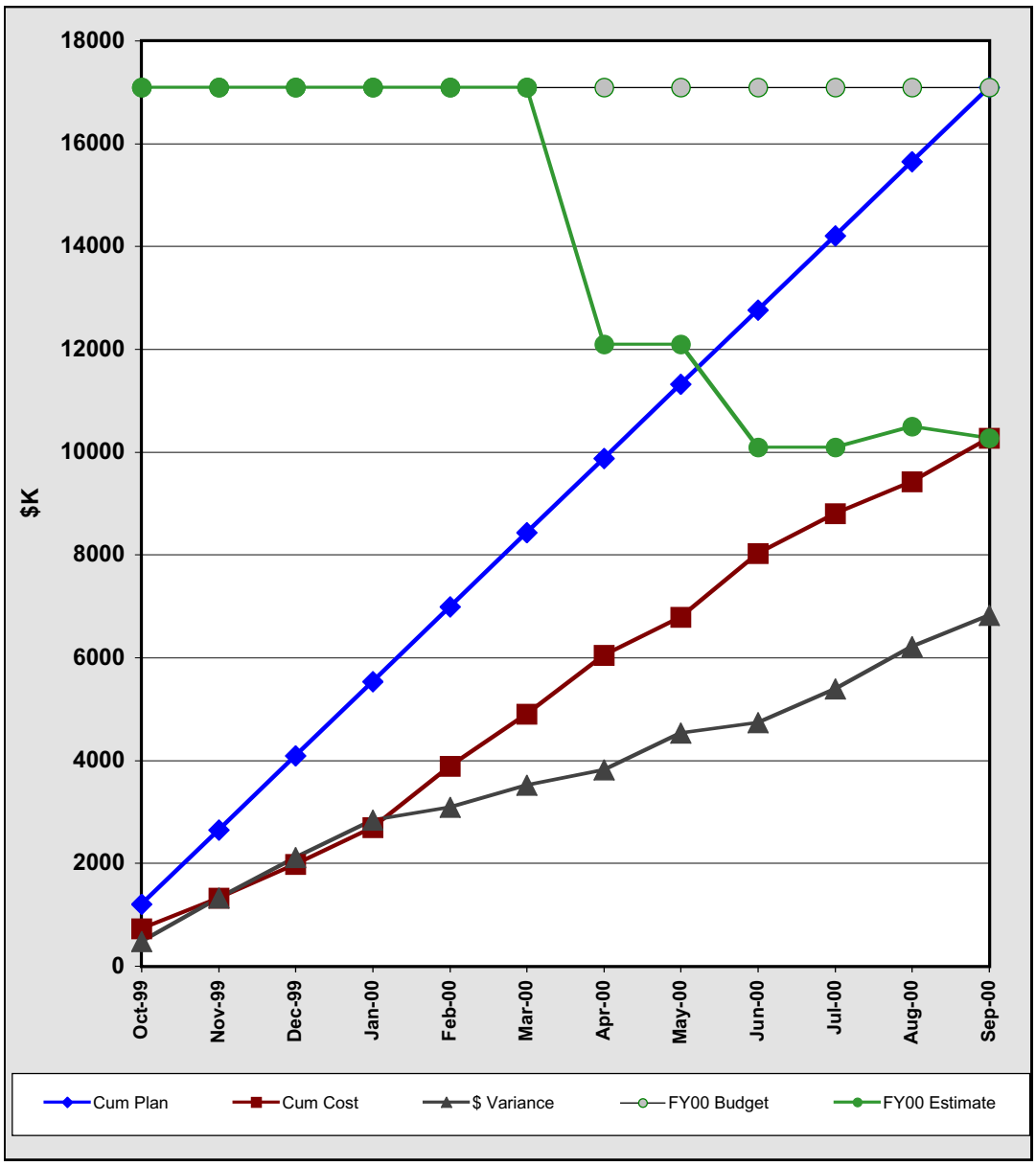
FY2000 Cost Plan to Actual
as of September 2000
WBS 1.8 - Target Experimental System ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,458	1,429	1,458	1,429	29	2%	29,303	29,303
Nov-99	2,531	1,296	3,989	2,725	1,264	32%	29,303	29,303
Dec-99	2,531	1,806	6,521	4,531	1,990	31%	29,303	29,303
Jan-00	2,531	2,521	9,052	7,052	2,000	22%	29,303	29,303
Feb-00	2,531	3,410	11,584	10,462	1,122	10%	29,303	29,303
Mar-00	2,531	1,782	14,115	12,243	1,872	13%	29,303	29,303
Apr-00	2,531	1,373	16,646	13,616	3,030	18%	29,303	29,303
May-00	2,531	1,250	19,178	14,866	4,311	22%	29,303	29,303
Jun-00	2,531	1,440	21,709	16,306	5,403	25%	29,303	22,435
Jul-00	2,531	1,553	24,241	17,859	6,382	26%	29,303	22,435
Aug-00	2,531	1,328	26,772	19,186	7,586	28%	29,303	21,000
Sep-00	2,531	2,689	29,303	21,875	7,428	25%	29,303	21,875

Project Number 96-D-111
September 2000

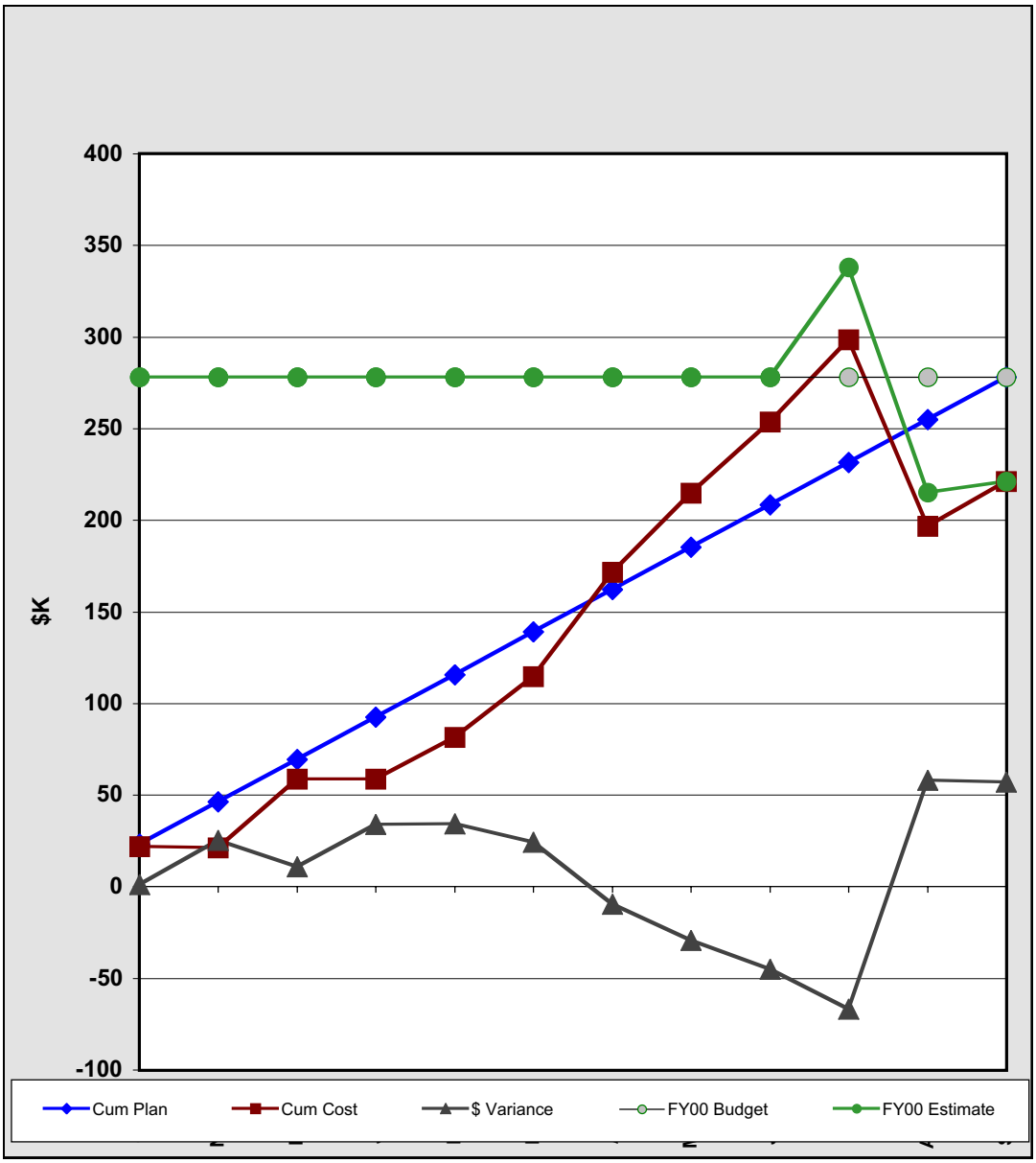
FY2000 Cost Plan to Actual
as of September 2000
WBS 1.9 - Operations Special Equipment ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,209	728	1,209	728	481	40%	17,091	17,091
Nov-99	1,444	601	2,653	1,329	1,324	50%	17,091	17,091
Dec-99	1,444	653	4,097	1,982	2,115	52%	17,091	17,091
Jan-00	1,444	716	5,540	2,698	2,843	51%	17,091	17,091
Feb-00	1,444	1,191	6,984	3,889	3,095	44%	17,091	17,091
Mar-00	1,444	1,019	8,428	4,908	3,520	42%	17,091	17,091
Apr-00	1,444	1,142	9,872	6,050	3,822	39%	17,091	12,091
May-00	1,444	737	11,316	6,787	4,529	40%	17,091	12,091
Jun-00	1,444	1,241	12,759	8,028	4,732	37%	17,091	10,088
Jul-00	1,444	781	14,203	8,809	5,394	38%	17,091	10,088
Aug-00	1,444	619	15,647	9,428	6,219	40%	17,091	10,500
Sep-00	1,444	842	17,091	10,270	6,821	40%	17,091	10,270

