

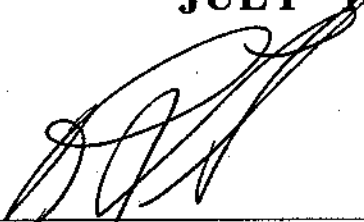
**PRINCETON PLASMA PHYSICS LABORATORY  
PROJECT CONTROL SYSTEM DESCRIPTION**

**PPPL PROJECTS**

**Revision: 0**

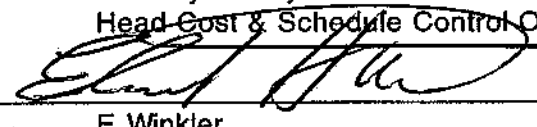
**JULY 1996**

Prepared:



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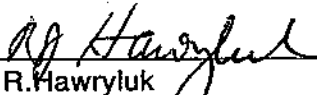
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22 July 1996

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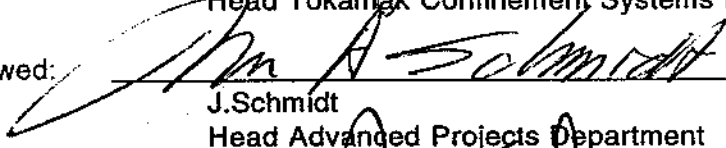
Reviewed:



7/26/96

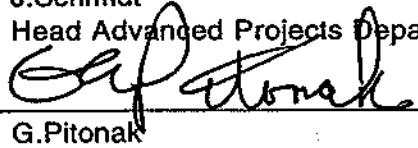
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## CONTENTS

	<u>PAGE</u>
A. General	
A.1 Overview	2
A.2 Objectives/Benefits	3
B. Organization	
B.1 Work Breakdown Structure (WBS)	4
B.2 Cost Account Structure	5
B.3 Roles and Responsibilities	6
B.4 Systems Integration	8
C. Planning and Estimating	
C.1 Planning & Scheduling	9
C.2 Work Estimating and Authorization	12
C.3 Cost Baseline	15
C.4 Progress Status	16
D. Accounting and Budgeting	
D.1 Cost Accounts	17
D.2 Cost Accounting	19
D.3 Laboratory Budget Process	21
E. Analysis & Control	
E.1 General	21
E.2 Performance Indicators	21
E.3 Reports	23
E.4 Variance Analysis Reporting	25
E.5 Management Oversight	25
F. Change Management and Access to Data	
F.1 Revisions	26
F.2 Retroactive Change Prohibition	27
F.3 DOE Access to Data	27
G. Glossary of Terms	28

## A.1 Overview

PPPL's Project Control System for PPPL Projects is targeted towards laboratory projects that are fundamentally design and hardware oriented and have major programmatic impact (i.e., TFTR Upgrades, NSTX)<sup>1</sup>. Utilizing the concept of a graded approach, with the best control for the value received, other projects (i.e., PBX, CDX, TFTR Operations and other research) may utilize only portions of the system. Determination of the proper application of PCS is a dynamic process that is a function of the current projects in-house, their size, programmatic impact and current status (construction vs operations). The intent, therefore, is to document a system as a blueprint of control elements and allow both PPPL and DOE-PG management the flexibility to mutually agree to the elements and level of their applicability that provide value added control benefits. Specific project application and implementation of PCS processes, reports, etc, will be addressed in the Project Management Plan. Project Management Plans will be prepared by PPPL at the request of DOE-PG.

PPPL's Project Control System for PPPL Projects, in general, uses proven project management techniques to assist in the management of technologically complex, multi-million dollar government funded projects. The system starts by identifying the goal to be obtained (scope), organizes the work in a hierarchal fashion (WBS), identifies who is responsible for accomplishing the work, establishes a cost and schedule plan to accomplish the scope of work, authorizes the plan (WAF), and monitors performance showing progress, actual cost and identifying deviations from the plan. The system uses a single data source for both DOE and PPPL management reports.

The system is consistent with the five basic management functions necessary for successful completion of any large scale project - organization, planning and budgeting, accounting, analysis, and change management. PCS implementation is considered a normal part of project management. As such, project personnel time spent on planning, estimating, statusing, and analysis is charged to the individual's applicable cost account.

The Cost & Schedule Control Office is responsible for system operations and supports many individual projects in the implementation of PCS. As such the cost of this staff is included in the laboratory's general overhead cost (G&A).

<sup>1</sup> Major systems acquisitions, GPP & GPP Line Item, Environmental Restoration & Waste Management (ERWM) and Work for Others will each have their own PCS System Description and are not covered by this document.

## **A.2 Objectives/Benefits**

The overall objective of the PCS System is to establish and maintain an integrated cost and schedule database which will provide PPPL and DOE with timely and accurate cost and schedule performance information. A second objective is to establish systems which can support the wide range of management information systems requirements.

The following benefits result from the system:

- Formal process for organizing the work effort through PPPL's cost account/WBS structure.
- Assignment of responsibilities and accountability for work scope through the WBS (Job managers).
- Formal process for planning and estimating work in support of DOE funding and PPPL Project Milestones.
- Formal process for the Authorization of work through the Work Authorization Process.
- Formal process for monitoring work progress through monthly progress statusing.
- Formal process for identifying, reporting and analyzing schedule and cost variances through the Variance Analysis Process.
- Facilitates inter-project and laboratory communication of cost & schedule performance.
- Provide Projects and Engineering Organizations with manpower forecasting capabilities.

## **B. ORGANIZATION**

### **B.1 Work Breakdown Structure (WBS)**

An essential aspect of PCS is the definition of the Scope of Work. Project's Scope of Work is defined in PCS through a work breakdown structure (WBS). This WBS is a product-oriented family tree, or hierarchy, of tasks that make up a project. The WBS is established from the top-down (highest to lowest level), providing increasingly more detailed work definition at each succeeding level.

The specific functions of the WBS are to:

- (1) Define the total project Scope of Work
- (2) Provide the framework for planning, scheduling, budgeting, work authorization, documentation, and cost accumulation.
- (3) Provide a basis for cost and performance reporting and control at selected levels of detail.
- 4) Facilitates the summarization and reporting of cost and schedule performance.

## **B.2 Cost Account Structure**

PPPL's Cost Account Structure reflects the integration of WBS with a funding code (cost center), unique job number (sub-WBS element) and expense classification (resources req'd to achieve the work scope). **It is the foundation for the Laboratory's budgeting, planning, cost collection and reporting process.**

The PCS Cost Account has a fourteen-character identifier, twelve of which are utilized for task classification and description. Two are used to define object or expense class.

First Four Characters	Alpha/Numeric	=Cost Center
Second Four Characters	Alpha/numeric	=Work Package (WBS)
Third Four Characters	Alpha/numeric	=Job
Last Two Characters	Numeric only	=Expense Class

Budget estimates are built at the Job and activity level (via resource loaded schedules) and managed at the Job level and second level of expense. Labor estimates are created and maintained in productive man hours using Laboratory demographics (department/ division/ skill codes) to identify the job's manpower needs. These man hour estimates are converted to dollars using average labor, burden and overhead rates<sup>1</sup>.

Non-labor estimates are created and maintained in dollars using the Laboratory's expense classifications to identify cost estimates for non-labor resources<sup>2</sup>.

(See exhibit B-2-A "PPPL COST ACCOUNT STRUCTURE").

<sup>1</sup> (Ref section D for coding definition).

<sup>1</sup> (Reference "Budget Office Policies & Procedures" Manual-Chapter 4 for discussion of PPPL Rates).

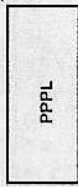
<sup>2</sup> (Reference "Accounting" manual - Chapter 2 for discussion of the PPPL expense classification structure.)

**PPPL COST ACCOUNT NUMBERING SYSTEM**

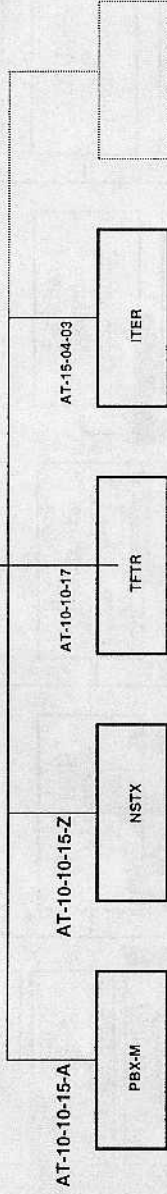
DOE FUNDING LEVEL

LEVEL I (PPPL)

B&R AT-10-XX-XX-X      B&R AT-05-XX-XX-X      B&R AT-15-XX-XX-X



LEVEL II (PROGRAM)



LEVEL III (DIVISION)



LEVEL IV (COST CENTER)



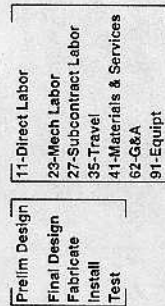
LEVEL V (WORK PACKAGE or WBS)



LEVEL VI (JOB)  
{control level}



LEVEL VII (ACTIVITY & RESOURCES)  
{planning estimating level}



B-2-A

### **B.3 Roles and Responsibilities**

The responsibility for planning, estimating, and managing a job is assigned to a job manager. Job managers report to higher level WBS managers or cost center managers. Typical PCS Responsibilities are as follows;

#### **PROJECT**

- |   |   |   |
|---|---|---|
| Project Manager   | - | Ensures staff compliance and support of functional procedures. Responsible for accomplishing technical scope, meeting project milestones, and control of project cost within prescribed DOE Funding constraints |
| Cost Center Mgr   | - | Technical, cost, schedule and budget accountability for the applicable cost center.   |
|   | - | Approval of Work Authorization Documentation  |
|   | - | Approval of variance analysis reports.  |
| WBS Managers  | - | Technical, cost, schedule and budget accountability for the applicable WBS Element.   |
|   | - | May also be assigned the role of cost center manager and/or job manager.  |
| Project Control Officer -<br>(or P&C Officer)                             | - | Responsible to the project manager for the implementation of PCS for the project including preparation of WAF's & resource loaded schedules.  |
|   | - | Interface with PPPL's Budget, Accounting, Cost & Schedule Control, Procurement and Material Control Offices.  |
| Job Manager<br>(a.k.a. Job<br>Cognizant<br>Engineer,<br>Cost Account Mgr) | - | Preparation of job cost & schedule estimates  |
|   | - | Preparation of monthly job progress status and estimate to complete.  |
|   | - | Preparation of written variance analysis reports.   |
|   | - | Control of job costs up to the authorized estimate.   |

#### **OFFICE OF RESOURCE MANAGEMENT DEPARTMENT**

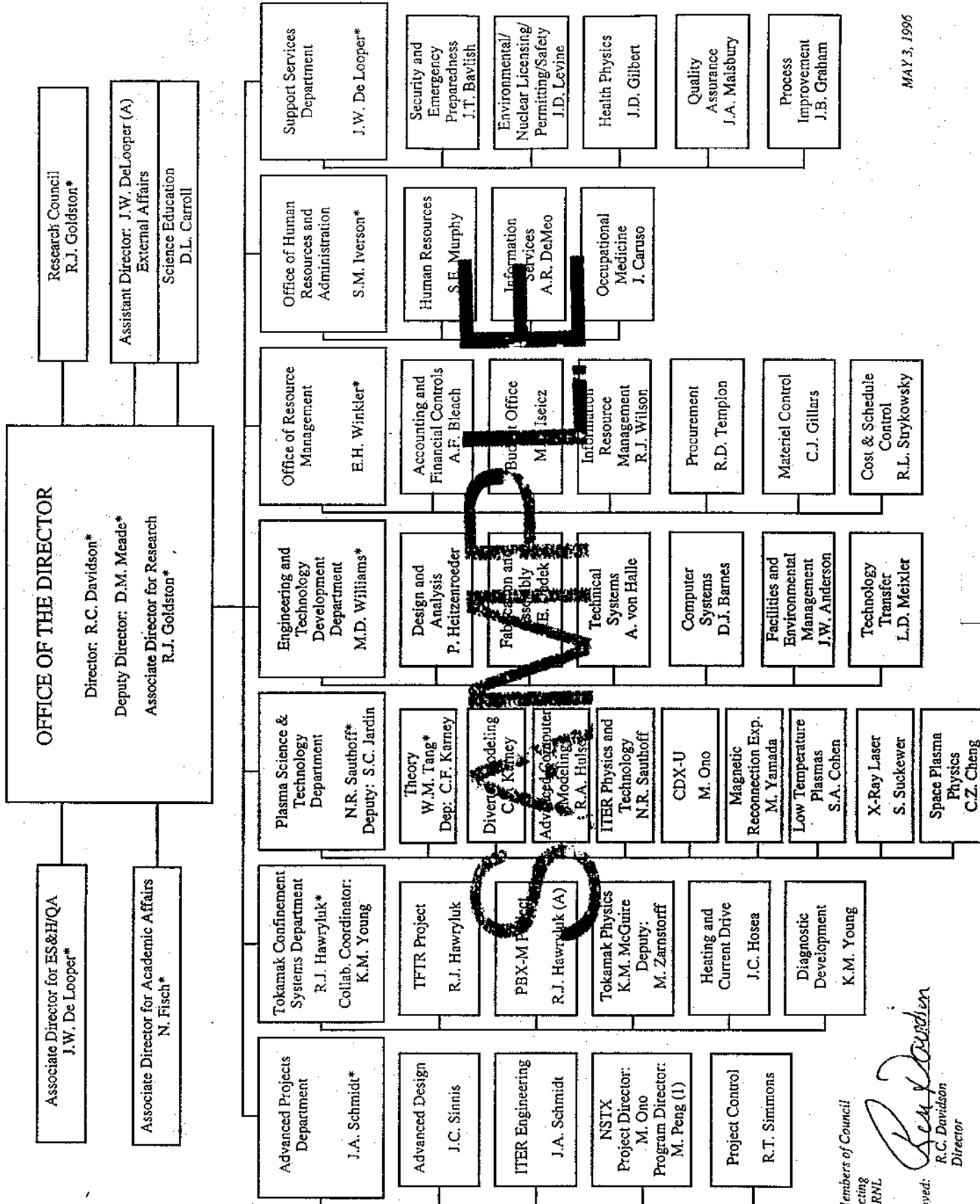
- |                                   |   |  |
|-----------------------------------|---|--|
| Cost & Schedule<br>Control Office | - | Generation of Work Authorization Documentation coordination & processing of progress status, and generation of cost & schedule performance reports in compliance with functional procedures. |
|                                   | - | PCS Data base and support systems maintenance and control.   |
|                                   | - | Provide scheduling and estimating support to Project and job managers.   |
|                                   | - | Generate specialized schedules and reports.  |
| Accounting                        | - | Maintenance & control of PPPL cost   |

- Office
- collection and accounting systems
  - Maintenance of Chart of Accounts  
*(for additional detail refer to the PPPL Accounting Manual)*
- Budget Office
- Maintenance & control of PPPL Labor rates
  - Maintenance & control of overhead (G&A) and labor burden rates.
  - Maintenance & control of Laboratory Funding and CC budgets.
  - Maintenance & control of direct/indirect allocations.
  - Overall PPPL Institutional management of DOE Funding. Ensures that the commitment and expenditure of funds will not exceed DOE authorized funding limits.  
*(for additional detail refer to the Budget Office policies and Procedure)*

(See Exhibit B-3-A PPPL ORGANIZATION CHART)



PRINCETON PLASMA PHYSICS LABORATORY



\* Members of Council.  
(A) Acting  
(1) ORNL

Approved: *R.C. Davidson*  
R.C. Davidson  
Director

#### **B.4 Systems Integration**

There are three major systems at PPPL that play a roll in the planning and control of work. Each performs a necessary function. The three systems are as follows:

*Accounting system -*

This system provides an auditable account of every fiscal transaction. It is the financial system of record required by the contract between PPPL and DOE.

