Date: March 14, 2003

To: Norbert Holtkamp

From: Tom Shea

Subject: **Fifth report of the LLRF Advisory Board**

Introduction

The following LLRF Advisory Board (LAB) members contributed to this report:
    Tom Shea (ORNL, Chairman)
    Curt Hovater (JLab)
    Mike Thuot (LANL)
    Coles Sibley (ORNL).

Assessment

Planning and budget: All materials required for the PCR have been delivered to the SNS project office. Team leaders from all participating labs still agree that the effort is adequately funded. Expenditures and resource requirements should be reviewed midyear to assure that each lab is spending according to plan and that funding for this fiscal year will support the aggressive development schedule.

Initial System: The LLRF team achieved a significant milestone this past month. An initial system was deployed at JLab and successfully controlled an SNS cryomodule. Demonstration of field and resonance control using feedback and feedforward shows the basic approach and technology will work. This is a good step towards reducing the LLRF risk to the project. The results should be analyzed to verify that field control can meet the SNS requirements. Open loop and closed loop data should be compared to the model. Experience from this test and from the recent front end operation can help refine the systems that will be deployed for DTL commissioning.

Ultimate system: The development of the production prototype is meeting a very aggressive schedule. All four components of the new field control module have been designed, and prototype fabrication has begun. These components are: the Digital Front End (DFE), the Analog Front End (AFE), the RF Output circuit (RFO), and the VXI motherboard. The first AFE has already been received by LANL. Some testing will depend on an additional, simplified DFE that allows the use of a PC-based test system from SNS Diagnostics. Due to the level of review that the four circuits received, the schedule and technical risk in this area remains manageable.

Software and Gate Array Development: The version 0.1 of the LLRF Control System FPGA Specification is a good start. It describes the first level of functional specification and begins to describe test plans. Further development is needed in these areas before new programmers can contribute. Performance specifications should be included in the test plan. The schedule requires functioning code for the ultimate hardware platform in about two months. We believe that there is still significant schedule risk in this area, but this could be mitigated by increased involvement of Larry Doolittle, who developed most of the code for the initial platform. Other team members would have to cover his support responsibilities for the initial systems at ORNL and JLab.

Recommendations

With increased involvement of Larry Doolittle, complete the detailed specification for the software and gate array code.

Document lessons learned during operation of the initial system at ORNL and JLab.

After the mid-year mark, review the burn rate of each lab's LLRF team.