Conventional Systems Preliminary Review Committee Report
October 24, 1996

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Introduction:

On October 24th, 1996, at BNL, a committee reviewed the status of STAR Conventional Systems (CNV). The charge to the committee was to review CNV technical requirements, preliminary design, cost estimate and schedule for scope, feasibility and realism. An important element of the review was to determine if the cost estimate and budget were realistic considering the requirements, scope and interface definitions.

Executive Summary:

The committee concluded that while the requirements, scope and interfaces were not clearly presented, the AC Power distribution system, chilled water distribution and platforms were being designed appropriately. These elements require some last final input from the integration group but should be ready for a Final Design Review (FDR) shortly.

The other elements of CNV, the air distribution (ventilation) system within the detector, safety systems, access systems, etc. were at a much more preliminary stage of design and consequently need further work. The committee recommends that an aggressive effort be undertaken to identify all the key requirements and to develop schematics and preliminary designs so that a Preliminary Design Review (PDR) can be held on these elements at the time of the aforementioned FDR.

The committee recommends removing all identified (and all unidentified) contingency within the CNV budget. Furthermore, the committee found several elements of scope that need modification (both additions and deletions). From a preliminary analysis, the net affect of removing the identified contingency and making these scope modifications results in a budget of approximately $1.77M for CNV - a reduction of more than $700K from the plan presented.

All indications are that the CNV schedule is consistent with meeting the need dates from the installation plan. It is recommended that task logic (predecessors and successors) be added to the schedule and that the critical path be explicitly identified.

Scope and Interfaces:

During the presentation to the committee, interfaces were not explicitly presented; e.g., between CNV, the RHIC Project and BNL provided utilities and infrastructure and between CNV and other STAR subsystems. These interfaces should be documented by CNV and reviewed to assure that there are no holes.

The scope of CNV was not formally presented, but was touched upon as the various major elements were discussed. The committee noted a number of items related to scope that must be modified or corrected. These items are as follows:

1) The baseline quantity of racks should be 53; quantities of valves, radiators and water mats should be consistent with this.

2) The scope of WBS 4.9.1.2 (Air distribution) should be modified so as to include only "distributing air within the detector" and not "around the detector".

3) The 300KVA transformer should be replaced with an isolation transformer.
4) Power distribution throughout the AB and WAH should be removed.

5) One HSSD system and it's installation should be removed.

6) The scope and cost of implementing a hard-wired interlock system at a level above the subsystems interlocks should be added.

7) The electrical and safety systems component in the platform WBS is double counted.

8) In access systems, "platforms/scaffolds" vs "manlifts" should be investigated. Requirements should be sought out from the people who will install and maintain FEE.

9) The scope of "shop equipment" should be modified to include only a "light-tight", class 10,000ish clean-room.

Requirements and Design Status:

It was clear from the presentation that a defined set of requirements was used to develop the designs of the various parts of CNV. It would appear that the designs presented for CNV addressed the needs of the experiment. However, these requirements were not explicitly stated during the review. A clear definition is necessary for the review process, particularly since this could be one of the main means for communicating to the rest of the collaboration what is planned.

The status of the design of the AC power distribution (WBS 4.9.2) is fairly mature and well thought out. The last few changes to the schematic (1-lines) should be made so that the design of this element can be concluded. The water system requirements should be completed and locked so that the final schematic can be developed and detailed design begun. This will take some communication with the integration group to ensure timely completion. When these items complete the final design stage, the committee recommends that a Final Design Review occur for these 2 elements.

The platform system design specification (WBS 4.9.4) is also quite mature. It is understood, and endorsed by the committee, that the specification and RFP will be released to bid very shortly. Further review of the platforms will be part of the platform construction contract.

The remaining elements - the air circulation system, safety systems, access systems and shop equipment - are at the very preliminary or concept stage of design. It is recommended that further efforts be applied to these elements by CNV and Integration in order to advance them to a more mature state. When this has been accomplished, the committee recommends that a Preliminary Design Review of these elements take place.