*Budget system -*

This system is used as the key system to reconcile cost center budgets against available resources and against the B&R funding guidance. It is used to prepare PPPL's formal annual funding request to DOE. It is also used to input cost center budgets to the accounting system. It addresses only cost center level funding and does so only for whole fiscal years.

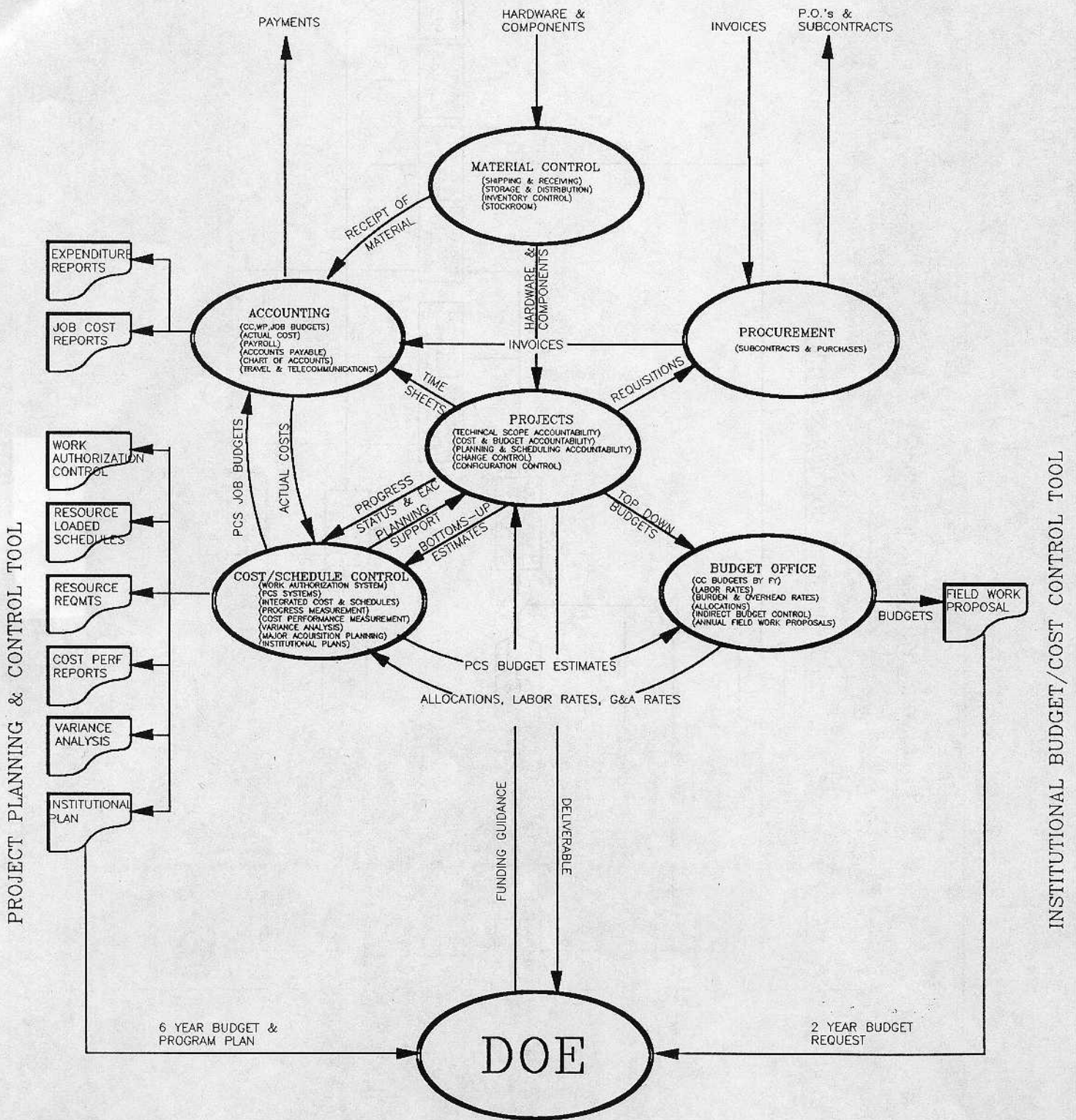
*PCS System -*

This system performs two functions. It is the system for planning and authorizing work as well as the system for monitoring work progress and flagging significant variances to management.

The Accounting, Budget, and PCS Systems are integrated and centralized in PPPL's "Controllers Office Public Financial Information System" (PUBSYS). The PCS System is linked with the Accounting module for electronic transfer of cost accounting data. The PCS is also electronically linked with the Budget Module for labor, burden, and overhead rate computations.

(See exhibit B-4-A "SYSTEM INTEGRATION")

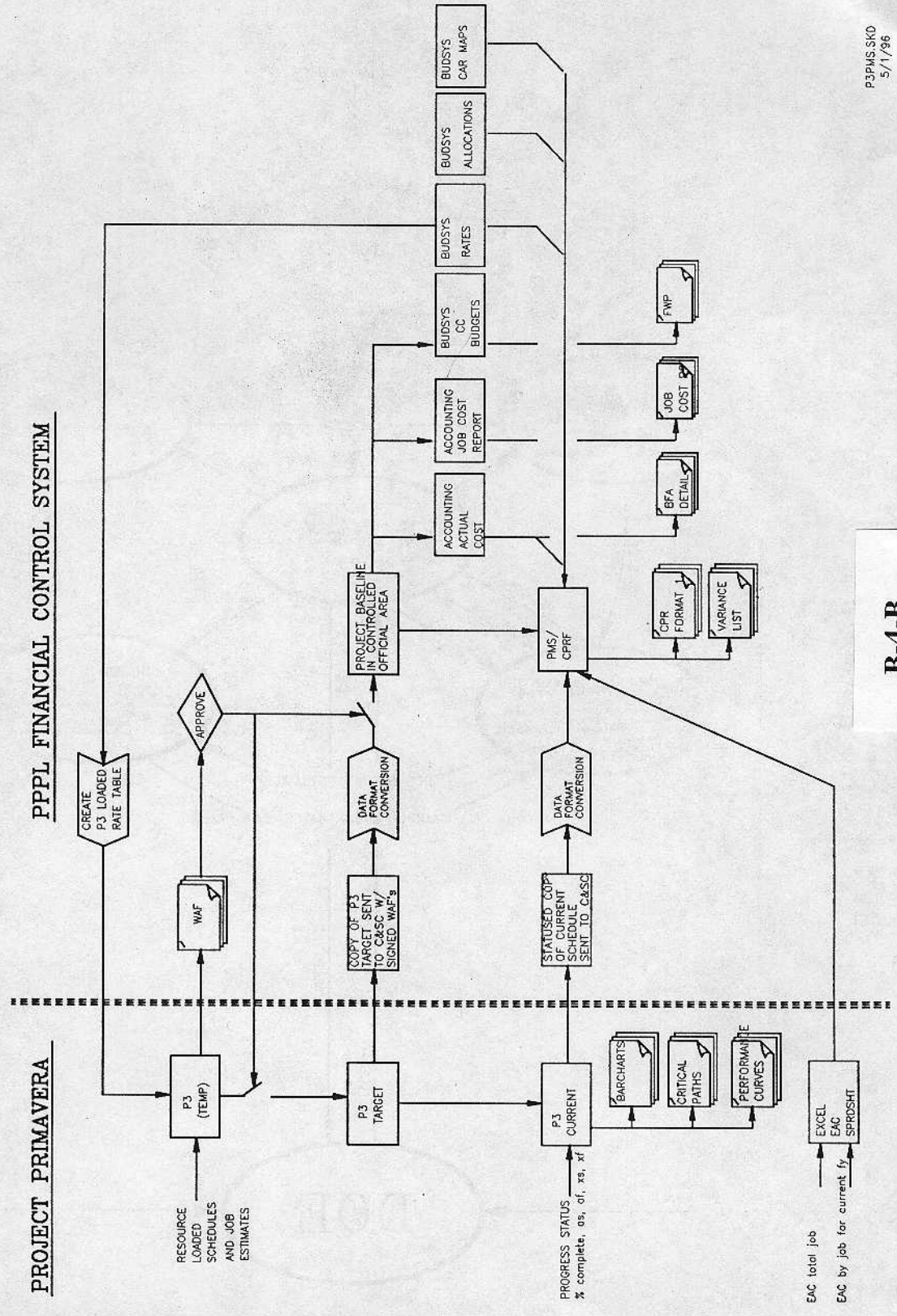
# PCS SYSTEM INTEGRATION



**PPPL PCS  
PRIMAVERA/FINANCIAL CONTROL SYSTEMS  
INTEGRATION**

**PROJECT PRIMAVERA**

**PPPL FINANCIAL CONTROL SYSTEM**



**B-4-B**

PPPL's PCS system uses a combination of software products installed and operated on PC and IBM 4381 mainframe computer systems. Primavera Project Planner software is the primary tool used to compute activity schedules, "time frame" activity resource estimates, create integrated CPM project schedules and calculate earned value. Primavera is also used in an analytic capacity to support project cost & schedule "what-if" scenarios.

(See exhibit B-4-B "PRIMAVERA/FINANCIAL CONTROL SYSTEMS INTEGRATION")

**C. Planning and Estimating**

**C.1 Planning & Scheduling**

The following are typical levels of planning used by PPPL Projects -

- Level I - Project Summary Schedule
- Level II - Intermediate Level Schedule
- Level III - Job Schedule
- Level IV - Working Level Schedules

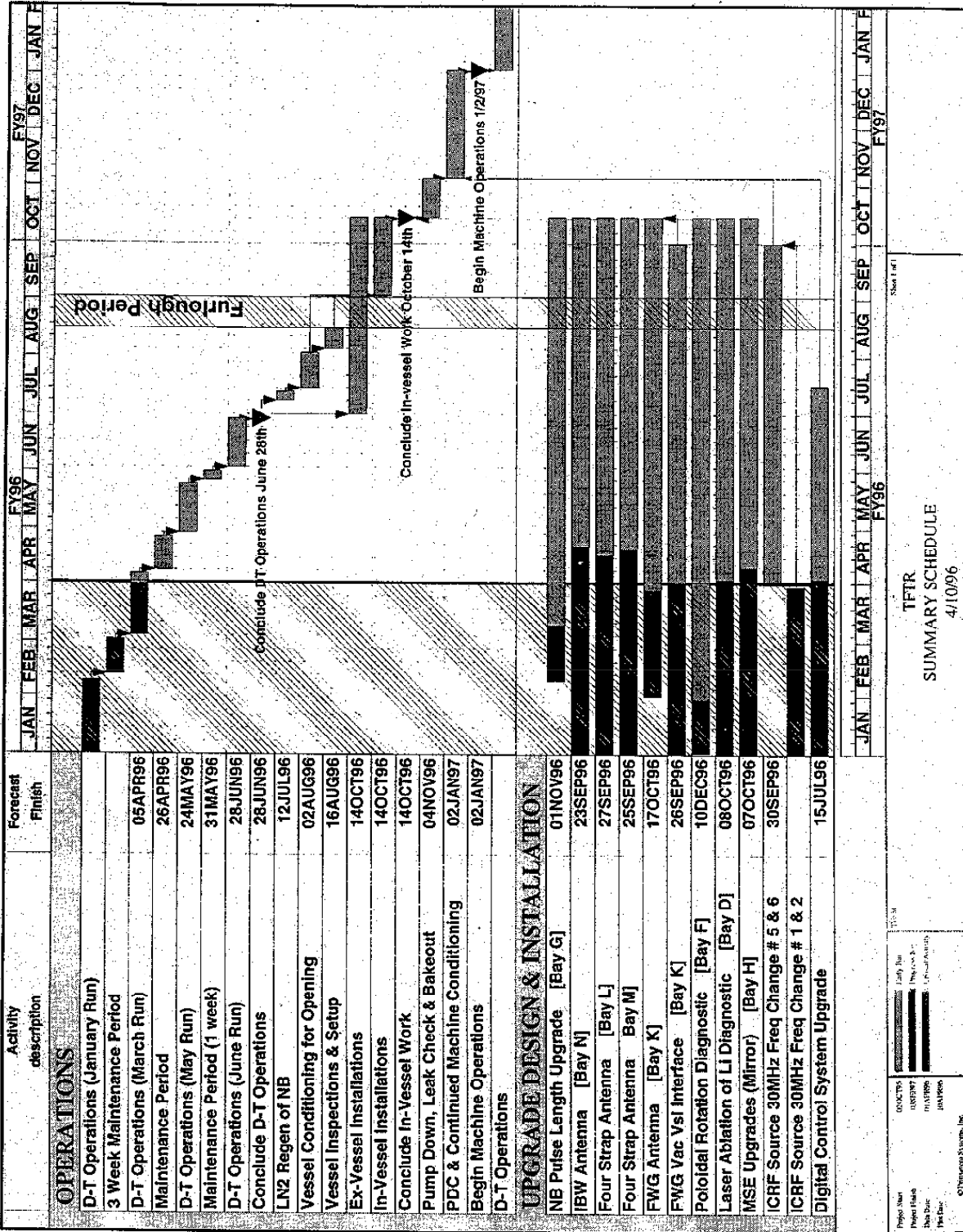
The **Level I** Project Milestone Summary Schedule will identify significant project milestones and summary logic for the entire project.