Project Number 96-D-111
September 2000

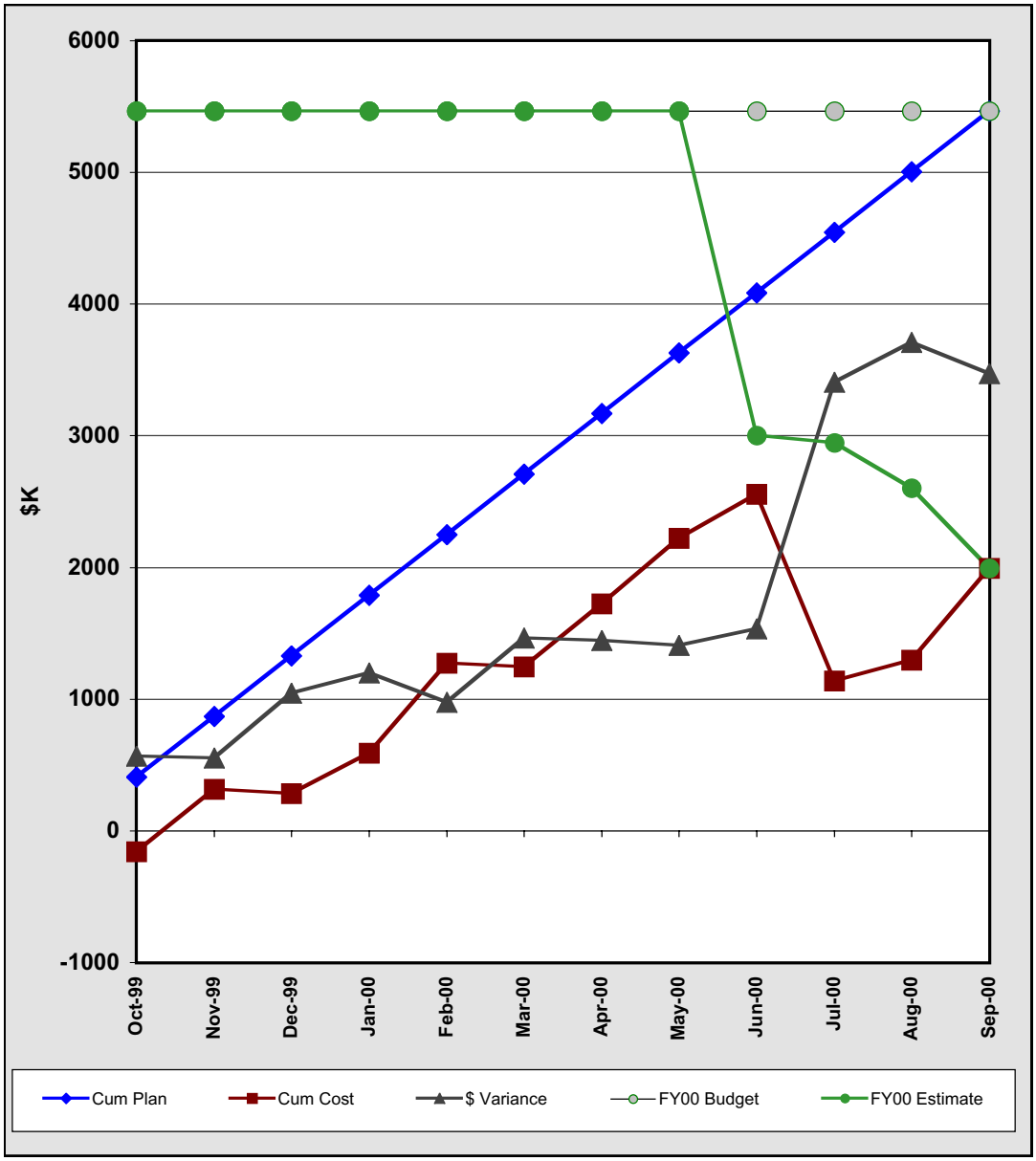
FY2000 Cost Plan to Actual
as of September 2000
WBS 1.10 - Start-up Activities ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	23	22	23	22	1	5%	278	278
Nov-99	23	-1	46	21	25	54%	278	278
Dec-99	23	37	70	59	11	16%	278	278
Jan-00	23	0	93	59	34	37%	278	278
Feb-00	23	23	116	82	34	30%	278	278
Mar-00	23	33	139	115	24	18%	278	278
Apr-00	23	57	162	172	-9	-6%	278	278
May-00	23	43	185	215	-29	-16%	278	278
Jun-00	23	39	209	254	-45	-22%	278	278
Jul-00	23	45	232	299	-67	-29%	278	338
Aug-00	23	-102	255	197	58	23%	278	215
Sep-00	23	24	278	221	57	21%	278	221

FY2000 Cost Plan to Actual
as of September 2000
WBS 1.11 ($K)

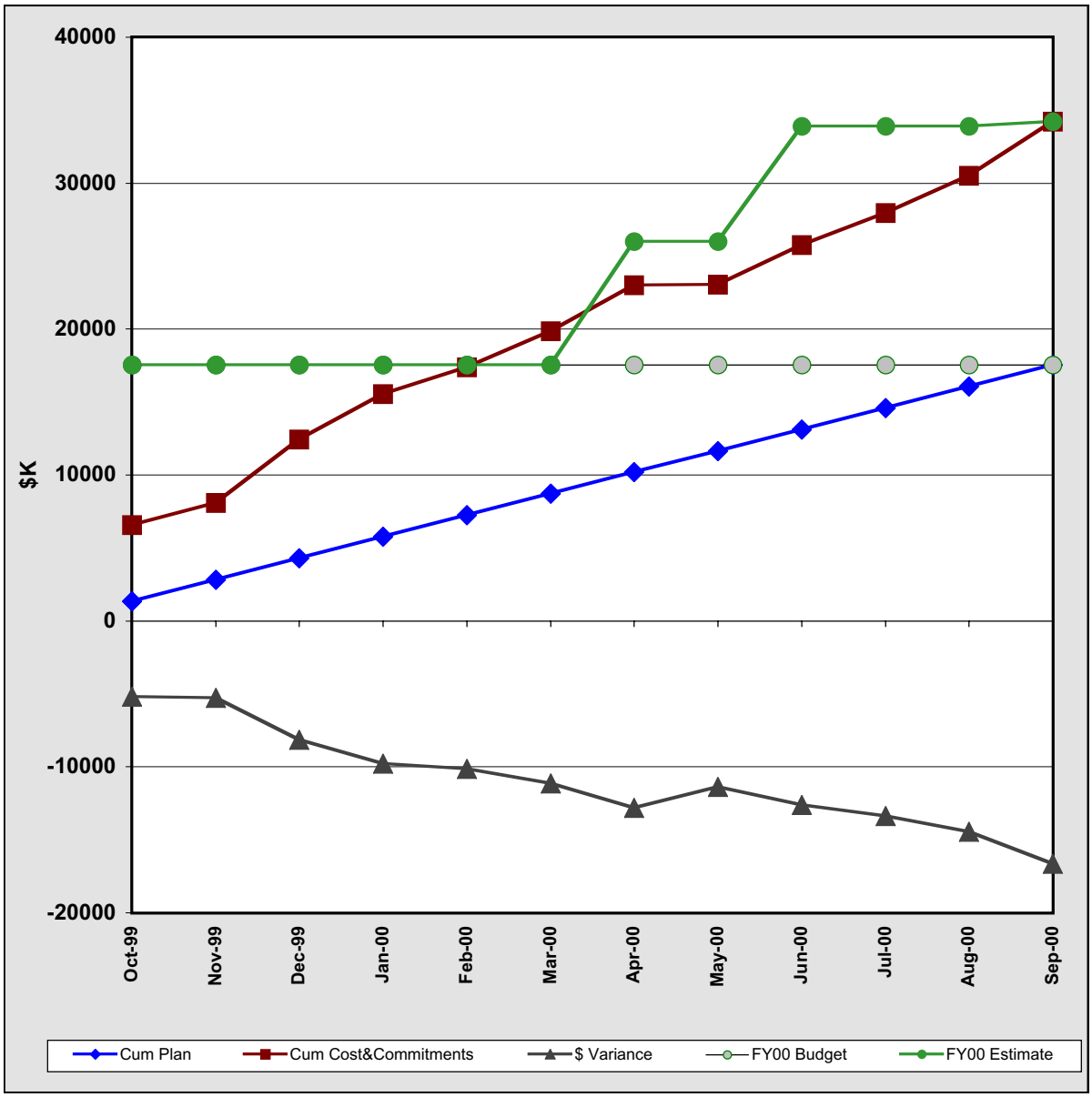
Project Number 96-D-111
September 2000



	Monthly		Cumulative				FY2000	FY2000
Month	Planned*	Actual	Planned	Actual	$ Var	% Var	Budget*	Estimate
Oct-99	410	-157	410	-157	567	138%	5,466	5,466
Nov-99	460	474	870	317	553	64%	5,466	5,466
Dec-99	460	-33	1,329	284	1,046	79%	5,466	5,466
Jan-00	460	306	1,789	589	1,200	67%	5,466	5,466
Feb-00	460	682	2,248	1,272	977	43%	5,466	5,466
Mar-00	460	-29	2,708	1,243	1,465	54%	5,466	5,466
Apr-00	460	482	3,168	1,724	1,443	46%	5,466	5,466
May-00	460	495	3,627	2,220	1,408	39%	5,466	5,466
Jun-00	460	335	4,087	2,555	1,532	37%	5,466	3,004
Jul-00	460	-1,416	4,546	1,138	3,408	75%	5,466	2,944
Aug-00	460	157	5,006	1,295	3,711	74%	5,466	2,600
Sep-00	460	699	5,466	1,994	3,471	64%	5,466	1,994