Cost Estimate:

The Committee reviewed costs in the following areas (and with the following proposed budgets):

Mechanical Utilities	
MCWS	$193.5K
Detector conditioned air	$ 95.0K
Labor	$198.8K
Electrical Systems	
Facility clean power	$97.6K
Detector clean power	$230.0K
UPS	$0.0K
Emergency power	$11.0K
Signal Distribution System	$405.0K
Labor	$183.2K
Safety Systems	
Detection & Suppression	$144.0K
Labor	$ 68.4K
Platforms	
Procurement	$360.1K
Labor	$114.8K
Access Systems	$62.3K
Shop Equipment	$115.7K
Gray Area	$204.0K

The total cost as presented for CNV is $2,483.5K. This includes a contingency of 25% for most areas and EDIA costs where appropriate. The Committee had the following comments on cost for specific systems:

MCWS -

The cost included low conductivity water. It was not clear why LCW was needed. It was also noted that there was inconsistency in the quantities of valves, radiators and water mats. These numbers should be modified to reflect the baseline number of racks, defined as 53.

Facility Clean Power -

It was noted that the cost estimate may not have included the cost of replacing the 300KVA transformer with an isolation transformer. The scope and cost should be there, if not, the budget in this area should be increased by approximately $20K.

Detector Clean Power -

The cost of running the power from the substation was included. This boundary between RHIC/STAR should be investigated and explicitly defined. As it now stands, this scope should not be part of STAR. Removing this scope would reduce the budget in this area by approximately $50K.

UPS -

If individual subsystems define their UPS needs, it may be cost effective to install a central UPS system.

Emergency Power -
These requirements need to be defined.

Signal & DC Power Distribution -
Once again, the quantity of baseline racks should be 53, reducing the budget by $17K.

Safety Systems -
Better definition of needs have to be obtained before the cost can be evaluated. It was generally agreed that the cost of at least one HSSD system can be eliminated but that the cost of controls logic and hardware should be added. The fire suppression estimate should be reviewed further.

Platforms -
As Bruce noted, safety and electrical systems on the platforms is double counted. If this scope is removed, it would result in a possible $42K savings.

Shop Equipment -
It was acknowledged that much of the scope of shop equipment is really a duplicate of the shop equipment WBS item in Installation & Test. Further, after discussing some of the requirements of the clean room, it was generally agreed the budget for this element should be reduced from $115K to approximately $20K. A relatively simple cleanroom will be the only remaining scope.

To be consistent with the overall management plan, it was agreed that all contingency and gray area scope should be removed from the CNV budget. Additionally, the scope changes identified here and in Scope and Interfaces should be accounted for.

A preliminary estimate of removing the identified contingency and making the appropriate changes in scope result in a total cost for CNV of $1,770K (AY$). This is a reduction of $713K from the $2,483K presented at the review.

Schedule:

Of the scope of CNV tasks identified prior to this review, the schedule is consistent with the installation plan. There does not however seem to be any appreciable float in the schedule. One area of risk is the platform schedule. Due to the history of difficulties in reaching a consensus on this issue, if an executive decision is not made to freeze the design and this is open for more input, the schedule for the platforms could slip to critical. At this time, the platform procurement is 3 weeks behind schedule. Sufficient time has been provided in Phase 1 for design modifications.

An element not included in the schedule is the safety interlock system. This is a $50-100K and 6-9 month effort that needs to be incorporated and tracked. This may require more resources than are presently allocated.

In terms of the format of the schedule developed for CNV, it is recommended that predecessors and successors be added to individual tasks (i.e., the task logic be added to the schedule). It is also recommended that design, fabrication/procurement tasks (many of which are 1-3 years long) be divided up in order to determine if time and resources are

sufficient to finish them. Finally, it is recommended that the critical path be identified so that appropriate measures are taken to insure timely completion.

Appendix: Action Items (in review binder in project office)