See exhibits: "TFTR DT MILESTONE SUMMARY SCHEDULE" (C-1-A.1)  
and "TFTR SUMMARY SCHEDULE" (C-1-A.2)

The **Level II** Intermediate Level Schedules will show major milestones and key tasks summarized by WBS including interrelationships. (This level is optional depending upon project complexity or risk.)

(See exhibit C-1-B "LEVEL II SCHEDULE")





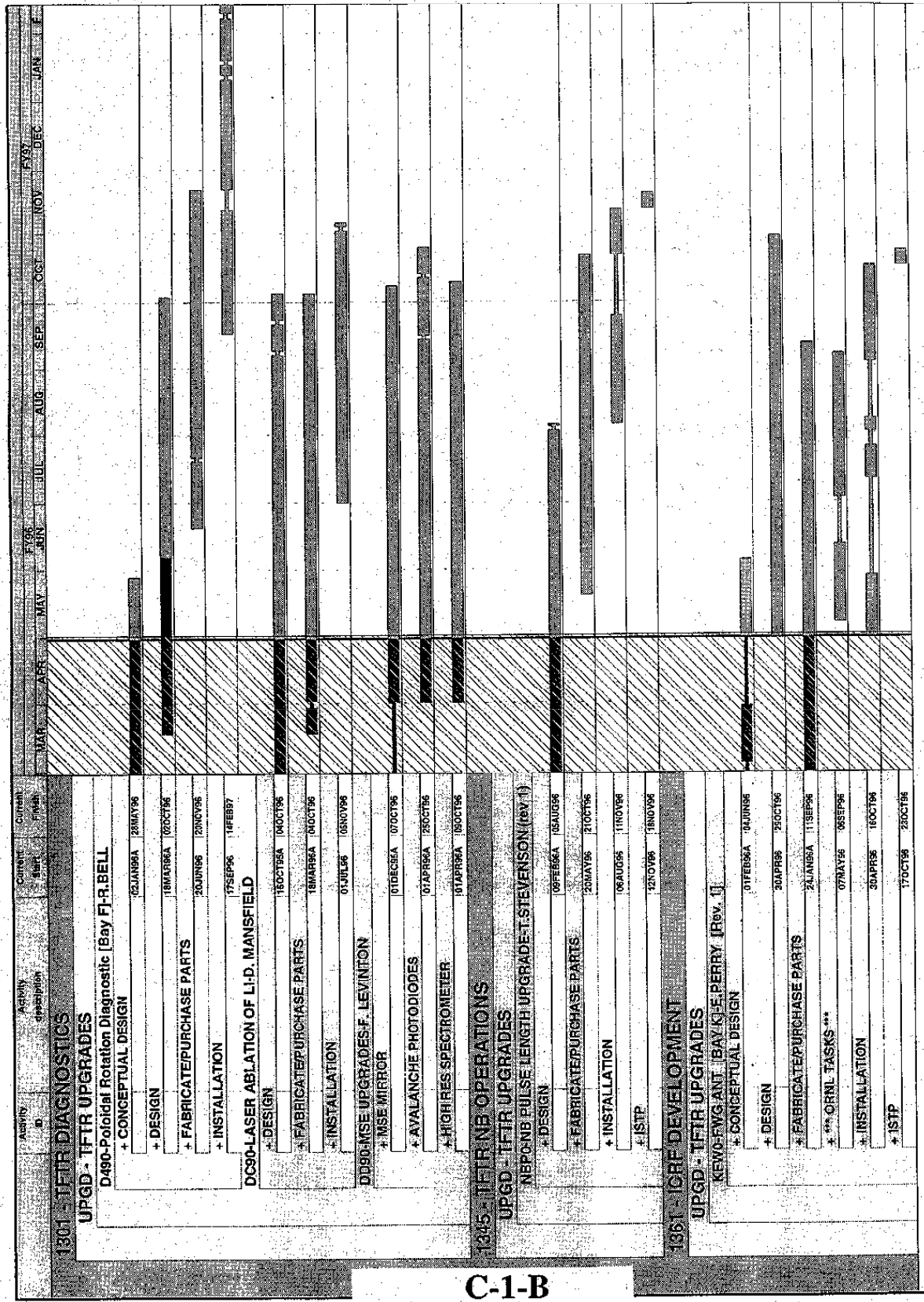
C-1-A.2

Page No: 000000  
 Project Name: JT-60U  
 Issue No: 1  
 Date: 4/10/96  
 Author: JIM WICK  
 © Thomson-CSF, Inc.

TFTR  
 SUMMARY SCHEDULE  
 4/10/96

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN F  
 FY96 FY97

Sheet 1 of 1



Project Start: 09OCT96  
 Project Finish: 29SEP96  
 Date Due: 30APR96  
 Pre-Date: 02MAY96

Activity description: [Task Name]  
 Current Start: [Start Date]  
 Current Finish: [End Date]

Legend:  
 [Diagonal Lines] Early Start  
 [Solid Black] Progress Bar  
 [White] Critical Activity

Sheet 1 of 1

LEVEL II SCHEDULE

C-1-B



The **Level III** Job Schedules are detailed schedules prepared by the Job Manager (a.k.a. Cost Account Manager). This schedule is established as part of the Work Authorization process and will span at least the current fiscal year. Design and Construction projects will be planned through to completion (out years will be represented by resource loaded schedules at the WBS level). These schedules are resource loaded at the activity level and will form the basis for Budgeted Cost of Work Scheduled (BCWS). These schedules will also be progress statused by the cognizant job manager each month for calculation of Budgeted Cost of Work Performed (BCWP). These Job Schedules will also be integrated with project milestones and other jobs to allow for critical path analysis. Major contributors to the project may have activities added to the schedule as appropriate. For example, QA/ES&H, Certifications & Training, Facility Engineering and Emergency Preparedness departments may have activities relevant to the project schedule although not directly covered in the project job estimates (cost for these activities are recovered through the indirect cost accounting process). In addition to PPPL work, major subcontractors may have their schedules incorporated into the project schedule as deemed necessary (i.e., major component fabrication critical to the project schedule). Integration of these Level III job schedules is facilitated by the use of Primavera Project Planner (P3), a commercially available, PC based project management software product. P3 is used as the primary project scheduling tool. Project milestones and job schedule detail activities are linked to form the nucleus of the project schedule.

(See exhibit C-1-C for typical job schedule)



The **Level IV** Detail working level schedules are prepared as needed. As critical tasks occur (i.e., planned maintenance outages, complex hardware fabrication, construction/ installation tasks) activities that are covered in the Level III job schedules may be broken down into additional detail to allow for coordination of work by the responsible manager. Level IV schedules are also developed by cognizant job managers to aid in the performance and control of their jobs. Although these are typically uncontrolled documents, efforts are made to ensure continuity to established project milestones and Level III schedules. The Level III schedule, since it is the basis for the approved job, is the official schedule of record.

See exhibits: "TFTR OUTAGE SCHEDULE" (C-1-D.1) and  
"PPPL-TFTR Trit Systems Division" Schedule (C-1-D.2)



Activity ID	Activity Description	Orig. Planned Start	Current Earliest Start	Current Earliest Finish	Required Date	1996																			
						MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR								
<b>VIOLA</b>																									
<b>OUTAGE TASKS</b>																									
T-0090	Review/Revise System Setpoints		01AUG96	01AUG96*	06AUG96																				
<b>LOW PRIORITY</b>																									
WV-009	Procure GHT Mezzanine and Ladder		12FEB96	23APR96																					
WV-011	Install GHT Mezzanine and Ladder		12FEB96	16APR96A	03MAY96																				
<b>VONHILLE</b>																									
<b>LOW PRIORITY</b>																									
GTT-012	Instrument Air for TCS 02		20NOV95	23APR96*																					
PL-WL-002	VPGB Redesign/Rebuild (Repl Vac Pumps)		09OCT95	23APR96	19JUN96																				
PL-WL-003	Upgrade QMS ****TBD****		09OCT95	23APR96																					
PL-WL-004	Furnehood Process Direct to Position 2 **TBD**		09OCT95	13MAY96	24MAY96																				
PL-WL-005	Initiated Vent/House Vacuum Improve Flow **TBD**		09OCT95	23APR96*																					
PL-WL-006	All Systems Leak Ck (Find Air Intrusion) **TBD**		09OCT95	23APR96*																					
PL-WL-007	GHT Mezzanine and Ladder		09OCT95	23APR96*	03MAY96																				
PL-WL-008	Commission HTPGB for Hot Work **TBD**		09OCT95	23APR96*																					
PL-WL-009	Contr Room Ergonomics (L/O,Furniture) **TBD**		09OCT95	23APR96*																					
PL-WL-010	Contr Room Instrumentation (Re-Examine) **TBD**		09OCT95	23APR96*																					
PL-WL-011	Upgrade Control Room Chart Recorders **TBD**		09OCT95	23APR96*																					
PL-WL-012	Upd Lists--Viv.Line,Equip,etc(Tulip,Work)TBD*		09OCT95	23APR96*																					
PL-WL-013	TRS Process TCS **TBD**		09OCT95	23APR96*																					
PL-WL-014	Air Lines GHT Room (TBD)		09OCT95	23APR96*																					
PL-WL-019	Prep. of Replacement of Catalyst for TCS**TBD**		09OCT95	23APR96*																					
PL-WL-022	Recombiner Power Mod-Variable Adjustment *TBD*		02NOV95	23APR96*																					
PL-WL-023	Increase Stack Flow with Blower**TBD**		09OCT95	23APR96*																					
<b>FAILURE REPORTS</b>																									
PL-WL-020	Repair or Install Can Around AV-100**TBD**		13OCT95	23APR96*																					
<b>WALTERS</b>																									
<b>HIGH PRIORITY</b>																									
TW-086.12	Calibrate FH		19FEB96	29JUN96	02JUL96																				
TW-086.22	Pre Job Brief/Train Operators		24FEB96	29JUN96	28JUN96																				
TW-086.23	Remove Sieve from Type A		25FEB96	30JUN96*	03JUL96																				
TW-086.24	Post Job Brief		29FEB96	04JUL96	04JUL96																				
TW-086.25	Lessons Learned Report		01MAR96	05JUL96	06JUL96																				
TW-087	Fume Hood Mod Position 1 or 2 - Design Rvw		20DEC95	13MAY96*	13MAY96																				
TW-088.1	Fume Hood Mod Position 1 or 2 - DCN		22JAN96	20MAY96*	20MAY96																				
TW-089	Fume Hood Mod Position 1 or 2 - Install		05FEB96	27MAY96*	27MAY96																				
TW-090	Revise DMSB Type B		22APR96	22APR96A	15MAY96																				
TW-091	Lithium Composition Analysis [10% ongoing]		22APR96	22APR96A	30SEP96																				
<b>MEDIUM PRIORITY</b>																									
TW-096	Design Pressure Relief for FH *TBD*		08OCT95	23APR96*																					

Sheet 7 of 7

PPPL-TFTR Trit Systems Division  
22-APR-96

Project Start: 10/01/95  
Project Finish: 12/31/96  
Start Date: 22 APR 96  
Proc Date: 21 APR 96

TMH  
Entry Bar  
Progress Bar  
Critical Activity

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**Job Number:**

1361-JPGD-KFC0

**Job Title:**

Lower ICRF Sources #5 and #6 to 30 MHz

**Requestor:**

Randy Wilson

**Performer:**

Elmer Fredd

**Terse Task Description:**

This job provides the design, fabrication and installation of modifications to two of the TFTR ICRF FMIT sources to lower their operating frequency to 30 MHz. Subsequent system commissioning is also provided.

## C.2 Work Estimating and Authorization Process

### General

Through the work approval process details of work scope, schedule, budget and responsibility will be integrated, documented, reviewed and agreed to by both project management and the performing organization. The cognizant job manager will be responsible and accountable for accomplishing the scope of work, as defined, within established schedule and cost targets. The vehicle for documenting and authorizing work is the Work Approval Form (WAF). The WAF formally documents the work scope to be performed, establishes a schedule, provides a cost estimate, identifies a responsible person for accomplishing the work, and provides time phased cost & manpower profiles.

### Process:

- o Initiate work request

The preparation of a "Job Request Form" by the project initiates the process by defining the scope of work, cost guidance, and schedule parameters that the job must meet. (Use of the Job Request Form is recommended as a means of communicating this information but is not mandated.) A unique 12 digit cost account number and job manager is usually assigned at this point<sup>1</sup>

<sup>1</sup>(Ref section D.1 for definition of cost accounts)

- o Prepare job estimate  
A job estimate is then prepared by the assigned job manager by providing the following information:
  - A narrative explanation of the work to be performed.
  - A job plan identifying all activities and their logical sequence including time durations for each activity (PERT Diagram or linked barchart). Constraints from other jobs should be shown when applicable for each activity. The completion of this job should be tied to a Level II summary schedule activity or project milestone.
  - Identification of the resources required to perform each activity using the PPPL Labor Demographics and expense classes<sup>1</sup>  
(Note: It is recognized that some activities will not have definable end products or results and will be categorized as level-of-effort (LOE) activities. "Management" is a primary example of an activity that cannot be measured against a schedule milestone. The amount of work budgeted as

LOE will be kept to a minimum by requiring separate cost accounts for LOE work).