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.1 - Project Office ($K)

Project Number 96-D-111
September 2000

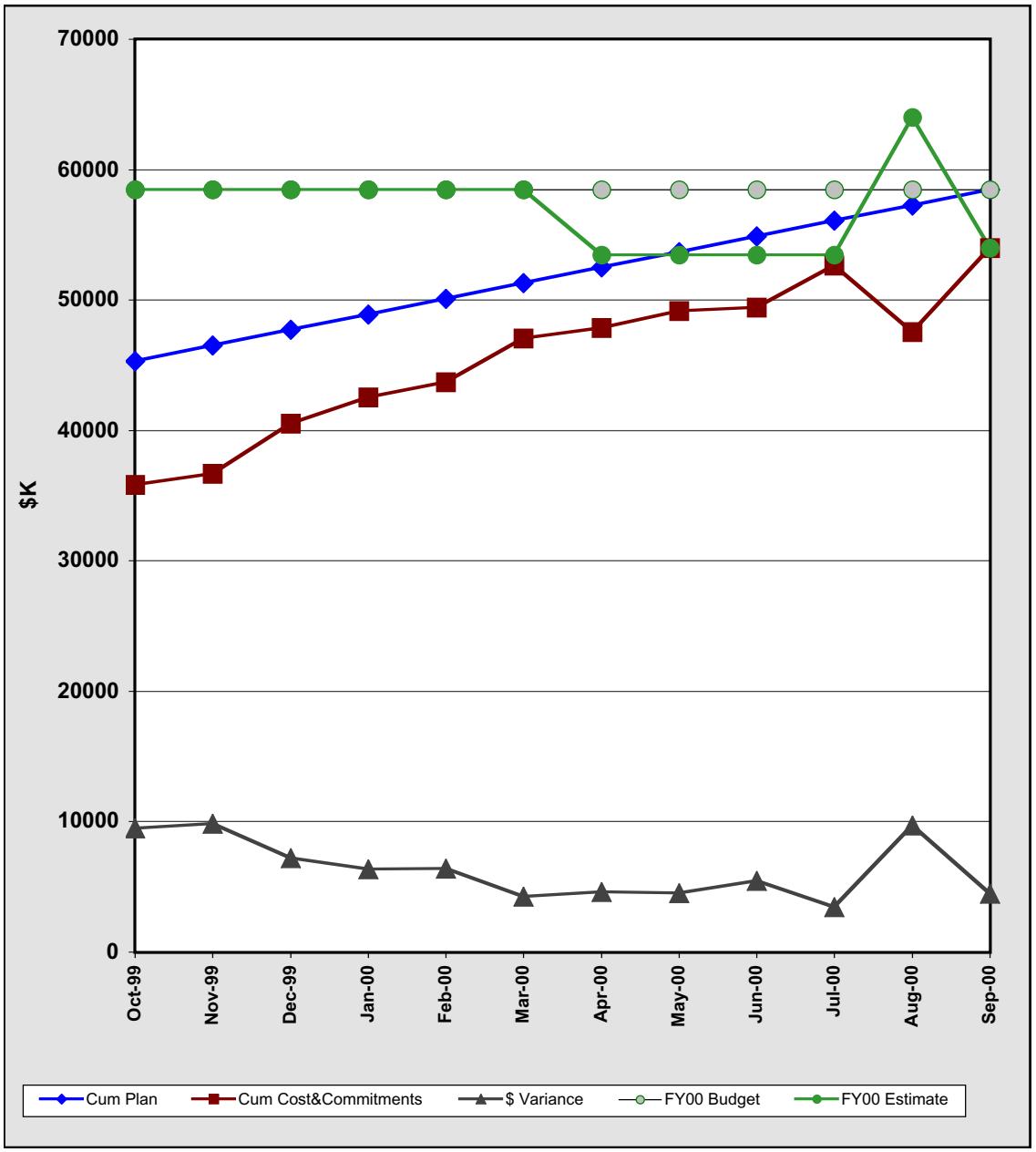


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,358 *	6,571	1,358 *	6,571	-5,213	-384%	17,537	17,537
Nov-99	1,471	1,531	2,829	8,103	-5,274	-186%	17,537	17,537
Dec-99	1,471	4,346	4,300	12,449	-8,149	-190%	17,537	17,537
Jan-00	1,471	3,092	5,770	15,541	-9,771	-169%	17,537	17,537
Feb-00	1,471	1,830	7,241	17,371	-10,130	-140%	17,537	17,537
Mar-00	1,471	2,498	8,712	19,869	-11,157	-128%	17,537	17,537
Apr-00	1,471	3,123	10,183	22,992	-12,809	-126%	17,537	25,996
May-00	1,471	64	11,654	23,056	-11,403	-98%	17,537	25,996
Jun-00	1,471	2,688	13,124	25,744	-12,620	-96%	17,537	33,890
Jul-00	1,471	2,220	14,595	27,965	-13,369	-92%	17,537	33,890
Aug-00	1,471	2,548	16,066	30,512	-14,446	-90%	17,537	33,890
Sep-00	1,471	3,692	17,537	34,204	-16,668	-95%	17,537	34,204

* Includes $4,263K of uncosted obligations from FY99.

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.2 - Site and Conventional Facilities ($K)

Project Number 96-D-111
September 2000

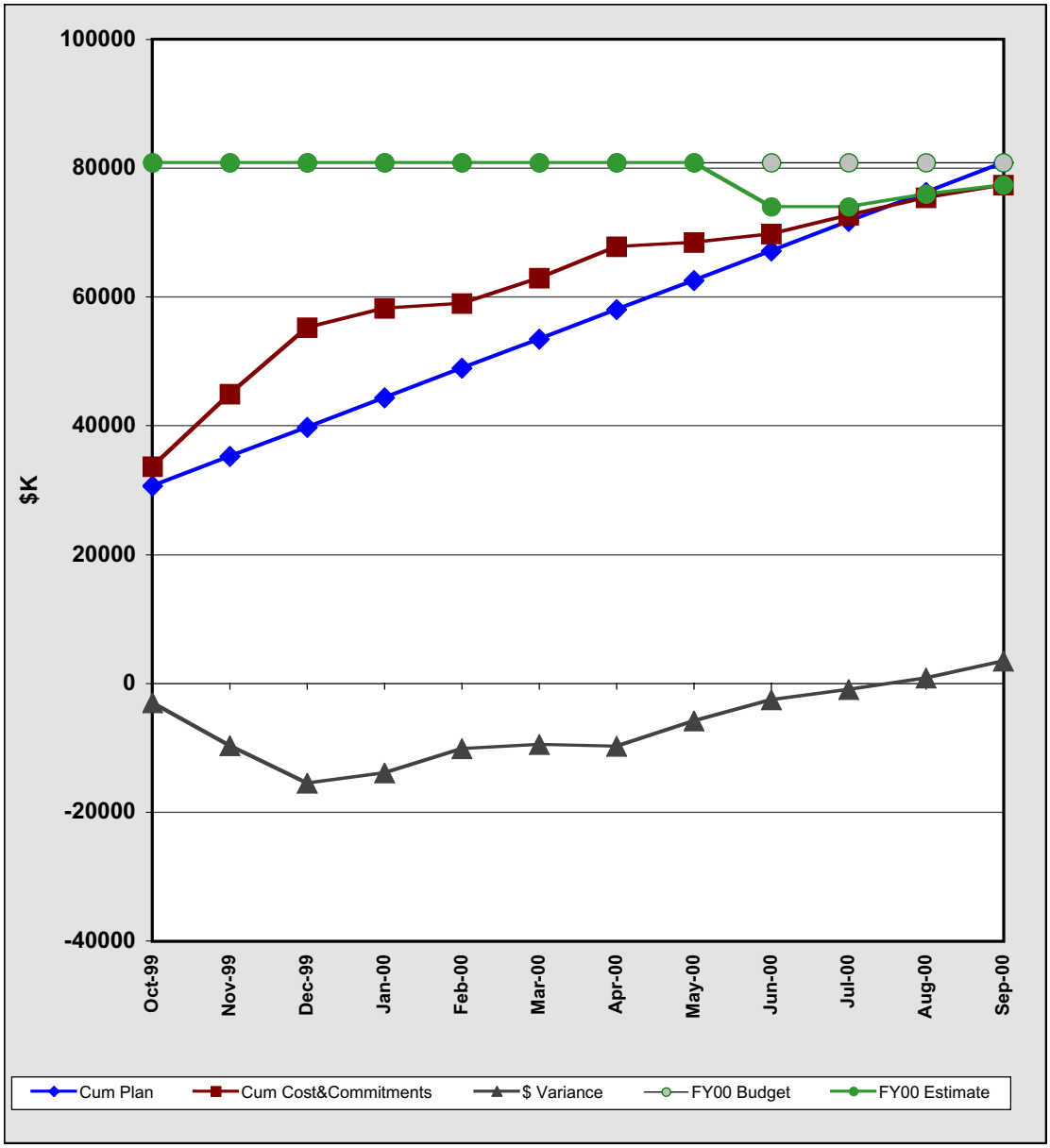


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	45,320 *	35,825	45,320 *	35,825	9,495	21%	58,466	58,466
Nov-99	1,195	860	46,515	36,685	9,830	21%	58,466	58,466
Dec-99	1,195	3,842	47,710	40,527	7,184	15%	58,466	58,466
Jan-00	1,195	2,016	48,905	42,543	6,363	13%	58,466	58,466
Feb-00	1,195	1,143	50,100	43,685	6,415	13%	58,466	58,466
Mar-00	1,195	3,372	51,296	47,057	4,239	8%	58,466	58,466
Apr-00	1,195	809	52,491	47,866	4,625	9%	58,466	53,466
May-00	1,195	1,306	53,686	49,172	4,514	8%	58,466	53,466
Jun-00	1,195	264	54,881	49,436	5,445	10%	58,466	53,466
Jul-00	1,195	3,197	56,076	52,633	3,443	6%	58,466	53,466
Aug-00	1,195	-5,073	57,271	47,560	9,711	17%	58,466	64,000
Sep-00	1,195	6,421	58,466	53,981	4,485	8%	58,466	53,981

* Includes $34,968K of uncosted obligations from FY99.

