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CABLING ISSUES

(Rev. 3/22/99)

Cabling issues identified to date include:

1. What is the best organizational structure for implementing SNS cabling? (i.e. "Who should do what")

2. What should we be doing now to optimize implementation of SNS cabling?

Approaches to addressing these issues are presented below.

Implementation Plan

The current proposal for implementation of cabling follows.

a) Design responsibility for cables goes with the system to which the cables belong. Some examples follow:

- The AE (conventional facilities) is responsible for AC power cables.
- Technical systems are responsible for "non-AC" power cables interconnecting their equipment, like magnet power, high voltage, and RF cables.
- Technical systems are responsible for their own signal cables.
- The AE (conventional facilities) is responsible for "communications infrastructure" cables, like telephone cables and network cabling for general use (network backbone, "wall plug" cabling, etc.).
- The AE (conventional facilities) is responsible for conventional-facility-related I&C cabling (e.g HVAC, cooling water, waste processing, and personnel protection I&C cabling).
- Global controls is responsible for network cabling between EPICS nodes and the network backbone.

This approach makes sense since it minimizes the design interface required.

b) The AE (conventional facilities) is responsible for design of cable raceways. Some raceways will be shared between systems, so we need a central authority to handle any combined requirements. Raceways must not interfere with other equipment, and the AE will have the best information on where other equipment is. Design of raceways is standard "conventional" stuff, so the AE is the logical choice to serve this integration function.

c) The Construction Manager will be responsible for installation of cables. This is a "no-brainer".

This strategy is consistent with what has been presented in the CDR and design manual since day one.

The current strategy does present one logistics problem: Ideally a completed cable design package would be handed over to the AE, who could then design the raceways. However, a complete cable design package should include cable routing instructions, which can't be prepared until the raceways are designed. This problem can be overcome by letting the AE handle cable routing. The AE is a good choice for handling cable routing anyway, since:

- The AE will likely have cable and raceway design tools that could be put to good use. (For example, a cable database system and/or automatic routing tools).
- If we have five different labs routing cables in the same raceways, it will be difficult to keep track of raceway utilization.
- Having the AE serve as a "clearing house" for cabling offers the possibility of standardizing on cable types.

The design interface between technical systems and the AE could work as follows:

- Fairly early in the project, the technical systems' should provide the AE with preliminary cable data to enable the design of a cable raceway infrastructure. (If the AE waits until he gets a complete cable design package before he starts raceway design, he won't have time to get the job done). This infrastructure (mostly cable trays and duct banks) will be over-sized to allow for errors in the preliminary data and for future expansion.

- The technical systems' designers will generate documents that specify numbers of cables, cable types, termination details, and the equipment the cables connect. A standard document format is desirable. To the extent possible, the designers should pick from a standard list of cables.

We could make this more rigorous if we wanted to: The specifications provided by the technical systems could be done in accordance with a cable plan developed by the A/E. This plan would include a list of approved cable types. This approved list should have cable types that will meet 90% of all requirements. Special cable types could be approved by a review process. Designers could use a standard specification form provided by the A/E. This form would include information such as cable type, signal-level category, length constraints, termination points, and other special information or constraints required to ensure the cable meets the needs of the user and that installation can be managed by the A/E.

- Technical systems' designers will interface with global controls to make sure signal cable terminations match.

- The technical systems' will hand over their cable design documents to the AE.

- The AE will enter the cable data into their cable and raceway design/management system. The AE will then generate cable routing and final raceway documentation.

- ORNL engineers will provide oversight of the AE's efforts and help with interface issues.

- At the end of the project, the AE will hand over a single, integrated set of cable documentation. (One can imagine a cable database system usable by operations and maintenance people).

"Design Optimization" Tasks

An effort should be made to select cabling standards and implementation methods. The following actions are proposed:

1. Assign responsibility

Assign a single person to be responsible for generating requirements and standards documents for cabling. (For now, call him/her the "cable tzar"). This person should be from WBS 1.8 conventional facilities ORNL electrical engineering oversight staff. Each STL could assign a single-point contact (call him/her the "lab cable person") for the cable tzar to interface with. Contacts should also include the AE and CM, since they need to be involved in the process.

The lab cable persons could later transition to an oversight roll during actual implementation of cabling (e.g. review raceway designs generated by the AE to make sure they meet that lab's requirements).

2. Write a cabling survey document.

To give the collaboration an idea of the scope of cabling issues, a survey of cabling requirements should be made. This task should be managed by the cable tzar. The survey should include for each SNS system:

Types of cable expected
Preferred implementation strategy ("Who should do what")
Preferred raceway architecture
Special problems expected: EMI sources, grounding requirements, etc.
Preferred connection/termination methods
Preferred labeling strategy
Plans for digitizing and multiplexing signals (fieldbuses, etc.)

This will be an informational document to share ideas and show areas of commonality.

3. Write a cable standards document.

Once the survey is completed, cabling standards and the implementation strategy should be selected. Again, this effort should be managed by the cable tzar. A workshop might be useful as a means of reaching a consensus. In the end, the standards and strategy selected should be documented in a standards document that can be signed off by STLs. This document must be signed off before Title II design begins so detailed design will be done according to the selected standards.

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