The end product of this step will be a time phased budget plan (resource loaded schedule) for accomplishing the work scope. The Project P&C or Project Control Officer (with support from the Cost & Schedule Control Office) will enter this data into the PCS system and generate a WAF. (see exhibit C-2-A.1 through C-2-A.3 for example job estimate)

- o Authorization  
The WAF requires the approval of Project Management and the performing organization. If Project Management is not satisfied with the work definition, schedule, or cost estimate then Project Management will provide additional guidance to the performing organization. The job estimate will be iterated until agreement is reached.
- o Entry into the controlled baseline  
Upon approval, the official PCS Baseline & Project Integrated Schedule will be updated. This will become the baseline for performance measurement BCWS, BCWP and critical path analysis. Absolute control of this baseline resides within the PPPL Cost & Schedule Control Office. Additionally, the job number will be entered into the Accounting system Chart-of-Accounts<sup>2</sup> as a valid cost account for the accumulation of costs.

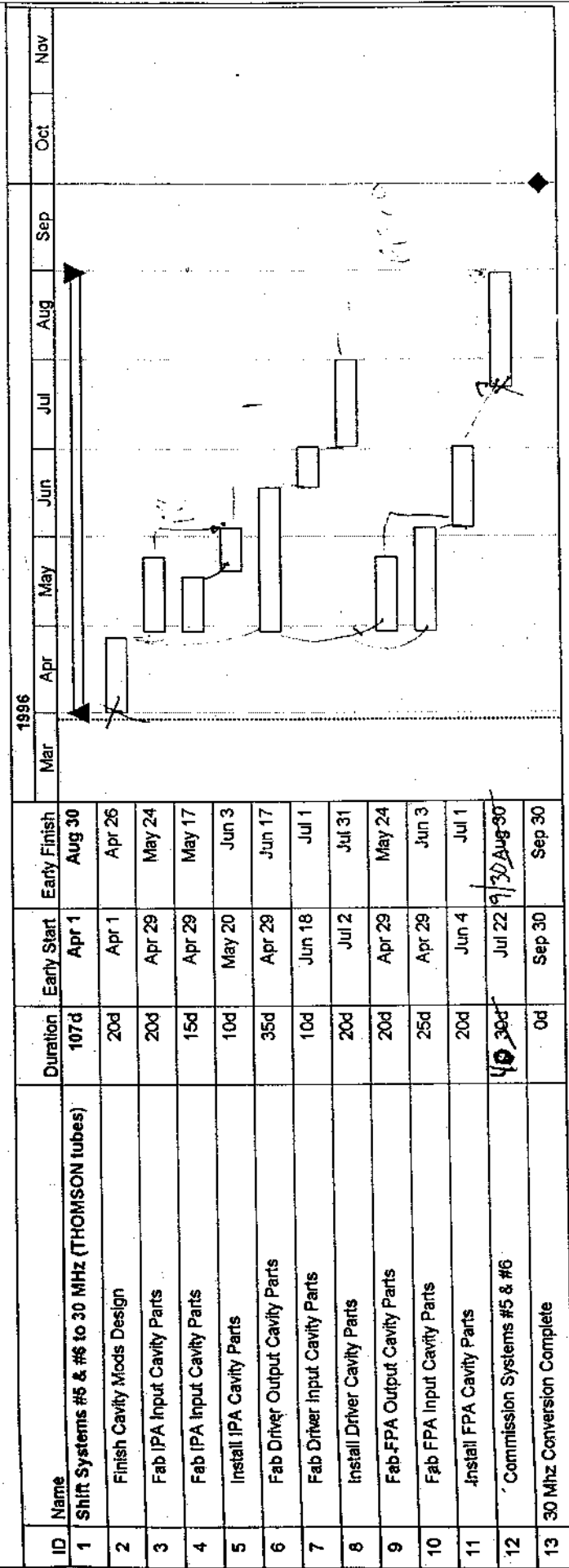


The authorization process is a key step in the communication process between Project management and the performing organization because it documents the cost, schedule, and the scope of work the Project desires and which the performing organization will strive to meet. The authorization process is also a control mechanism in that work may not begin and payment for work will not be authorized until the WAF is approved.  
(See exhibits C-2-B.1 through C-2-B.4 for a typical WAF)

<sup>1</sup>(REF section D.1).

<sup>2</sup>(Reference: "Accounting" manual Chapter 2 for discussion of the chart of accounts)

Lower ICRF Sources #5 and #6 to 30 MHz  
Job # 1361-UP6D-KFCO



Critical  
 Noncritical  
 Progress  
 Milestone  
 Summary  
 Rolled Up





BUDGET AMOUNTS SHOWN REFLECT DATA FROM 30/70 CARDS SUPPLIED

EXPL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOT
ACCT: 1361 UPGD KFD0													
23	0.0	0.0	0.0	0.0	0.0	0.0	15.7	31.5	11.9	2.0	0.0	0.0	61.1
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	13.7	12.4	12.9	15.8	9.3	14.8	78.9
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.4	0.6	0.3	0.5	2.8
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	0.0	0.0	0.0	0.0	0.0	0.0	1.7	16.9	5.7	1.6	0.3	0.5	26.8
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	0.0	0.0	0.0	0.0	0.0	0.0	2.4	4.2	1.9	0.9	0.4	0.7	10.6
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	0.0	0.0	0.0	0.0	0.0	0.0	18.6	28.1	15.6	10.9	5.7	9.0	88.1
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64	0.0	0.0	0.0	0.0	0.0	0.0	0.5	4.5	1.5	0.6	0.2	0.2	7.4
BCMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACCT TOT	0.0	0.0	0.0	0.0	0.0	0.0	52.8	98.5	50.0	32.4	16.2	25.7	275.7
ACMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RUCGENR

PRINCETON UNIVERSITY PLASMA PHYSICS LABORATORY CONTROLLER'S OFFICE  
RESOURCE USAGE CHART (MANHOURS ) PRINTED: 04/05/96 09:38

PAGE 1

BUDGET AMOUNTS SHOWN REFLECT DATA FROM 30,70 CARDS SUPPLIED

HOD STAFF		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOT
ACCT: 1361 UPGD KFCO	FY: 96	0	0	0	0	0	0	162	73	43	100	86	136	600
EER* EM	BCVS	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
SM	BCVS	0	0	0	0	0	0	93	142	137	85	55	88	600
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
TB	BCVS	0	0	0	0	0	0	0	72	160	209	62	97	600
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
EE DIV TOT	BCVS	0	0	0	0	0	0	255	287	340	394	203	321	1800
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
EM** EM	BCVS	0	0	0	0	0	0	80	7	16	17	0	0	120
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
EMD* DM	BCVS	0	0	0	0	0	0	200	4	8	8	0	0	220
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
EMS* RB	BCVS	0	0	0	0	0	0	93	899	308	20	0	0	1320
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0
EM DIV TOT	BCVS	0	0	0	0	0	0	373	910	332	45	0	0	1660
	ACMP	0	0	0	0	0	0	0	0	0	0	0	0	0

C-2-B.3

Activity ID: KFC0100  
 Activity description: 30MHz Conversion Complete

Activity ID	Activity description	Current Start	Current Finish
KFC0020	Finish Cavity Mods Design	01APR96	26APR96
KFC0030	Fab IPA Output Cavity Parts	29APR96	24MAY96
KFC0040	Fab IPA Input Cavity Parts	29APR96	17MAY96
KFC0050	Install IPA Cavity Parts	20MAY96	03JUN96
KFC0060	Fab Driver Output Cavity Parts	29APR96	17JUN96
KFC0070	Fab Driver Input Cavity Parts	18JUN96	01JUL96
KFC0080	Install Driver Cavity Parts	02JUL96	31JUL96
KFC0090	Fab FPA Output Cavity Parts	29APR96	24MAY96
KFC0100	Fab FPA Input Cavity Parts	29APR96	06JUN96
KFC0110	Install FPA Cavity Parts	04JUN96	01JUL96
KFC0120	Commission Systems #5 & #6	22JUL96	27SEP96
KFC0130	30MHz Conversion Complete	30SEP96	30SEP96



Project: 00C025  
 Project: 1JOC077  
 Date: 01APR96  
 Date: 01APR96

Legend:  
 ■ Bar Bar  
 ■ Progress Bar  
 ■ Critical Activity

Sheet 4 of 7

JOB REVISION  
 4/4/96

C-2-B.4

### **C.3 COST BASELINE**

The purpose of a cost baseline is to define a cost standard for each project which is segregated into an established cost account framework for the purposes of both collecting cost and measuring performance for specific scopes of work. A typical PCS database consists of several elements that make up the cost baseline as follows;

#### **C.3.1 Performance Measurement Baseline (PMB)**

The sum of all WAF budgets (and work package budgets for Design/Construction projects) is referred to as the Performance Measurement Baseline (PMB). The Cost & Schedule Control Office is responsible for PMB change control with changes officially approved by project management through the work authorization process.

The project will be planned and controlled by job (Level III) to the maximum extent possible. For determination of earned value (BCWP), work will be categorized as either discrete (jobs that have identifiable products or results) or level-of-effort (jobs with no definable products). The PMB is equal to the project's total cost estimate less the contingency and management reserve.

#### **C.3.2 Contingency** *(implementation by mutual agreement between PPPL and DOE)*

Contingency is defined as *funds budgeted for the entire project* that will cover cost that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. Contingency will be quantified by performing a technical, cost and schedule risk assessment of the project scope. The results and methodology employed will be documented by each project. The control and utilization of contingency will be documented in each project's Project Management Plan.

#### **C.3.3 Management Reserve**

*(implementation optional; at the discretion of the project manager)*

Management reserve (MR) is defined as the PPPL Project Manager's "set-aside" from appropriated funds to cover unanticipated problems and changes *within the Project scope for the current fiscal year*. Control of MR rests with the Project Manager. A MR account will be established as a separate & unique estimate from which budget transfer will be made & documented. The MR estimate is created by reviewing each job estimate within the project & quantifying the potential dollar value of any technical, cost and schedule risks that could materialize. These estimates are accumulated & budgeted in a MR account. At the same time, other Project jobs may be eliminated or de-scoped to offset the MR estimate. Documentation will be maintained to record draw-downs and replenishment of managements reserve funds.



## **C.4 Progress Status**

### **General**

Monthly schedule progress is collected from the performing organization for each job and processed into the integrated PCS database. This will provide the basis for Budgeted Cost of Work Performed (BCWP) and updated project schedules.

### **Process**

By the last week of each month the Cost & Schedule Control Office (C/SCO) will transmit an activity schedule bar chart to each job manager for purposes of obtaining schedule progress for the current month. These bar charts will show each activity within the job, its approved baseline schedule (basis of BCWS), and the previously reported progress status (referred to as the "current" schedule which is the basis of BCWP).

The job manager in collaboration with Project Controls or the P&C Officer will status each activity within the job for actual start dates, forecasted start dates, actual finish dates and forecasted finish dates. Additionally, an estimate-at-completion (EAC) will be provided by the job manager which will be utilized as an early flag of potential budget variances. In the event of an EAC not being provided by the job manager, a computer generated EAC will be reflected (and flagged as such) on the CPR Report. Clarifications or explanations of the EAC should be provided to help Project Management understand the driving forces behind cost under/over runs.

This data will be entered to the PCS Database to update the current schedule and determine BCWP. Additionally, the project schedule database will be updated to calculate project critical paths.

*(See exhibit C-4-A for typical statused bar chart)*



## **D. Accounting and Budgeting**

### **D.1 Cost Accounts**

A unique cost account will be established for each job performed by an organizational unit.

Details of each cost account will be documented on a Work Approval Form. Each cost account will have scheduled start and completion dates, and a time-phased budget.

#### **Cost Account Numbering Structure**

A PPPL cost account is composed of three fields, each field containing four characters, for a total of twelve characters. The three fields are Cost Center (CC), Work Package (WP), and Job. In addition to the cost account number a 2 digit expense classification (XP) identifies the resource type. (Note: for detailed cost accounting purposes a four digit expense classification is utilized. For planning & estimating purposes only the first two digits are used.)

#### **EXAMPLES:      CC WP JOB XP**

*abcd efg h ijkl mn*

**CC (Cost Center):**

- a* - Budget & Reporting Classification
  - 1 - Confinement Systems            OPEX (AT-10)
  - 2 - Development & Technology    OPEX (AT-15)
  - 3 - Applied Plasma Physics        OPEX (AT-05)
  - 4 - Projects & Planning            OPEX (AT-20)
  - 8 - Project & Capital Equipment    PACE
  - 9 - GPP (General Plant Projects and fabrication)

*bcd* - PPPL Project designator

**WP (Work Package)**

*efgh* - The four character WBS number.

**JOB** A unique number representing the intersection of scope (WBS) and responsible organization. The project may establish its own structure within the following framework.

*i* - performing organization identifier

B,G,W	- Computer division
Y	- Engr Analysis division
P	- AC Power section
L	- Calibration lab
M	- MG Section
H, N, R	-Heating systems
D	-Diagnostics
K, T	- Tokamak Ops
S	- Experimental projects
E	- Engineering dept.

*jkl* - unique 3 character job identifier  
(alpha/numeric)

**XP** (Expense Class)

11 - Direct Labor & Benefits	41 - Materials & Services
12 - Research labor & benefits	48 - ICO/IWO
13 - Health Phys Labor & Benefits	51 - Indirect Allocations
17 - Direct Subcontract Labor	52 - Research burden
22 - Computer Division Labor & Benefits	53 - Tech Center Burden
23 - Fab & Assembly Div Labor & Benefits	54 - Direct Allocations
25 - Technical Sys Division Labor & Benefits	55 - Health Physics Burden
26 - Design & Analysis Div Labor & Benefits	62 - G&A absorbed
27 - Tech Center Subcontract Labor	63 - Offsite G&A
30 - Direct Labor Overtime & Benefits	64 - MHX G&A
31 - Tech Center Overtime & Benefits	65 - ICO/IWO G&A
32 - H/P OT & Benefits	81 - Cost Transfers
34 - PU Computing	91 - Capital Equipment
35 - Travel	92 - Indirect Equipment Tax
36 - Electrical Energy	93 - Equipment G&A
37 - Stockroom Withdraws	94 - Fabricated Equipment
39 - Other Expenses	

All work will be budgeted, planned and costed using the existing laboratory management systems. Accordingly, the above listed expense classes will apply uniformly to these activities.<sup>1</sup>

### **Man Power Estimating**

For purposes of estimating labor the following Home Organizational Demographics (HOD) and Payroll Demographic (PDG) coding structure will be utilized.