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.3 - Lasers Systems ($K)

Project Number 96-D-111
September 2000

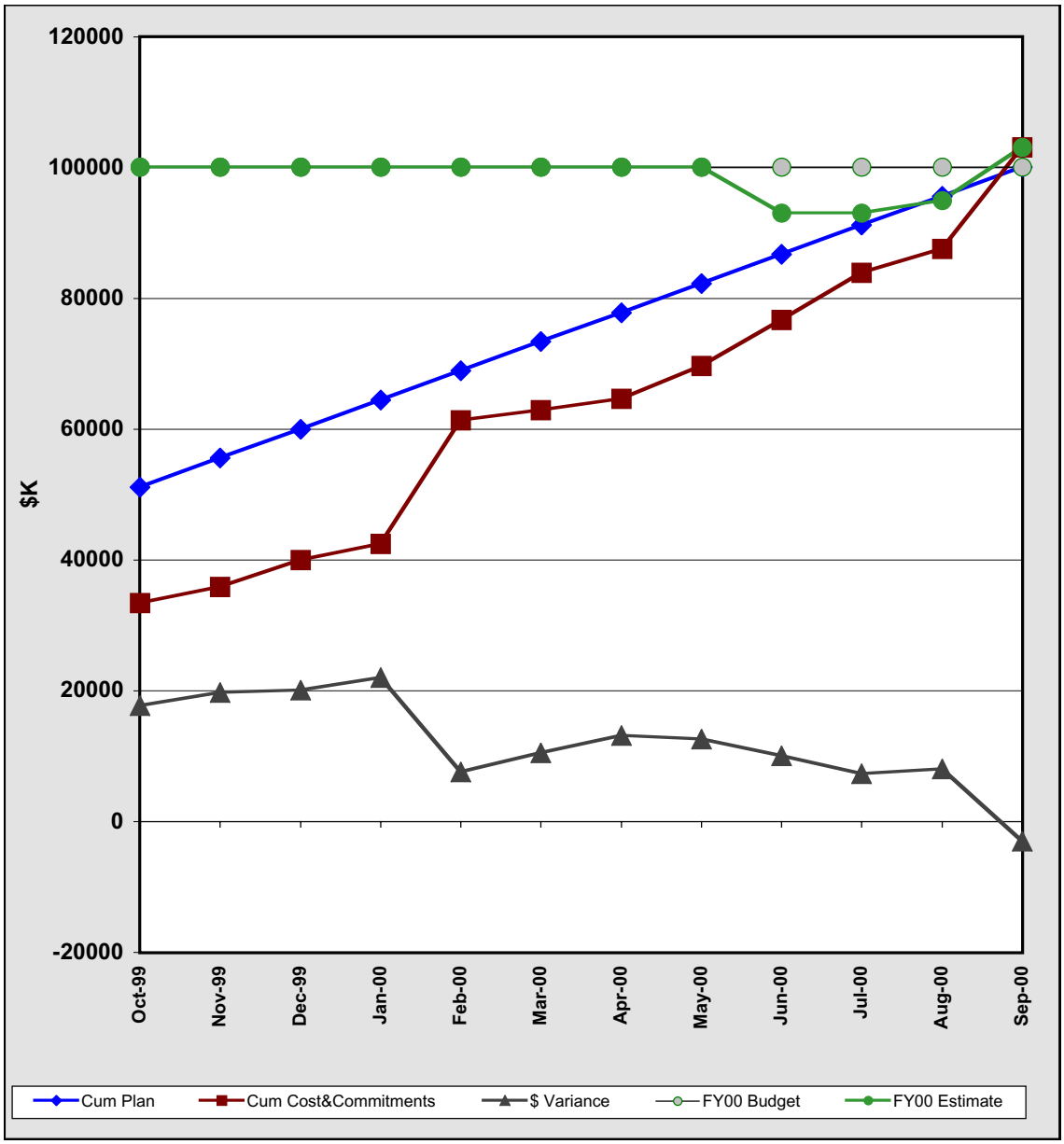


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	30,661 *	33,683	30,661 *	33,683	-3,022	-10%	80,840	80,840
Nov-99	4,562	11,269	35,223	44,952	-9,729	-28%	80,840	80,840
Dec-99	4,562	10,316	39,784	55,268	-15,484	-39%	80,840	80,840
Jan-00	4,562	2,990	44,346	58,259	-13,912	-31%	80,840	80,840
Feb-00	4,562	775	48,908	59,033	-10,125	-21%	80,840	80,840
Mar-00	4,562	3,947	53,470	62,980	-9,511	-18%	80,840	80,840
Apr-00	4,562	4,838	58,031	67,818	-9,787	-17%	80,840	80,840
May-00	4,562	642	62,593	68,460	-5,868	-9%	80,840	80,840
Jun-00	4,562	1,292	67,155	69,752	-2,598	-4%	80,840	74,037
Jul-00	4,562	2,975	71,716	72,728	-1,011	-1%	80,840	74,037
Aug-00	4,562	2,705	76,278	75,432	846	1%	80,840	76,000
Sep-00	4,562	1,969	80,840	77,401	3,438	4%	80,840	77,401

* Includes $25,645K of uncosted obligations from FY99.

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.4 - BeamTransport Systems ($K)