#### **HOD    PDG**

*stuv*    *wx*

**HOD** (Home organizational demographic)

*s* - alpha (identifies **department**)

*t* - alpha (identifies **division**)

*u* - alpha (identifies **branch**)

*v* - alpha (identifies **section**)

**PDG** (Payroll demographic)

*w* - Identifies staff type  
A = Administrative  
C = Clerical & secretarial  
D = Drafting  
E = Engineering/Scientific  
F = Faculty  
G = Graduate student  
J = Janitorial  
M = Material Control  
N = Machinist  
R = Research  
S = Senior lab & shop  
T = Technician/lab & shop  
V = Visitor

*x* - Identifies pay category  
M = Monthly  
B = Bi-weekly  
S = Subcontract  
H = Hourly  
C = Contractor

<sup>1</sup> (Reference: "Accounting manual" Chapter 2 for a more detailed explanation of the cost account numbering structure.)

## **D.2 Cost Accounting**

Funding will be provided by DOE directly to PPPL through the Financial Plan and Contract Modification Process.

PPPL shall distribute and control these funds by cost center by individual expense class. These costs fall into two major categories, direct or indirect.

**Direct costs** are those specifically designated toward program objectives. The various projects are responsible for planning and estimating these costs as described in C.1.

**Indirect costs** are those necessary to support the laboratory infrastructure and support systems. Establishment and control of these costs are the responsibility of the Indirect Cost Center Managers and the PPPL Budget Office. Categories of indirect costs are;

*Direct Allocations (54xx)* - Cost of activities that directly support several final cost objectives are collected in separate cost centers and distributed to cost objectives through percentage distribution tables based on an assessment of the benefits received.

*Tech Center Burden (53xx)* - Costs associated with the management and administration of engineering divisions are collected in separate cost centers and allocated to final cost objectives as a percentage of the productive labor time of the subject division.

*Research Administration (5215)* - Costs associated with the management and administration of the research department are collected in separate cost centers and allocated to final cost objectives as a percentage of the productive labor time of the subject division.

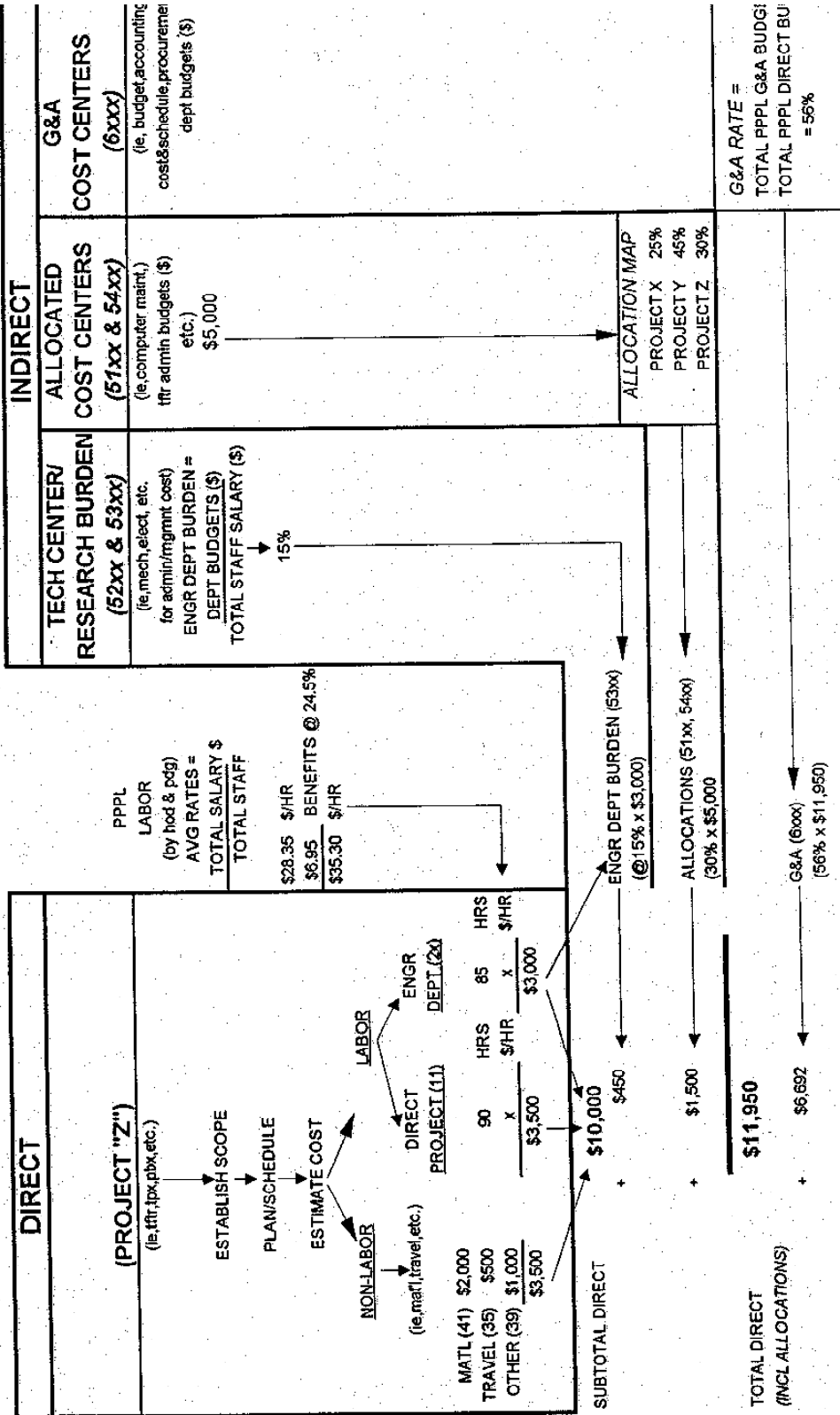
*Indirect Allocations (51xx)* - Costs of activities that indirectly support final cost objectives are collected in separate cost centers and distributed to cost objectives through percentage distribution tables based on an assessment of the benefits received.

*G&A (6xxx)* - Costs of activities that benefit the institution at-large are collected in separate cost centers in a G&A cost pool and distributed based on a modified total cost base.

(See exhibit D-2-A "PPPL Cost Accounting Overview")

# PPPL COST ACCOUNTING OVERVIEW

(SAMPLE CALCULATIONS)



D-2-A

### **D.3 Laboratory Budget Process (Direct and Indirect Cost)**

- o The Field Work Proposal (FWP) process commences in late January with a memorandum from the Office of Resource Management to key laboratory staff.
- o Indirect budgets are prepared and transmitted to the Budget Office in early February.
- o The PPPL Budget and Human Resource Committee, after review & iteration, approves indirect budgets in mid-February. Indirect liquidating rates (G&A rates) are then computed by the Budget Office.
- o Preliminary budget data is submitted to the Budget Office in late February. PCS detail provides the "bottoms up" estimates submitted by the Projects.
- o The Laboratory Program Committee reviews programs and budgets in early March leading to final sign-off on program budgets.
- o Final budget data is submitted to the Budget Office in mid-March.
- o FWP's are reviewed with DOE in Germantown in late March.
- o Final FWP's are submitted to DOE in mid-April.
- o Final funding is received from DOE in early September.

(Refer to "Budget Office Policies and Procedures" Chapter 3 Budget Formulation)

## **E. Analysis & Control**

### **E.1 General**

PPPL's PCS provides for the objective measurement and analysis of performance against the technical, cost, and schedule baselines. This permits Project Management to recognize deviations from the plan early, and to be in a position to initiate corrective and preventive actions on significant variances. Various performance indicators are computed each month on a cumulative to date basis. Variance analysis is performed at the WAF level as required.

### **E.2 Performance Indicators**

#### **Budgeted cost of Work Scheduled (BCWS)<sup>1</sup>**

BCWS represents the time-phased budget for work shown on a WAF, against which actual performance is measured. For any given point in time BCWS to date is determined at the WAF level by totaling the budgets for the activities scheduled to be in progress.



### **Budgeted Cost of Work Performed (BCWP)<sup>1</sup>**

BCWP, also called "earned value", represents the amount of budget (BCWS) assigned to an activity within a WAF that has been partially or fully "earned" as a result of work having been completed. At the WAF level, BCWP is determined by total the amount of BCWP earned for activities actually completed, plus the BCWP earned-to-date for partially completed activities.

PPPL utilizes two methods of assessing BCWP:

#### ***Level-of-Effort***

This method is usually reserved for activities that have no deliverables or products such management and supervision. In this case BCWP will always equal BCWS.

#### ***Percent Complete***

In this method each activity's schedule progress is first determined by entering the actual/forecast start dates and the actual/forecast completion dates (as obtained from the job manager's status mark-up). For activities completed, percent complete would equal 100%. For activities in progress percent complete will be calculated by dividing the actual elapse time the activity has been in progress by the total revised duration the activity is now expected to take. In a variation of this method projects may, instead, solicit subjective percent complete data for each activity directly from the job manager.

### **Actual Cost of Work Performed (ACWP)<sup>1</sup>**

ACWP represents the amount of actual charges (either invoiced or accrued) to the job (WAF). This data is collected at the job level by expense classification (16 digit cost account) and summarized cumulative to date for the entire job. ACWP is not collected nor reported by activity.

### **Budget at Completion (BAC)<sup>1</sup>**

BAC is the total baseline budget for completing assigned scopes of work. At the WAF level, it is the sum of all current year BCWS. At the project level it is the sum of all past year budgets the current year WAF budgets and future planned work.

### **Estimate at Completion (EAC)<sup>1</sup>**

EAC is the estimated costs at completion of the assigned work scope. The job manager inputs his EAC when statusing his/her WAF. If the job manager does not provide an EAC , one will be automatically computed by dividing the BAC by the CPI.

**Schedule Variance (SV)<sup>1</sup>**

The Schedule Variance is simply the difference between the BCWP minus the BCWS. This provides an overall assessment of schedule progress but does not indicate specific schedule impacts or criticalities. As such, a proper schedule analysis must be supplemented by detailed WAF schedules (critical path analysis).

**Cost Variance (CV)<sup>1</sup>**

The Cost Variance is the difference between the BCWP minus the ACWP. This comparison provides an early indicator of potential cost over/under runs and can be used to validate the independently obtained EAC.

**Cost Performance Index (CPI)<sup>1</sup>**

The CPI is equal to the BCWP divided by the ACWP. It provides a measure of "cost efficiency"; how much work is being accomplished per dollar spent.

**Schedule Performance Index (SPI)<sup>1</sup>**

The SPI is equal to the BCWP divided by the BCWS. It provides a general indicator of how work is proceeding.

<sup>1</sup> (See section E.2 for sample PCS calculations)

**E.3 Reports**

Various types of reports are available which provide for the control of technical objectives, schedule, and cost (funds management). The basic categories of PCS Reports include;

**PCS Cost Performance Reports** (exhibit E-3-A.1 through E-3-A.3)

These reports contain cost performance data from Project summary down to the job level for the five primary data elements (expressed in dollars).

**Budget Analysis Reports** (exhibit E-3-C.1 & .2)

These reports contain Laboratory Budget and Accounting Cost data from Project summary down to the cost center level by second level of expense classification for the seven primary data elements (expressed in dollars).

*PCS Job Estimate Budget* - The summation of approved job estimates.

*Cost Center Budget* - DOE Funding guidance as broken down by project and cost center.

# PCS SAMPLE CALCULATIONS

(FOR TYPICAL JOB)

TASK	STATUS DATE							ANALYSIS						
	JAN	FEB	MAR	APR	MAY	JUN	JUL	BUDGET AT COMPL	BCWS	BCWP	BCWR	ACWP	ETC	EAC
A		13	27					40	40					
		ACTUAL START 15 FEB	ACTUAL FINISH 20 MARCH											
B			50					100	50					
		ACTUAL START 01 MARCH	FORECAST FINISH 01 MAY											
C			50					100	50					
			FORECAST START 01 APRIL											
D				20				80	0					
			ACTUAL START 15 MARCH	FORECAST FINISH 01 MAY										
E			50					200	100					
		ACTUAL START 01 FEB	FORECAST FINISH 15 APRIL											
F			150					300	150					
		ACTUAL START 01 MARCH	FORECAST FINISH 01 JULY											
							TOTALS	800	390	410	430	410	840	

**INDICIES:**  
 COST PERFORM. INDEX =  $\frac{BCWP}{ACWP} = \frac{390}{430} = .91$   
 SCHEDULE PERFORM. INDEX =  $\frac{BCWS}{BCWP} = \frac{390}{390} = 1.00$

**LEGEND:**  
  
 (BCWS)      (BCWP)      (BCWR) BASED UPON ENGR'S STATUS

BCWS = BUDGETED COST OF WORK SCHEDULED  
 BCWP = BUDGETED COST OF WORK PERFORMED  
 ETC = ESTIMATE TO COMPLETION

BCWR = BUDGETED COST OF WORK REMAINING  
 ACWP = ACTUAL COST OF WORK PERFORMED  
 EAC = ESTIMATE AT COMPLETION

Princeton University Plasma Physics Laboratory Controllers Office  
 Cprf:CURRENT CurMth:06 (JUN) CurFyr:96 Frozen:07/16/96 02:54:48  
 report CprfBAR FYr:96 CurMth:JUN Printed:07/16/96  
 \*\*\*\* Fiscal Year 96 only \*\*\*\*