Project Number 96-D-111
September 2000

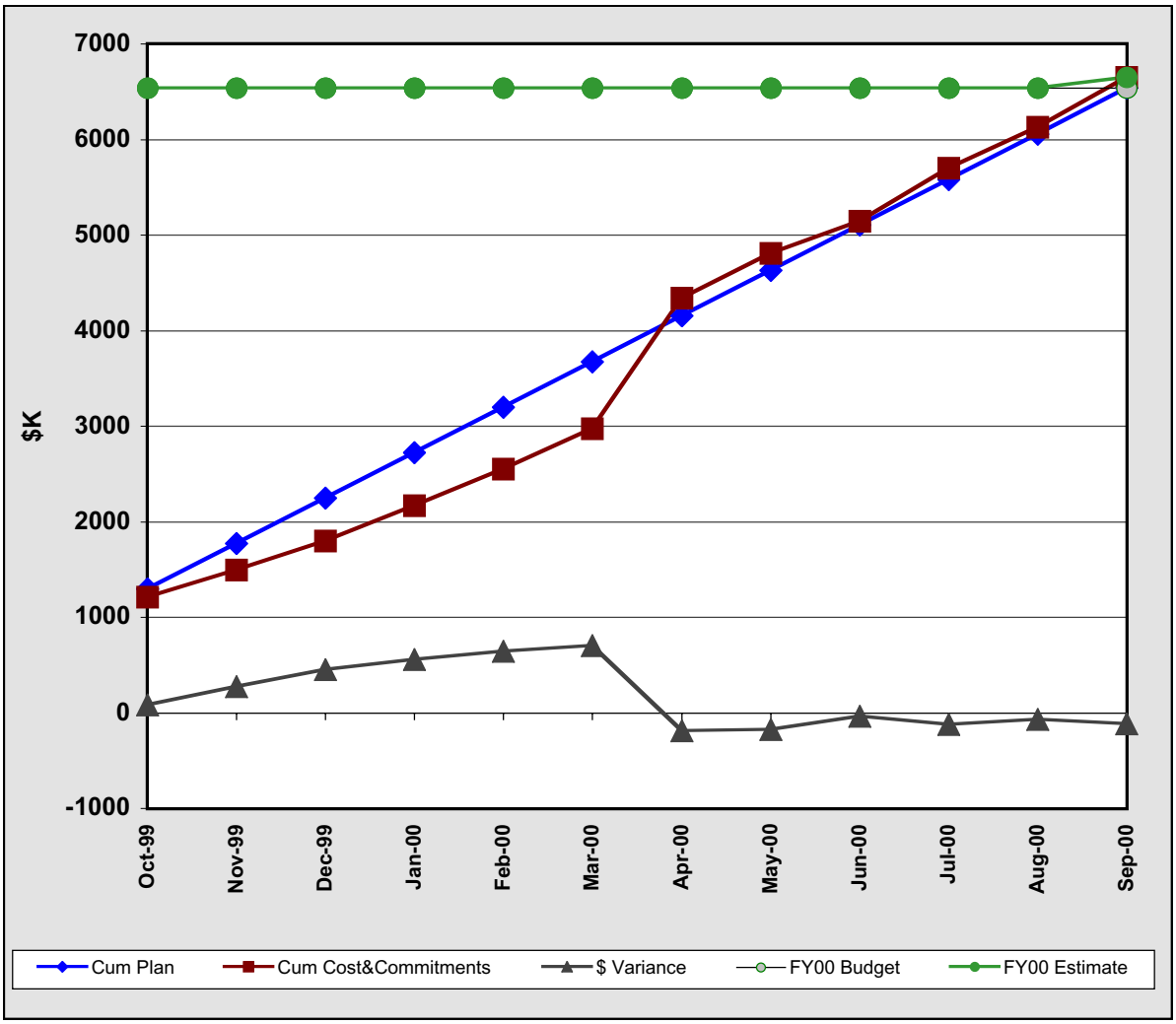


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	51,134 *	33,394	51,134 *	33,394	17,740	35%	100,106	100,106
Nov-99	4,452	2,457	55,586	35,850	19,736	36%	100,106	100,106
Dec-99	4,452	4,109	60,038	39,960	20,078	33%	100,106	100,106
Jan-00	4,452	2,535	64,490	42,495	21,995	34%	100,106	100,106
Feb-00	4,452	18,832	68,942	61,327	7,615	11%	100,106	100,106
Mar-00	4,452	1,602	73,394	62,929	10,465	14%	100,106	100,106
Apr-00	4,452	1,725	77,846	64,654	13,192	17%	100,106	100,106
May-00	4,452	5,058	82,298	69,712	12,586	15%	100,106	100,106
Jun-00	4,452	6,961	86,750	76,673	10,077	12%	100,106	93,014
Jul-00	4,452	7,246	91,202	83,919	7,283	8%	100,106	93,014
Aug-00	4,452	3,673	95,654	87,591	8,063	8%	100,106	95,000
Sep-00	4,452	15,534	100,106	103,125	-3,019	-3%	100,106	103,125

* Includes $34,782K of uncosted obligations from FY99.

Project Number 96-D-111
August 2000

FY2000 Cost and Commitment Plan to Actual as of August 2000 WBS 1.5 - Integrated Computer Control ($K)

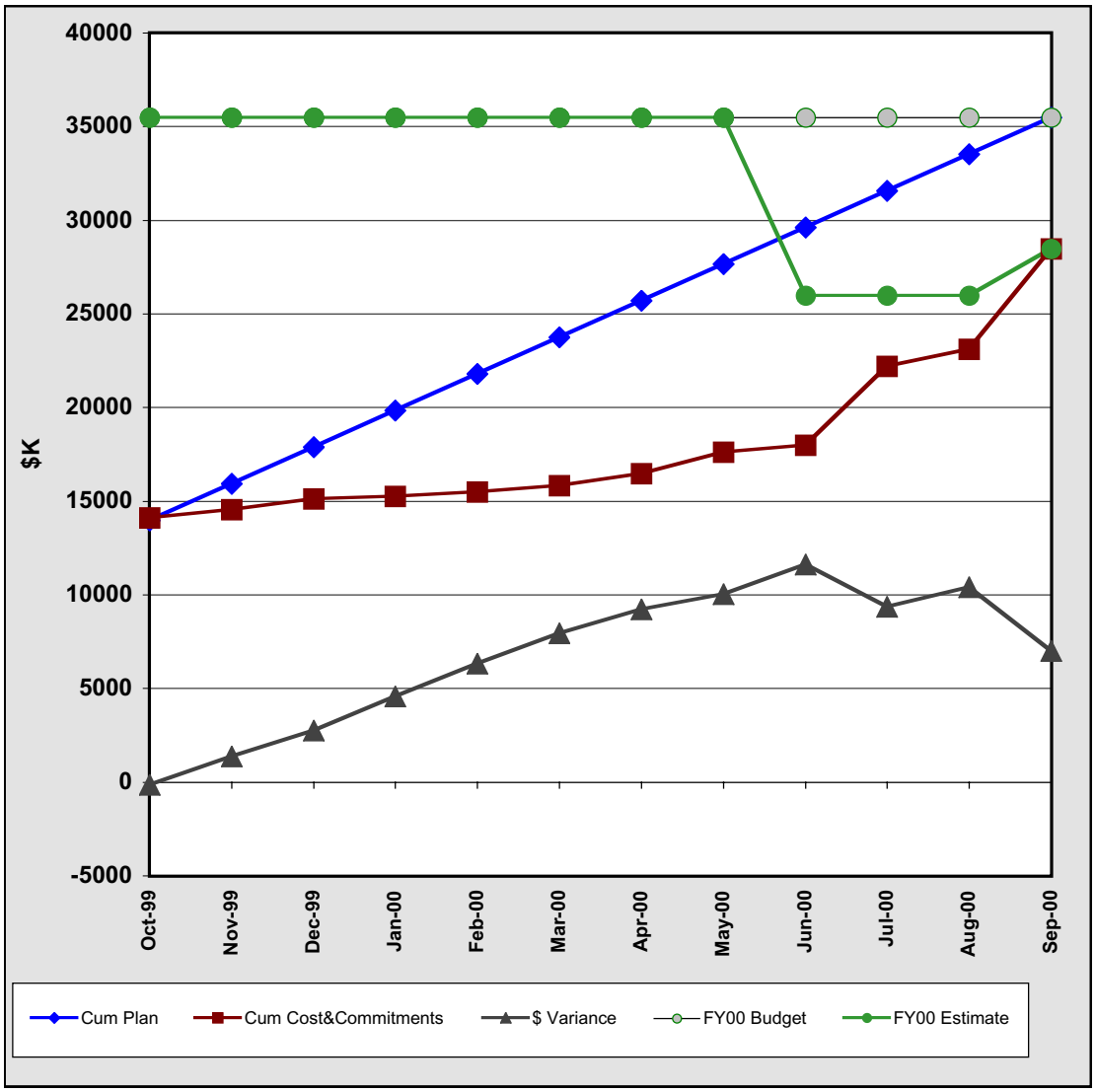


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,294 *	1,211	1,294 *	1,211	83	6%	6,536	6,536
Nov-99	477	287	1,771	1,498	273	15%	6,536	6,536
Dec-99	477	299	2,247	1,797	450	20%	6,536	6,536
Jan-00	477	369	2,724	2,166	557	20%	6,536	6,536
Feb-00	477	388	3,200	2,554	646	20%	6,536	6,536
Mar-00	477	422	3,677	2,976	701	19%	6,536	6,536
Apr-00	477	1,364	4,153	4,340	-187	-5%	6,536	6,536
May-00	477	467	4,630	4,807	-178	-4%	6,536	6,536
Jun-00	477	335	5,106	5,142	-36	-1%	6,536	6,536
Jul-00	477	560	5,583	5,702	-120	-2%	6,536	6,536
Aug-00	477	427	6,059	6,129	-70	-1%	6,536	6,536
Sep-00	477	523	6,536	6,652	-117	-2%	6,536	6,652

* Includes $750K of uncosted obligations from FY99.

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.6 - Optical Components ($K)

Project Number 96-D-111
September 2000

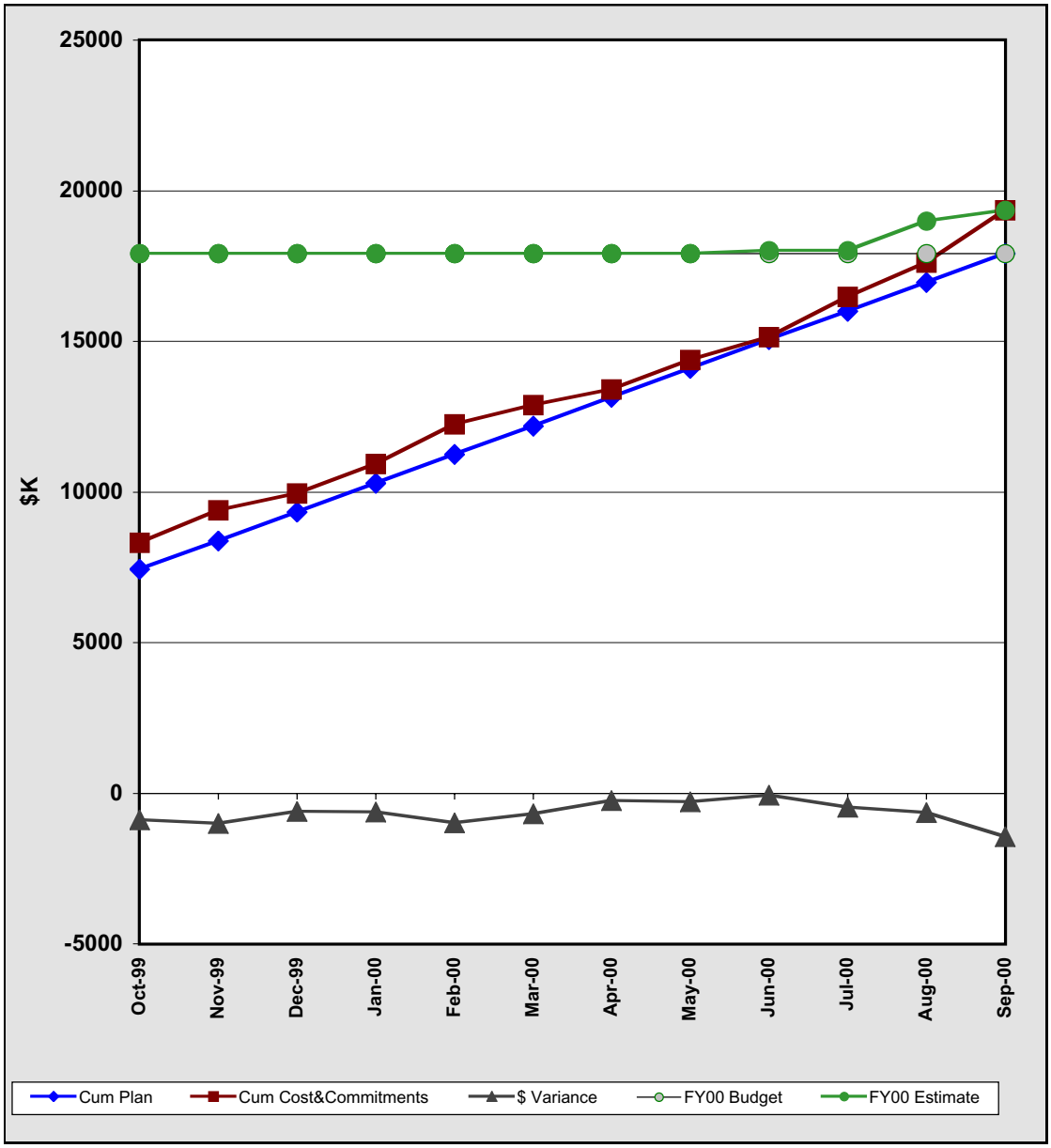


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	13,984 *	14,124	13,984 *	14,124	-140	-1%	35,473	35,473
Nov-99	1,954	441	15,938	14,565	1,373	9%	35,473	35,473
Dec-99	1,954	570	17,891	15,135	2,756	15%	35,473	35,473
Jan-00	1,954	131	19,845	15,266	4,579	23%	35,473	35,473
Feb-00	1,954	223	21,798	15,489	6,309	29%	35,473	35,473
Mar-00	1,954	326	23,752	15,815	7,937	33%	35,473	35,473
Apr-00	1,954	657	25,705	16,472	9,233	36%	35,473	35,473
May-00	1,954	1,156	27,659	17,628	10,031	36%	35,473	35,473
Jun-00	1,954	366	29,612	17,994	11,618	39%	35,473	25,975
Jul-00	1,954	4,223	31,566	22,217	9,349	30%	35,473	25,975
Aug-00	1,954	907	33,519	23,124	10,395	31%	35,473	25,975
Sep-00	1,954	5,352	35,473	28,476	6,996	20%	35,473	28,476

* Includes $12,620K of uncosted obligations from FY99.

Project Number 96-D-111
September 2000

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.7 - Laser Control ($K)

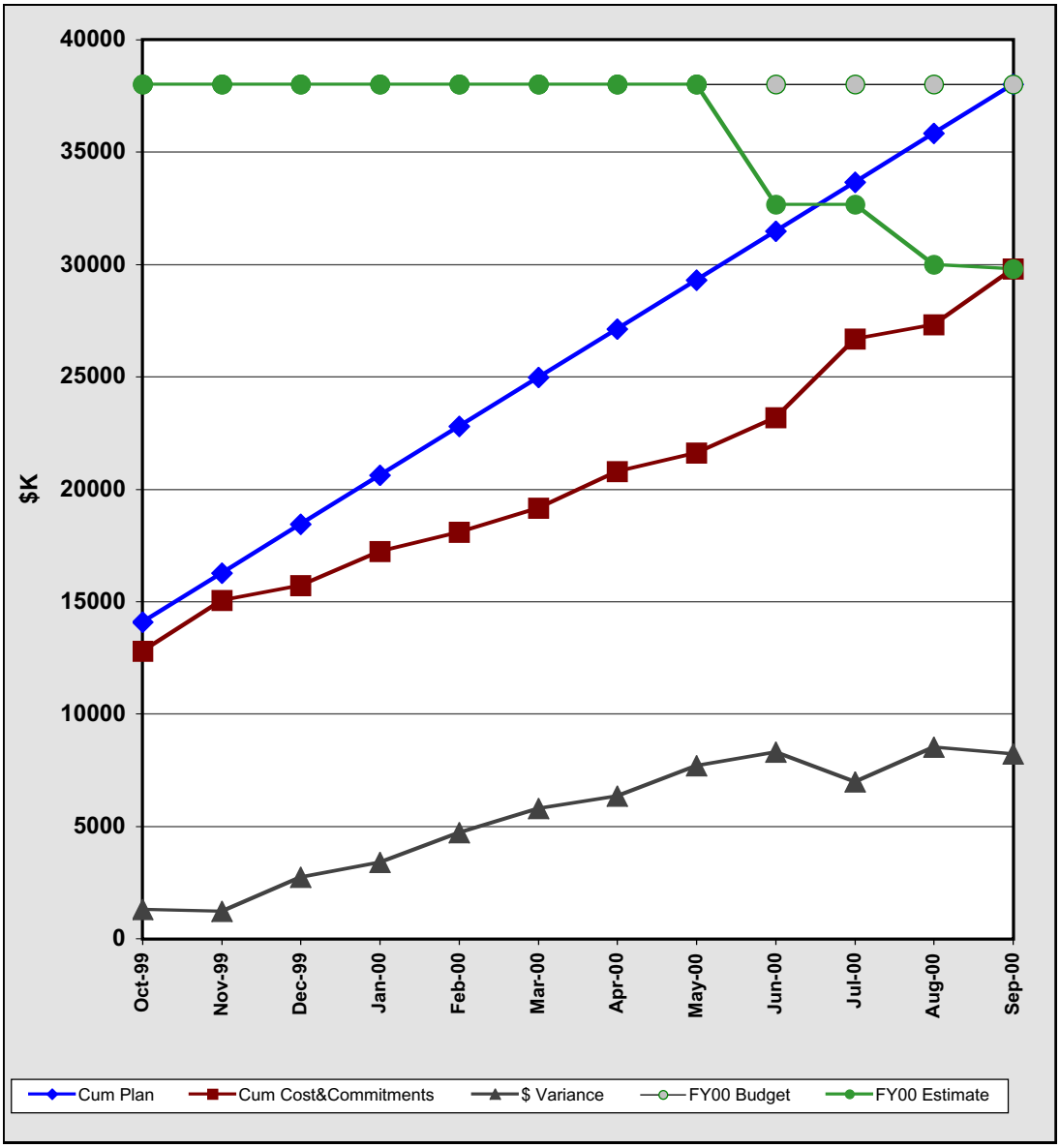


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	7,429 *	8,309	7,429 *	8,309	-880	-12%	17,914	17,914
Nov-99	953	1,089	8,382	9,398	-1,016	-12%	17,914	17,914
Dec-99	953	544	9,335	9,942	-607	-6%	17,914	17,914
Jan-00	953	982	10,289	10,924	-636	-6%	17,914	17,914
Feb-00	953	1,312	11,242	12,236	-994	-9%	17,914	17,914
Mar-00	953	641	12,195	12,877	-682	-6%	17,914	17,914
Apr-00	953	525	13,148	13,402	-253	-2%	17,914	17,914
May-00	953	989	14,101	14,390	-289	-2%	17,914	17,914
Jun-00	953	742	15,055	15,132	-78	-1%	17,914	18,009
Jul-00	953	1,355	16,008	16,487	-479	-3%	17,914	18,009
Aug-00	953	1,122	16,961	17,609	-648	-4%	17,914	19,000
Sep-00	953	1,747	17,914	19,356	-1,442	-8%	17,914	19,356

* Includes $4,136K of uncosted obligations from FY99.

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.8 - Target Experimental System ($K)