KDollars

PMS Job	CC/PMS Delta	Cst Ctr Budget	Cur Mth Expend	Yr-to-Dt Expend	PMS Est. At Compl	PMS YTD BCMP
1020 ONSITE COLLABORATION	-10.2	608.9	67.4	259.2	501.0	283.2
1040 DIII-D SUMMER SUPT P	.0	18.4	.0	21.3	20.0	13.8
1051 DIII-D COLLAB PERFORM	1.6	146.5	12.1	101.1	135.0	107.3
1060 C-MOD COLLAB PERFORM	-37.7	670.8	55.9	407.6	615.0	406.3
1301 TFTR DIAGNOSTICS	-170.2	6838.7	632.8	4580.2	6562.0	4599.2
1310 TFTR PHYSICS PROGRAM	-132.6	7206.6	636.6	5476.3	7167.0	5484.7
1335 CENTRAL COMPUTING FA	-88.4	3551.5	248.1	2284.4	3097.0	2723.0
1345 TFTR NB OPERATIONS	372.9	6766.7	558.1	4756.3	6197.0	4709.2
1349 TFTR POWER SYSTEMS	-172.5	3131.5	182.6	2633.3	3128.0	2698.9
1350 TOKAMAK OPERATIONS	-740.6	9679.6	1059.2	7921.2	10236.0	8021.8
1361 ICRF DEVELOPMENT	521.5	4758.0	556.9	3264.7	4838.0	2449.6
1391 TFTR/S&R TRANSITION	.0	.0	.0	6.0	6.0	.0
1392 TRIT SYS OPS	-775.0	6720.6	833.5	5063.5	6562.0	5577.5
*TOTAL KDollars	-1231.1	50097.8	4823.7	36775.2	49064.0	37074.6

note: SEQ=DETAIL WP=NO JOB=NO LEVEL=0  
 CPRF (PRIMAVERA version)

Princeton University Plasma Physics Laboratory Controllers Office  
 PPL Cost Performance Report  
 Cprf: JUN Closing CurMth: 06 CurFYr: 96 Frozen: 07/16/96 02:54:48  
 report CPR (kDollars) Printed: 07/16/96  
 \*\*\*\* Fiscal Year 96 only \*\*\*\*

	Current Month		Cumulative To Date				through JUN FY96				Total at Completion		
	JUN BCWS	JUN BCWP	BCWS	BCWP	ACWP	Sch Var	SPI	Est Var	CP	Budget	Est	Var	
1020 ONSITE COLLABORATION	102	55	47	316	283	259	-33	.90	24	1.09	619	501	118
1040 DIII-O SUMMER SUPT P	2	2	0	14	14	21	0	1.00	-7	.65	18	20	-2
1051 DIII-O COLLAB PERFOR	14	14	12	107	107	101	0	1.00	6	1.06	145	135	10
1060 C-MOO COLLAB PERFORM	52	35	56	466	406	408	-60	.87	-1	1.00	709	615	94
1301 TFTR DIAGNOSTICS	731	489	633	5007	4599	4580	-408	.92	19	1.00	7009	6562	447
1310 TFTR PHYSICS PROGRAM	588	589	637	5490	5485	5476	-5	1.00	8	1.00	7339	7167	172
1335 CENTRAL COMPUTING FA	300	297	248	2728	2723	2284	-5	1.00	439	1.19	3640	3097	543
1345 TFTR NB OPERATIONS	522	498	558	4758	4709	4756	-48	.99	-47	.99	6394	6197	197
1349 TFTR POWER SYSTEMS	189	182	183	2708	2699	2633	-9	1.00	66	1.02	3304	3128	176
1350 TOKAMAK OPERATIONS	1008	925	1059	8131	8022	7921	-110	.99	101	1.01	10420	10236	184
1361 ICRF DEVELOPMENT	396	318	557	3218	2450	3265	-769	.76	-815	.75	4236	4838	-601
1391 TFTR/S&R TRANSITION	0	0	1	0	0	6	0	.00	-6	.00	0	6	-6
1392 TRIT SYS OPS	600	578	833	5607	5577	5064	-29	.99	514	1.10	7496	6562	934
*TOTAL	4502	3982	4824	38550	37075	36775	-1475	.96	299	1.01	51329	49064	2265

note: SEQ=DETAIL MP=NO JOB=NO LEVEL=0  
 CPRF (PRIMAVERA version)

Princeton University Plasma Physics Laboratory Controllers Office  
 PPL Cost Performance Report  
 Cprf: JUN Closing CurMth:06 CurFYr:96 Frozen:07/16/96 02:54:48  
 report CPR (Kdollars) Printed:07/16/96  
 \*\*\*\* Fiscal Year 96 only \*\*\*\*

	Current Month		-- Cumulative To Date		through JUN FY96				Total at				
	JUN BCWS	FY96 BCWP	Budgeted Cost BCWS	Actuals BCWP	V A R I A N C E S Sch Var	SPI	Cst Var	CPI	Total Budget	Completion Est   Var			
UPGD UPGRADE	0	4	3	175	160	156	-15	.92	4	1.03	175	172	3
KDCO TFTR DIGITAL CONTROL SYS													
*TOTAL 1350 TOKAMAK OPERATIONS	1008	925	1059	8131	8022	7921	-110	.99	101	1.01	10420	10236	184
1361 ICRF DEVELOPMENT	****												
AAAA JOB SUSPENSE	0	0	9	0	0	9	0	.00	-9	.00	0	0	0
KAH0 ICRF ANTENNA SYS OPS/DEV	40	39	39	375	516	516	-2	.99	-143	.72	502	588	-86
KRFS RF SOURCE OPERATIONS&DEV	141	141	79	452	270	270	-0	1.00	182	1.68	826	483	343
UPGD UPGRADE	50	8	20	201	36	52	-166	.18	-16	.70	276	270	6
KFCO LOWER ICRF SOURCES 5& 6	30	-4	55	221	78	177	-144	.35	-100	.44	337	334	3
KFW0 INSTALL FMG ANTENNA(CORN)	0	0	0	190	190	198	-0	1.00	-8	.96	190	194	-4
KLH0 CLOSED 04/02/96	25	33	16	165	142	53	-24	.86	89	2.70	183	103	80
KL10 TFTR LOWER HYBRID CLOSEO	52	49	84	544	421	430	-123	.77	-9	.98	639	640	-1
K1B0 INSTALL PBX-M 1B0 ANTENN	57	52	254	1069	758	1561	-310	.71	-803	.49	1284	2226	-942
K4S0 FOUR STRAP RF ANTENNA													
*TOTAL 1361 ICRF DEVELOPMENT	396	318	557	3218	2450	3265	-769	.76	-815	.75	4237	4838	-601
1391 TFTR/S&R TRANSITION	****												
TAB0 TFTR/S&R TRANSITION	0	0	1	0	0	6	0	.00	-6	.00	0	6*	-6
1392 TRIT SYS OPS	****												
HP30 TFTR HP FIELD OPS	43	41	43	402	400	416	-2	.99	-16	.96	537	517	20
HP90 HP REML,CASL,-HC&A SUPPO	55	53	50	516	513	467	-3	.99	46	1.10	689	614	75
TC10 TRITIUM INVENTORY & CONT	42	41	34	395	393	321	-2	1.00	72	1.22	528	425	103
TR10 TRIT ENGINEERING	80	77	57	752	748	500	-4	.99	247	1.49	1005	662	343
TR20 TRIT SYS OPERATORS 1ST S	117	113	157	1097	1091	1033	-6	.99	58	1.06	1467	1366	101
TR50 TRIT SYS OPERATORS 2ND S	85	82	57	797	793	612	-4	.99	181	1.29	1065	811	254
TR90 TRIT CALIBRATIONS	71	68	87	661	657	552	-4	.99	105	1.19	883	731	152
TS00 CC5433 ALLOCATIONS	11	10	11	98	98	99	-0	1.00	-2	.98	131	131	-0
TS30 TRITIUM MONITOR SUPPORT	11	11	10	105	104	90	-1	1.00	14	1.16	140	119	21

note: SEQ=DETAIL WP=YES JOB=YES LEVEL=0  
 :A star (\*) indicates the EAC was calculated from the CPI.  
 CPRF (PRIMAVERA version)

Princeton University Plasma Physics Laboratory Controllers Office  
 Bfa: MAY Closing CurMth: 05 CurFYr: 93 Frozen: 06/03/93 : 39:48  
 report BFABAR (Dollars) Printed: 06/04/93 7.13.42

PMS Job Est CC/PMS Bud Cost Center

FUND	Fiscal Year(FYR) - 3	OPER	Budget	Est	CC/PMS	Bud	Cost	Center	Budget	Cur Month	Yr-to-date	Cur Year	Cur Year	CC Budget
					Delta					Expend	Expend	Encumb	Reqs	Remaining
		*1 TFTR PROJECT	0	0	0	0	0	0	0	0	32,000	0	0	-32,000
		0800 PRIOR YEARS VARIANCE	644,631	0	92,069	736,700	50,486	0	0	50,486	480,881	206,791	0	49,028
		1100 DIRECT LABOR & BENEFITS	5,216,713	0	-29,443	5,487,300	506,704	0	0	506,704	3,580,362	1,906,938	0	0
		1200 RESEARCH LABOR & BENEFITS	278,700	0	261,500	540,200	60,469	0	0	60,469	350,756	262,903	1,693	0
		1700 SUBCONTRACT LABOR	2,260,361	0	-40,861	2,219,500	206,774	0	0	206,774	1,466,411	768,335	0	-75,152
		2200 COMPUTER DIV LABOR & BENEFITS	8,699,834	0	-303,834	8,396,000	677,841	0	0	677,841	5,548,221	2,948,541	0	-15,246
		2300 MECHANICAL DIV LABOR & BENEFIT	5,877,910	0	3,290	5,881,200	561,614	0	0	561,614	4,165,307	1,807,172	0	-100,761
		2500 ELECTRICAL DIV LABOR & BENEFIT	454,926	0	-7,226	447,700	73,565	0	0	73,565	543,298	21,883	0	-91,279
		2600 ANALYSIS DIV LABOR & BENEFITS	3,570,564	0	508,036	4,078,600	455,361	0	0	455,361	3,976,115	1,079,056	0	-976,571
		2700 TECH CENTER SCL	1,277,560	0	-81,260	1,196,300	79,708	0	0	79,708	1,257,899	202,035	0	-263,634
		2800 TIME & MATERIALS SCL	37,000	0	-500	36,500	3,097	0	0	3,097	42,784	6,240	0	-12,523
		3000 DIRECT OVERTIME & BENEFITS	529,798	0	135,902	665,700	112,249	0	0	112,249	736,363	93,679	0	-164,341
		3100 TECH CENTER OVERTIME & BENEFIT	100	0	0	100	5	0	0	5	116	0	0	-16
		3400 COMPUTING	449,012	0	6,988	456,000	38,309	0	0	38,309	313,287	176,056	0	-33,344
		3500 TRAVEL	2,401,200	0	69,900	2,471,100	198,156	0	0	198,156	915,742	1,555,358	0	0
		3600 ELECTRICAL ENERGY	221,300	0	-15,800	505,400	60,291	0	0	60,291	394,198	172,678	0	-61,476
		3700 STOCKROOM WITHDRAWALS	10,694,401	0	139,300	360,600	26,424	0	0	26,424	191,160	175,388	0	-5,947
		3900 OTHER EXPENSE	198,000	0	-657,501	10,036,900	462,351	0	0	462,351	5,844,331	971,936	271,616	2,949,017
		4100 MATERIALS & SERVICES	4,275,213	0	-75,000	123,000	11,000	0	0	11,000	81,070	279,877	20,000	-257,947
		4200 ICO LABOR	68,268	0	-309,513	3,965,700	129,510	0	0	129,510	2,074,838	2,127,517	108,085	-344,741
		4600 MAJOR PURCHASES	1,769,006	0	-471	87,797	8,107	0	0	8,107	57,286	30,511	0	0
		4800 RESEARCH BURDEN	5,371,160	0	-24,210	1,744,796	164,787	0	0	164,787	1,254,085	550,570	102,374	-59,858
		5200 TECH CENTER BURDEN	27,105,066	0	-9,137	5,362,023	373,940	0	0	373,940	3,450,847	2,028,265	200,990	-219,462
		5300 DIRECT ALLOCATIONS		0	25,007	27,130,073	2,204,327	0	0	2,204,327	18,494,655	8,005,918	0	428,510
		6200 G&A ABSORBED		0				0	0				0	
		*TOTAL FUND OPER	82,241,952	-312,763	81,929,189	6,465,076	55,252,011	25,377,645	704,758	594,775				

NON-OPER

*1 TFTR PROJECT	1,683,378	0	807,420
9100 CAPITAL EQUIPMENT	336,676	0	161,484
9200 INDIRECT CAPT. EQUIP. ABSORBED			
*TOTAL FUND NON-OPER	2,020,054	86,728	968,904

Full CstCtr Level Encumbrances included.

Princeton University Plasma Physics Laboratory Controllers Office  
 Bfa: MAY Closing CurMth:05 CurFyr:93 Frozen:06/03/93 39:48  
 report BFABAR (Dollars) Printed:06/04/93 7.20.36

COST CENTER TOTALS

FUND	Fiscal Year (Fyr) - 3	PMS Job Est Budget	CC/PMS Bud	Delta	Cost Center Budget	Cost Center Expend	Yr-to-date Expend	Cur Year Encumb	Cur Year Reqs	CC Budget Remaining
OPER		436,121	0		436,121	33,729	310,596	152,444	17	-26,936
CstCtr:1001	DIVERTOR STUDIES TOK	176,422	-6,518		169,903	17,797	41,062	118,924	0	9,918
CstCtr:1003	JET PELLETT EXPERIMEN	50,478	0		50,478	3,027	37,457	17,901	2	-4,881
CstCtr:1004	ARIES COLLAB	159,967	0		159,967	5,865	-44,344	201,684	7	2,621
CstCtr:1005	ASDEX COLLABORATION	98,323	42,047		140,370	26,235	65,439	78,869	1,844	-5,783
CstCtr:1006	TEXTOR/TORRE-SUPRA CO	0	0		0	64	-35,979	0	0	-979
CstCtr:1010	CAMEO	-2	0		-2	0	0	0	0	34,998
CstCtr:1014	HIGH FIELD MAGNET	132,963	0		132,963	88,806	88,806	44,157	0	0
CstCtr:1022	NUF PROGRAM	0	0		0	0	261,000	0	0	-261,000
CstCtr:1065	PYR VARIANCE OFFSET	523,051	1,799		524,850	59,623	529,319	189,272	213	-193,954
CstCtr:1091	TPX PHYSICS PPPL	24,000	0		24,000	0	0	0	0	24,000
CstCtr:1092	TPX UNIV DIAGNOSTICS	456,000	14,000		470,000	1	267,451	139,725	0	62,824
CstCtr:1094	TPX LLNL PHYSICS	137,000	0		137,000	33,156	150,686	51,576	0	-88,287
CstCtr:1095	TPX UNIV PHYSICS	57,000	0		57,000	0	49,775	5,225	0	2,000
CstCtr:1096	TPX PHYSICS ANL	131,000	0		131,000	15,000	131,000	0	30,000	-30,000
CstCtr:1097	TPX PHYSICS LANL	585,000	0		585,000	43,000	411,219	106,298	0	67,483
CstCtr:1098	TPX PHYSICS ORNL	256,000	0		256,000	0	142,290	0	113,710	0
CstCtr:1099	TPX PHYSICS MIT	193,871	0		193,871	0	0	0	0	193,871
CstCtr:1100	DIRECTORS MGT RESERV	8,001,939	266,999		8,268,938	631,544	4,551,243	3,042,424	234,039	441,232
CstCtr:1110	PBX OPERATIONS	2,592,155	-522,514		2,069,641	0	0	209,221	0	1,860,420
CstCtr:1300	TFTR CONFIN SYS CONT	6,851,056	7,834		6,858,890	542,479	4,565,542	2,217,691	40,001	35,656
CstCtr:1301	TFTR DIAGNOSTICS	6,707,319	-18,515		6,688,804	597,058	4,185,422	2,460,603	28,656	14,124
CstCtr:1310	TFTR PHYSICS PROGRAM	4,104,660	-34,104		4,070,557	341,222	2,499,131	1,770,245	48,610	-247,428
CstCtr:1335	CENTRAL COMPUTING FA	9,923,409	-192,583		9,730,826	830,970	5,911,457	3,329,503	101,904	387,961
CstCtr:1345	TFTR NB OPERATIONS	5,541,520	286,299		5,827,818	430,970	3,777,881	1,617,729	209,097	223,112
CstCtr:1349	TFTR POWER SYSTEMS	12,058,589	133,549		12,192,138	1,199,528	7,142,229	4,881,499	91,852	76,558
CstCtr:1350	TOKAMAK OPERATIONS	1,051,636	-12,329		1,039,307	124,518	703,001	331,670	1,658	2,978
CstCtr:1361	ICRF DEVELOPMENT	7,469,729	52,100		7,521,829	584,224	6,124,165	2,250,628	3,973	-856,937
CstCtr:1390	TOKAMAK ENGR D-D SCO	850,617	-25,030		825,587	41,933	422,220	409,707	1,108	-7,449
CstCtr:1391	TFTR DECONTAMINATION	3,662,059	71,164		3,733,222	501,586	2,582,456	1,589,821	86,662	-525,717
CstCtr:1392	TRIT SYS OPS	1,483,055	4,912		1,487,967	10,284	24,652	143,932	0	631,459
CstCtr:1701	ORR TEAM COSTS	3,884,509	-404		3,480,105	87,831	1,000,798	474,151	29,415	-21,714
CstCtr:1702	TFTR D-T PROJECT MAN	3,926,844	-272,085		3,654,759	221,253	3,734,309	48,641	460	-170,987
CstCtr:1705	TRITIUM SYSTEMS DIVI	2,327,513	-8,955		2,318,558	177,043	4,051,509	134,448	34,514	-302,583
CstCtr:1710	TFTR D-T TOKAMAK OPE	2,775,695	9,055		2,784,750	224,812	2,386,466	234,516	7,522	-291,936
CstCtr:1715	VAC/ICRF D-T PREP	3,024,444	-15,663		3,008,781	339,076	2,604,561	231,456	11,819	-87,804
CstCtr:1720	TFTR D-T DIAGNOSTICS	2,991,007	230,130		3,221,137	128,835	2,756,320	573,982	7,122	-82,649
CstCtr:1730	TFTR D-T HEATING SYS	4,623,490	-17,574		4,605,916	58,951	528,341	2,444,454	0	-169,563
CstCtr:1740	TFTR TRIT.PURIF.SYS.	70,000	255,863		325,863	334,280	3,776,775	1,254,411	17,729	-2,000
CstCtr:1901	TPX PPPL DESIGN	1,010,550	-35,000		975,550	94,084	854,963	65,657	15,000	14,379
CstCtr:1911	TPX ANL DESIGN									
CstCtr:1921	TPX V V DESIGN									

Full CstCtr Level Encumbrances Included.  
 DIRECT COST CENTERS



JCRPT JOB COST REPORT AS OF 11/06/92

JOB# T9CO D-T SYSTEMS HVAC MODS&OPS

COST CENTER 1710 WK PKG TRIT

REV # 4 HOURLY (PG 1) THRU 10/31/92

REVISION DATE 09/03/92

ENGR CARNEVALE, H.

REQ BY PERRY, E.

START DATE 04/01/91

PRIORITY

ESTIMATE DATE 00/00/00

ESTIMATED COMP DT 00/00/00

\*\*\*\*\*

FOR FY 93 ONLY

EXP CL	APPROVED ESTIMATE	CUR MTH EXPEND	YTD COSTS	REQS + ENCUMB	BALANCE
23 MECHANICAL DIV LABOR & BEN	54595	15994	15994	0	38601
27 TECH CENTER SCL	53701	27840	27840	0	25861
28 TIME & MATERIALS SCL	304986	19608	19608	0	285378
31 TECH CENTER OVERTIME & BEN	0	33	33	0	33
37 STOCKROOM WITHDRAWALS	0	2244	2244	0	2244
39 OTHER EXPENSE	0	213	213	0	213
41 MATERIALS & SERVICES	33757	1332	1332	240322	95903
48 MAJOR PURCHASES	125000	0	0	248471	123471
53 TECH CENTER BURDEN	6005	1763	1763	0	4242
62 G&A ABSORBED	412480	37619	37619	130976	243885
TOTAL	1294324	106646	106646	619769	567909

INCOMPLETE ORDERS AND REQUISITIONS ARE LISTED BELOW. THEY ARE ALSO INCLUDED IN THE TOTALS "COST + PO + REQ" TO THE LEFT (IN FY 93).

P/O #	EXP CL	P/O DATE	P/O FY	AMOUNT	OUTSTANDING AMOUNT	REQ #	VENDOR#
PC37910	41	10312	3	1500	1500		012432
PC79340	41	09302	3	3825	3825	R306375	016365
PC84070	41	09212	3	3136	3136		016455
PC85020	41	09302	3	219	0	R318551	016299
PC89900	41	09232	3	250	250	R306379	016075
PC90530	41	09302	3	1340	1340	R306377	016137
PC92460	41	10192	3	294	0	R318075	003333
PC92640	41	10122	3	550	550	R306348	003686
PC93460	41	10232	3	224	0	R318072	012571
PC94510	41	10282	3	115	0	R318551	003098
PC94970	41	10282	3	1256	1256		
R313626	41	09082	3	15000	15000		
R314973	41	09292	3	18575	18575		
R314988	41	10142	3	2990	2990		
R315654	41	10152	3	50000	50000		
R315654	48	10152	3	125000	125000		
R315658	48	10222	3	115000	115000		
R318506	41	09082	3	84000	84000		
R318522	41	09302	3	2000	2000		
S03535N	41	10222	3	50000	50000		016566
S03535N	48	10232	3	8471	8471		016566
S306609	41	09302	3	5900	5900		011413
**** TOTAL *				489645	488793		

PG	HOD	STF	CLASS	CUR	CUM	STRAIGHT	CUM	UNITS ARE HR	OVERTIME	CUM
5	TID*	DS	2811	244.0	244.0	0.0	0.0	0.0	0.0	0.0
5	TID*	DS	2811	138.0	138.0	0.0	0.0	0.0	0.0	0.0
4	EMEM	ES	2713	80.0	80.0	16.0	16.0	16.0	16.0	16.0
8	EMDE	SM	2311	125.7	125.7	0.0	0.0	0.0	0.0	0.0
4	EMEM	ES	2713	80.0	80.0	26.0	26.0	26.0	26.0	26.0
4	EMEM	ES	2713	80.0	80.0	0.0	0.0	0.0	0.0	0.0
8	EMSM	SM	2311	17.3	17.3	0.0	0.0	0.0	0.0	0.0
4	EMEM	ES	2713	80.0	80.0	0.0	0.0	0.0	0.0	0.0
8	EMSM	SM	2311	17.3	17.3	0.0	0.0	0.0	0.0	0.0
4	EMEM	ES	2713	80.0	80.0	0.0	0.0	0.0	0.0	0.0
1	EMM*	EH	2314	8.0	8.0	0.0	0.0	0.0	0.0	0.0
4	EMEM	ES	2713	16.0	16.0	4.5	4.5	4.5	4.5	4.5
4	EMEM	TS	2713	50.0	50.0	0.0	0.0	0.0	0.0	0.0
8	EMEM	EM	2311	121.3	121.3	0.0	0.0	0.0	0.0	0.0
6	EMSM	TS	2311	16.0	16.0	0.0	0.0	0.0	0.0	0.0
4	EMEM	TS	2713	120.0	120.0	0.0	0.0	0.0	0.0	0.0
8	EMEM	SM	2311	43.3	43.3	0.0	0.0	0.0	0.0	0.0
4	EMDE	ES	2713	10.0	10.0	0.0	0.0	0.0	0.0	0.0
6	EMSE	TS	2311	12.0	12.0	0.0	0.0	0.0	0.0	0.0
6	EMSM	TS	2311	8.0	8.0	0.0	0.0	0.0	0.0	0.0

*Year to Date Expend* - Cumulative actual and accrued cost for the fiscal year.  
(same as ACWP above)

*Current Year Encumbrances* - Uncosted commitments i.e., Purchase Orders & Subcontracts.

*Current Year Requisitions* - Uncommitted requisitions being processed by the Procurement Office & Personnel Division.

Comparison of these data elements provides;

1. CC/PCS Budget Delta - The PCS job estimate minus the Cost Center Budget. Over/under budgeting conditions are flagged in the "CC/PMS Bud Delta" column.

2. CC Budget Remaining - The cost center budget minus y-t-d expenditures, encumbrances and requisitions.

#### **Job Cost Reports** (exhibit E-3-D.1)

These reports provide the job manager with detailed cost, labor, and procurement information about his/her job. The following key data is provided;

*Approved estimate & actual costs* - by second level of expense classification.

*Listing of individual requisitions and purchase orders.*

*Listing of labor charges by individual employee by name.*

#### **Project Schedule Reports** (exhibit C-1-A,B,C in section C)

These reports provide detail status of discrete activities within each job. The various levels of schedules are described in section C.1. The following key data is provided;

*Current schedule estimated start and finish dates.* - These reflect progress gathered during the monthly progress statusing cycle. Actual start and completion dates are also shown.

*Baseline schedule start and finish dates.* - These reflect the baseline schedule as reflected in the WAF.

*Total float* - This represents the number of working days the activity can slip before impacting project milestone dates. Critical activities are typically defined as those with zero or less days of float.

#### **E.4 Variance Analysis Reporting**

The purpose of variance analysis is to identify problems early so that prompt corrective action can be taken to minimize cost and schedule impacts, project cost overruns, and schedule delays etc. One formal method of variance analysis is the PCS Variance Analysis Report (VAR). Generally, VAR's will be prepared at the job level by the job manager when established variance thresholds are exceeded and when requested by project management.

Cost and schedule variances that exceed established parameters will automatically be identified by the Cost & Schedule Control Office each month and issued to Project Management.

Cumulative-to-Date Variance thresholds:

- CPI or SPI outside .8 to 1.2 range.

and

- SV or CV greater than \$25,000

and

- SV or CV greater than 10% of BAC

A properly prepared VAR will identify the cause of the variance, evaluate options to resolve the situation, provide a new estimate-at-completion, and communicate actions (taken, planned or proposed) to higher level management. The variance report system applies management by exception techniques that permit management to focus its attentions on specific areas of concern that deviate significantly from their cost or schedule plan and are therefore potential problem areas.

Variance analysis at the job level (Level III) will permit traceability of problems to the appropriate WBS element and the responsible organizational unit. Also, by performing variance analysis at the lowest level the offsetting of negative variances by positive variances in other areas (variance washout) will be avoided.