Project Number 96-D-111
September 2000

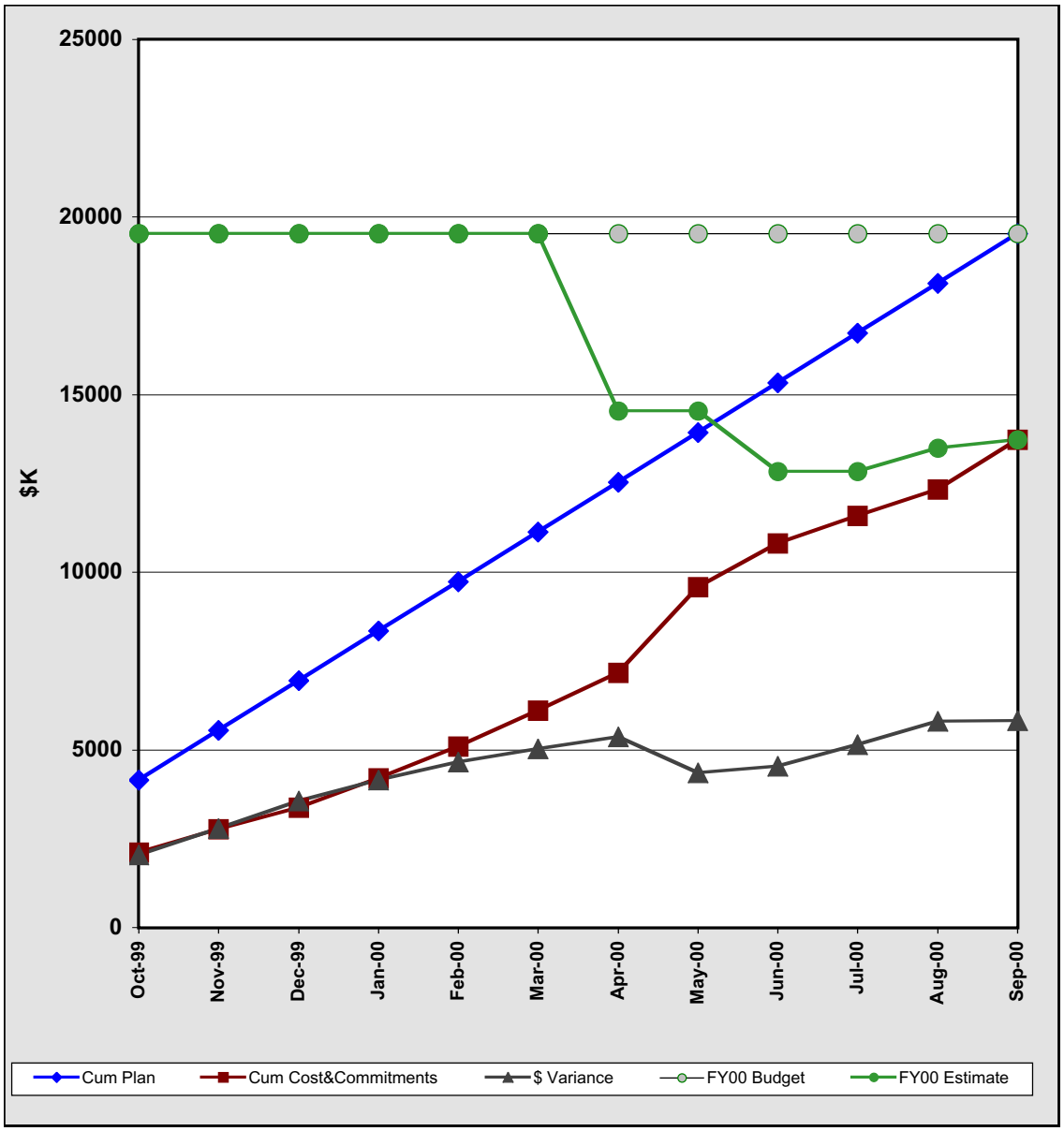


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	14,093 *	12,805	14,093 *	12,805	1,288	9%	38,008	38,008
Nov-99	2,174	2,246	16,267	15,050	1,217	7%	38,008	38,008
Dec-99	2,174	670	18,441	15,720	2,721	15%	38,008	38,008
Jan-00	2,174	1,496	20,615	17,216	3,399	16%	38,008	38,008
Feb-00	2,174	855	22,789	18,071	4,718	21%	38,008	38,008
Mar-00	2,174	1,091	24,964	19,162	5,802	23%	38,008	38,008
Apr-00	2,174	1,635	27,138	20,796	6,341	23%	38,008	38,008
May-00	2,174	821	29,312	21,618	7,694	26%	38,008	38,008
Jun-00	2,174	1,572	31,486	23,190	8,296	26%	38,008	32,672
Jul-00	2,174	3,492	33,660	26,682	6,978	21%	38,008	32,672
Aug-00	2,174	643	35,834	27,325	8,509	24%	38,008	30,000
Sep-00	2,174	2,482	38,008	29,807	8,201	22%	38,008	29,807

* Includes $6,252K of uncosted obligations from FY99.

Project Number 96-D-111
August 2000

FY2000 Cost and Commitment Plan to Actual
as of August 2000
WBS 1.9 - Operations
Special Equipment ($K)

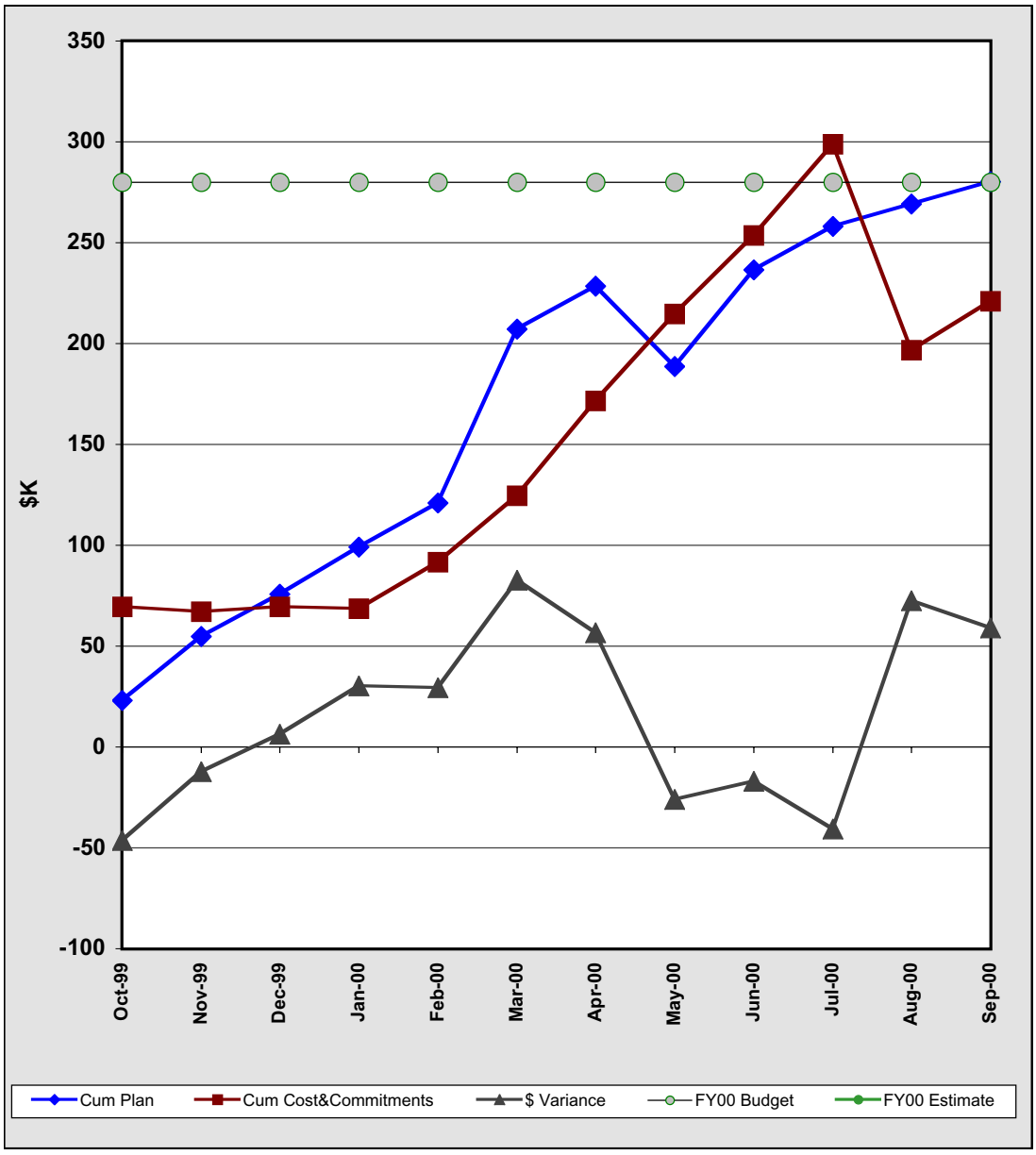


	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	4,144 *	2,102	4,144 *	2,102	2,042	49%	19,537	19,537
Nov-99	1,399	657	5,543	2,759	2,784	50%	19,537	19,537
Dec-99	1,399	618	6,943	3,377	3,566	51%	19,537	19,537
Jan-00	1,399	817	8,342	4,194	4,148	50%	19,537	19,537
Feb-00	1,399	894	9,742	5,088	4,654	48%	19,537	19,537
Mar-00	1,399	1,027	11,141	6,115	5,026	45%	19,537	19,537
Apr-00	1,399	1,059	12,540	7,174	5,367	43%	19,537	14,537
May-00	1,399	2,410	13,940	9,584	4,356	31%	19,537	14,537
Jun-00	1,399	1,224	15,339	10,808	4,531	30%	19,537	12,839
Jul-00	1,399	778	16,739	11,586	5,153	31%	19,537	12,839
Aug-00	1,399	746	18,138	12,332	5,806	32%	19,537	13,500
Sep-00	1,399	1,392	19,537	13,724	5,814	30%	19,537	13,724

* Includes $1,404K of uncosted obligations from FY99.