(See exhibits E-4-A & B for typical Variance Exception List and Analysis Report)

#### **E.5 Management Oversight**

Formal communication of Project status and problems are tabled at the various meetings held by PPPL and by Project specific reports transmitted to DOE-PG. These are the forums for discussing specific technical, cost and schedule issues including problems requiring management attention and/or decision. Example of these meetings & reports include but are not limited to;

- o Monthly inter-project management reviews
- o Weekly Project Division Head Meetings
- o Monthly Laboratory Management Reviews (LMR's) (all PPPL Departments and projects present monthly status/issues)
- o Weekly PPPL Senior Management meetings (All PPPL Departments Heads)
- o Monthly and Weekly DOE-PG meeting with project management
- o Daily project management meetings on critical initiatives

Princeton University Plasma Physics Laboratory Controllers Office  
 Variance Analysis Report  
 Cprf:MAR Closing CurMth:03 CurFYr:93 Frozen:04/15/93 03:00:48  
 report VARIANCE(LIST) (Kdollars) Printed:04/15/93  
 \*\*\*\* Fiscal Year 93 only \*\*\*\*

	Cumulative To Date				through MAR FY93				Total at Completion		Er Cd
	Budgeted Cost	Actuals	Variance	ACWP	Sch Var	SPI	Cst Var	CPI	Total Budget	Est   Var	
1705 TRITIUM SYSTEMS DIVI											
TRIT TRIT SYS D-T	45	0	-45	32	.00	.00	.00	.00	123	124	-0 S
T9P0 TH PUMP & PIPING MODS	424	274	-150	356	.65	.82	.77	.77	424	550	-126 B
T9V0 QNS AND FUME HOOD MODIFICATION	144	96	-47	154	.67	.57	.63	.63	144	199	-55 B
T9A0 DESIGN/PROC/INST OF TRITIUM SY	122	93	-29	203	.76	.110	.46	.46	124	238	-114 C
T910 TRITIUM SYSTEM DOCUMENTATION	194	184	-9	287	.95	-102	.64	.64	195	339	-143 C
T920 TRITIUM SYSTEM HARDWARE CRECTN											
TRNG TRAINING	327	333	7	85	1.02	249	3.94	3.94	400	383	18 C
T9D0 TRAIN TRIT SUPERVISORS, OPER/TE											
1710 TFTR D-T TOKAMAK OPE											
CITF TOKAMAK FACILITIES (	152	143	-9	87	.94	55	1.64	1.64	174	112	61 C
TAKO SEISMIC QUALIFICATIONS											
TRIT TRITIUM SYSTEMS (DT)	136	29	-107	34	.21	-5	.85	.85	136	126	10 S
T9H0 D-T LECT SYSTEM MODS											
1715 VAC/ICRF D-T PREP											
CTOT TOK OPS DT UPGRADES	270	211	-59	290	.78	-79	.73	.73	295	361	-66 B
TAB0 TRITIUM GAS INJ. SYS (TGIS)	117	62	-55	84	.53	-22	.74	.74	129	130	-0 S
TAE0 DT VACUUM SYSTEM SUPPORT	169	129	-41	59	.76	70	2.20	2.20	196	196	0 B
TVD0 DIAGNOSTIC VACUUM SYSTEMS P&ID	232	199	-32	302	.86	-103	.66	.66	247	385	-138 C
TVE0 VACUUM EXHAUST DIAG/VENT DT MO	324	308	-16	171	.95	137	1.80	1.80	400	231	169 C
TVPO PLASMA EXHAUST PROCESSING SYST											
1720 TFTR D-T DIAGNOSTICS											
9T10 DT DIAGNOSTICS SYSTE	41	0	-41	1	.00	-1	.00	.00	41	41	-0 S
DTU0 GYROTRON CLOSEOUT											
9T30 MICROWAVE & ECE DIAG	351	233	-118	277	.66	-44	.84	.84	384	383	0 S
DTA0 2ND GRATING POLYCHROMATOR	107	58	-49	72	.54	-14	.81	.81	144	144	0 S
DTJ0 REM CAL MICHELSEN INTERFEROMET											
9T40 SPECTROSCOPY DIAGNOS	191	142	-49	120	.74	22	1.18	1.18	216	216	1 S
DTM0 CHERS RELO TO HOT CELL	265	145	-120	148	.55	-3	.98	.98	295	300	-5 S
DTL0 SPRED, VIPS DT PREP											
9T70 FUSION PROD. DIAGNOS	285	300	15	240	1.05	60	1.25	1.25	322	326	-4 C
DTLO ESCAP ALPHA PART SYS D-T PREP	279	76	-203	50	.27	27	1.54	1.54	291	292	-1 S
DTM0 HM SYSTEM DT PREP											

note: SEQ=DETAIL WP=YES JOB=YES LEVEL=0  
 :A star (\*) indicates the EAC was calculated from the CPI.  
 ErCd: B-Cost and Schedule thresholds exceeded S-Schedule thresholds exceeded C-Cost thresholds exceeded  
 :V-No variance thresholds exceeded  
 note: Cost and Sched thresholds tested only on records where the Variance is greater than or equal to 40000

Princeton University Plasma Physics Laboratory Controllers Office  
**VARIANCE ANALYSIS REPORT**  
 Cprf: MAY Closing CurMth: 05 CurFYr: 92 Frozen: 06/13/92 02:59:25  
 \*\*\*\* Fiscal Year 92 only \*\*\*\*

1710 TFTR D-T TOKAMAK OPE  
 TRIT TRITIUM SYSTEMS (DT)  
 T9CO D-T SYSTEMS HVAC MODS&OPS  
 Responsible Person: - CARNEVALE.H.

As of MAY 1992 Printed: 06/15/92 ( ) Initial Report (✓) Follow Up

**Cumulative Cost/Schedule Performance Data (Kdollars)**

Planned BCWS	Earned BCWP	Actual ACWP	Schedule Variance BCWP-BCWS	Cost Variance BCWP-ACWP
1415	749	1110	-666	-362
Budget: 1525	EAC: 2498	BudgetVar: -974	SPI: .53	CPI: .67

:A star (\*) indicates the EAC was calculated from the CPI.  
 \*\* COST AND SCHEDULE THRESHOLDS EXCEEDED \*\*

Prepared by Job Engineer:

Variance Description - (Cause and Impact)  
 ORIGINAL SCHEDULE CALLED FOR COMPLETION OF HVAC & ELEC MODS BY JUNE 1<sup>ST</sup>. DELAYS DUE TO ADDITIONAL SCOPE, PURCHASING MATERIALS AND LATE ARRIVAL OF CRAFT S/C HAVE SHIFTED COMPLETION TO ~ MID-JULY. INCREASES IN COST ARE DUE TO ADDITIONAL SCOPE. (SEE ATTACHED H.M.C)

Projected FY Expenditures : \$ 2500 K

Job to finish on Schedule?: No

Impact on Milestones: \_\_\_\_\_

Impact on other Jobs: \_\_\_\_\_

**Recommended Corrective Action Plans**

REVISE WAF TO REFLECT PLAN ON ATTACHED MEMO  
 MODS ARE PROGRESSING. EXPECTED FINISH IS MID-JULY  
 OVER TIME HAS BEEN AUTHORIZED TO EXPEDITE COMPLETION

He 6/16/92 RAH  
 Job Engineer Date Division Head Date

Prepared by CC Manager:

Directed Action

CARNEVALE TO SUBMIT REVISED WAF BY 6/19

Ed 6/17/92  
 Cost Ctr Manager Date

## **F. Change Management and Data Access**

### **F.1 Revisions**

Contractual changes authorized by DOE (through a given project's change control process) and changes due to contractor internal replanning will be incorporated into the system in a timely manner through the work authorization process. When the changes impact a cost account's schedule, work scope or budget a job revision will be processed to update the baseline. Job revisions will require the same approvals as those needed to initially authorize the job.

***Revisions not requiring management reserve*** - Each project is expected to manage their work scope within their approved budget. However, it is recognized that minor changes may occur during the fiscal year that require additional funds to complete the intended scope of an individual job. As such the PPPL Project Manager is given latitude to transfer budgets between jobs to better reflect the job's requirements. These transfers are not to be made to eliminate cost variances but to react to the normal maturity or evolution of the job's design development. All revisions to WAF's will be with respect to the baseline established for the project. The allocations or redistribution of funds between jobs requires WAF revisions for all affected jobs. The total bottom line budget for all WAF's will remain consistent with the established performance measurement baseline.

***Revisions requiring management reserve*** - Requests for management reserve will be prepared by the cognizant job manager (or Project Control Office) and will identify specific scope changes, justification, and cost & schedule impacts. These changes will be documented via the Engineering Change Proposal (ECP) or similar project specific change control process. Once the change is approved by project management the affected WAF(s) will be revised for approval and subsequent entry to the PCS Baseline. A log will be maintained by the Project Office which will identify all approved jobs which were allotted management reserve funds and the current balance.

***Revisions requiring DOE contingency*** - Prior to the beginning of the fiscal year (for multi-year projects) the PPPL Project Manager may request an appropriate amount of DOE contingency to be converted to management reserve. The DOE Project Manager (DOE-PM) will review this request against the project risk and authorize an allocation of all or some of these funds to Management Reserve under the control of the PPPL Project Manager. These funds will be held in a Management Reserve account (WAF) and distributed as described above. The DOE-PM will be notified when contingency funds are distributed. Any DOE held contingency funds not already allocated to management reserve by mid-year shall be considered for conversion to management reserve for funding of outyear tasks during the current fiscal year. Additionally, requests for contingency distribution above authorized amounts will require specific approval from the DOE-PM.

(see exhibit F-1-B Management Reserve WAF)

PRINCETON UNIVERSITY PLASMA PHYSICS LABORATORY CONTROLLER'S OFFICE  
 WORK COST ESTIMATE & APPROVAL FORM  
 BUDGET AMOUNTS SHOWN REFLECT DATA FROM 30/70 CARDS SUPPLIED  
 TITLE: TFTR PROJ MGMT RESERVE

REVISION DATE: 05/11/93  
 EST. COMP DATE: 09/30/94

REVISION DATE: 06/08/93  
 START DATE: 00/00/00

PERSON IN CHARGE: HAHRYLUK/BROWNING  
 DOCUMENT REQUESTOR: MEADE, D.

OFFICER: 1300  
 WORK-PACKAGE: MGRS  
 JOB-NUMBER: A000

MAJOR MILESTONES	DATE	TERSE TASK DESCRIPTION	PRIOR	93A C.R.*	93 EST.	FY 94	FY 95	TOTAL
START JOB NO EARLIER THAN	01DEC92	TFTR PROJECT MANAGEMENT RESERVE.						
INT RESERVE RESOURCES FOR FY93 (START)	01SEP93	A. TRANSFER TO 1390 - \$415.6K BL TILE REPAIR (1/93).						
END FY93	30SEP93	B. TRANSFER TO 1390 - \$122.3K COIL BAKEOUT (1/93).						
INT RESERVE RESOURCES FOR FY94 (START)	01SEP94	C. TRANSFER TO 1390 - \$220.0K T. MONITOR (FOXBORO SKID) (1/93).						
WISH JOB NO LATER THAN	30SEP94	D. TRANSFER TO 1335 - \$46.0K SHIFT SUPERVISOR STATION (1/93).						
		E. TRANSFER TO 1301 - \$78.6K LDI MODIFICATION (2/93).						
		F. TRANSFER TO 1345 - \$30.9K NB ENTRY PORT DESIGN (2/93).						
		G. TRANSFER TO 1710 - \$102.9K TFTR STACK BOOSTER FAN MOODS (2/93).						
		H. TRANSFER TO 1301 - \$119.1K ALPHA CHERS RELO & ALPHA CHERS DETECTOR SHLDG (2/93).						
		I. TRANSFER TO VARIOUS CC - \$753.3K TO OFFSET G&A RATE INCREASE FROM 52% TO 55.5% IN FY94 ONLY.						
		J. TRANSFER TO 1730 - \$208K TPI PHASE II FDR.						
		K. TRANSFER TO 1390 - \$44K DPI/MIRNOV SHIELDING.						
		L. (REV 3) ADDITIONAL OFE FUNDING RECEIVED.						
		M. (REV 4) TRANSFER TO 1390 - \$128K (RELOCATE PRESSURE TANK)						
		N. TRANSFER TO 1705 - \$123K (TM PUMP & PIPING MOODS)						
		O. (REV 5) TRANSFER TO VARIOUS CC \$535. K OVERTIME. (4/93)						
		P. (REV 6) TRANSFER TO 1705 - \$277.7K TRITIUM SYSTEMS 4/93						
		Q. TRANSFER TO 1710 - \$93K PENETRATION FILLING						
		R. (REV 7) TRANSFER TO 1705 - \$391K DESIGN T SYS (93)						
		S. TRANSFER TO 1349 - \$250K MG OPS/MAINT; AC POWER SUPPORT (93)						
		T. TRANSFER TO 1350 - \$98K CPC UPGR/TFTR SYS ENGR SPRT (93)						
		U. TRANSFER TO 1390 - \$177K TF STRUCT BOLT INSP; 20 COIL TF ALTERNATE COOLING (93)						
		V. TRANSFER TO 1392 - \$220K TRIT SYSTEM OPERATORS (93)						
		W. TRANSFER TO 1730 - \$283K NB LPTS - MECH UPGRADES (93)						
		X. (REV 8) TRANSFER \$618K EC 91/92 TO EC 39/62.						
COSTS BY FY(060893)			PRIOR	93A C.R.*	93 EST.	FY 94	FY 95	TOTAL
39 OTHER EXPENSE			00	00	402600	1413500	00	1816100
41 MATERIALS & SERVI			00	00	1092600	1810000	00	2902600
62 G&A ABSORBED			00	00	799932	1789043	00	2588975
91 CAPITAL EQUIPMENT			00	00	214000	00	00	214000
92 INDIRECT CAPT. EQ			00	00	42800	00	00	42800
TOTAL			00	00	2551932	5012543	00	7564475

PERSON RESPONSIBLE: *[Signature]*  
 REQUESTOR: *[Signature]*  
 SECTION HEAD: *[Signature]*

*E. Staloff*  
 6/10/93

\*ACTUALS, COMMITMENTS, REQUISITIONS

*[Handwritten signature]*

**F.2 Retroactive Change Prohibition**

There will be no retroactive changes to records pertaining to actual cost that will change previously reported amounts for direct costs except for correction of errors, routine accounting adjustments, or changes to indirect and burden rates.

**F.3 DOE Access to Data**

Standard PCS Cost Performance, Budget Analysis and Project Schedule Reports are provided to DOE-PG on a monthly basis. In addition, all PCS, Budget and Accounting reports are available in PPPL's central administrative computer system PPLCATS-PUBSYS.



## **G. Glossary of Terms**

ACV	At completion variance
ACWP	Actual Cost of Work Performed
BA	Budget Authority
BAC	Budget at Completion
BCWR	Budgeted Cost of Work Remaining
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BO	Budget Outlay
C/SCO	Cost and Schedule Control Office
CPI	Cost Performance Index
CV	Cost Variance
EAC	Estimate at Completion
ETC	Estimate to Complete
HOD	Home Organizational Demographic
VAR	Job Variance Analysis Report
LOE	Level of Effort
PG	Princeton Group (DOE)
PMB	Performance Measurement Baseline
PCS	Project Control System
PPPL	Princeton Plasma Physics Laboratory
PUBSYS	PPPL Public Financial Information System
SPI	Schedule Performance Index
SV	Schedule Variance
WAF	Work Authorization Form
WBS	Work Breakdown Structure