Project Number 96-D-111
September 2000

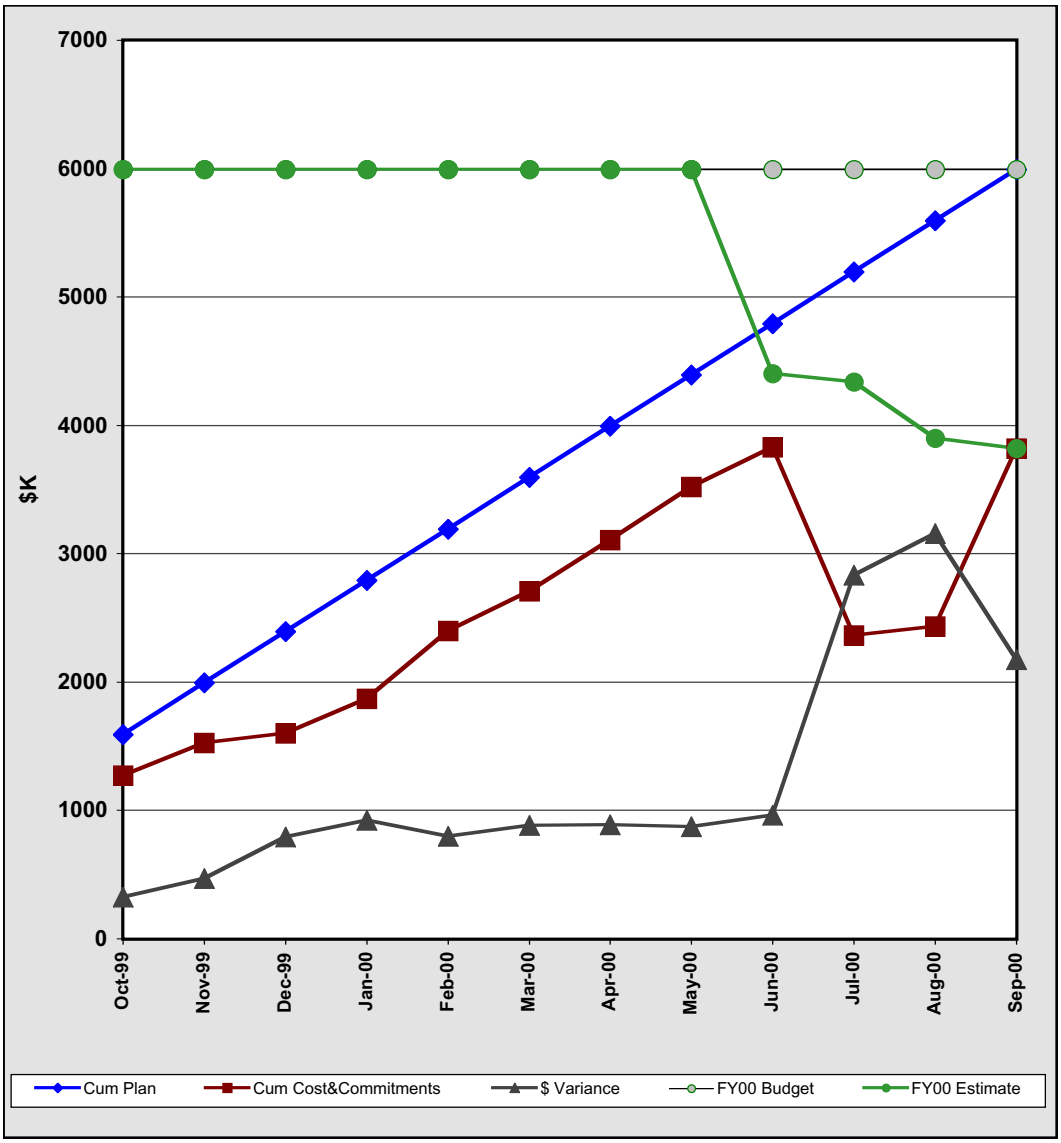
FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.10 - Start-up Activities ($K)



	Monthly		Cumulative				FY2000	FY2000
Month	Planned*	Actual	Planned	Actual	$ Var	% Var	Budget*	Estimate
Oct-99	23	70	23	70	-46	-200%	280	280
Nov-99	32	-2	55	67	-12	-22%	280	280
Dec-99	29	3	76	70	6	8%	280	280
Jan-00	29	-1	99	69	30	31%	280	280
Feb-00	28	23	121	92	29	24%	280	280
Mar-00	91	33	207	125	83	40%	280	280
Apr-00	89	47	228	172	57	25%	280	280
May-00	26	43	188	215	-26	-14%	280	280
Jun-00	51	39	237	254	-17	-7%	280	280
Jul-00	49	45	258	299	-41	-16%	340	340
Aug-00	37	-102	269	197	72	27%	215	215
Sep-00	25	24	280	221	59	21%	221	221

FY2000 Cost and Commitment Plan to Actual
as of September 2000
WBS 1.11 ($K)

Project Number 96-D-111
September 2000



	Monthly		Cumulative				FY2000	FY2000
Month	Planned	Actual	Planned	Actual	$ Var	% Var	Budget	Estimate
Oct-99	1,592 *	1,269	1,592 *	1,269	323	20%	5,993	5,993
Nov-99	400	256	1,992	1,525	467	23%	5,993	5,993
Dec-99	400	73	2,392	1,598	794	33%	5,993	5,993
Jan-00	400	271	2,792	1,869	923	33%	5,993	5,993
Feb-00	400	526	3,192	2,396	797	25%	5,993	5,993
Mar-00	400	312	3,593	2,708	885	25%	5,993	5,993
Apr-00	400	398	3,993	3,105	887	22%	5,993	5,993
May-00	400	415	4,393	3,520	872	20%	5,993	5,993
Jun-00	400	309	4,793	3,830	963	20%	5,993	4,400
Jul-00	400	-1,468	5,193	2,361	2,832	55%	5,993	4,340
Aug-00	400	74	5,593	2,435	3,158	56%	5,993	3,900
Sep-00	400	1,383	5,993	3,818	2,175	36%	5,993	3,818

* includes $1,423K of uncosted obligations from FY99.

4Q00 NIF Contingency Log ($BA)

Month	Request #	WBS element		Total
Jul-00	CTR364	1.2.2.4.6	$	75,000
		1.4.1.1	$	47,000
	CTR374	1.4.3.1	$	496,000
	CTR375	1.4.3.1	$	250,000
	CTR376	1.4.3.1	$	257,000
	ECR1142	1.9.3.4	$	60,000
	ECR1518	1.1.5	$	340,000
		1.5.1	$	24,000
		1.5.6	$	5,000
	ECR1937	1.4.6.1	$	227,300
	ECR1939	1.4.6.1	$	117,300
	ECR1955	1.3.1.3	$	(3,445,000)
	ECR2015	1.4.6.1	$	340,000
	ECR2053	1.4.6.1	$	264,000
	ECR2174	1.7.2.7	$	90,000
Aug-00	CTR377	1.4.3.1	$	300,000
	CTR380	1.2.2.2	$	200,000
	ECR1932	1.4.6.1	$	104,800
	ECR2171	1.3.3	$	10,400
	ECR2272	1.8.7	$	9,100
	ECR2282	1.7.2.3	$	150,000
	ECR2327	1.1.3.1	$	30,000
	ECR2331	1.1.5.6	$	(30,000)
		1.2.2.4.6	$	(257,000)
		1.4.2.5	$	(9,000)
		1.5.2	$	(33,000)
		1.2.3.2	$	436,000
Sep-00*	CTR394	1.6.10.2	$	(2,500)
	CTR396	1.4.2	$	(57,000)
		1.5.4	$	(36,000)
	ECR1925	1.4.3.1	$	82,200
	ECR2247	1.4.5.1	$	32,000

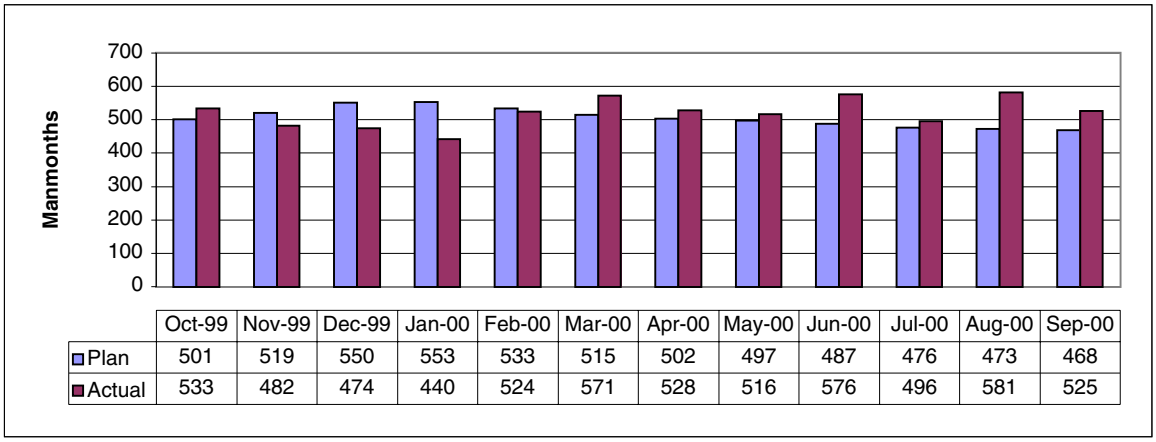
* Only the four actions approved in Sept00 impacting contingency in FY00 are shown. Contingency impacts in FY01-FY08 for actions completed in September will be reported in the FY01 October Monthly against the revised baseline and contingency pool.

4Q00 NIF Contingency Log ($BA)

	Contingency
$	13,915,388
$	13,868,388
$	13,372,388
$	13,122,388
$	12,865,388
$	12,805,388
$	12,465,388
$	12,441,388
$	12,436,388
$	12,209,088
$	12,091,788
$	15,536,788
$	15,196,788
$	14,932,788
$	14,842,788
$	14,542,788
$	14,342,788
$	14,237,988
$	14,227,588
$	14,218,488
$	14,068,488
$	14,038,488
$	14,068,488
$	14,325,488
$	14,334,488
$	14,367,488
$	13,931,488
$	13,933,988
$	13,990,988
$	14,026,988
$	13,944,788
$	13,912,788

* Only the four actions approved in Sept00 impacting contingency in FY00 are shown. Contingency impacts in FY01-FY08 for actions completed in September will be reported in the FY01 October Monthly against the revised baseline and contingency pool.

FY00 - Manpower Plan to Actual by Month
as of September 2000
(LLNL and Supplemental Labor Manmonths)



	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00
Plan	501	519	550	553	533	515	502	497	487	476	473	468
Actual	533	482	474	440	524	571	528	516	576	496	581	525