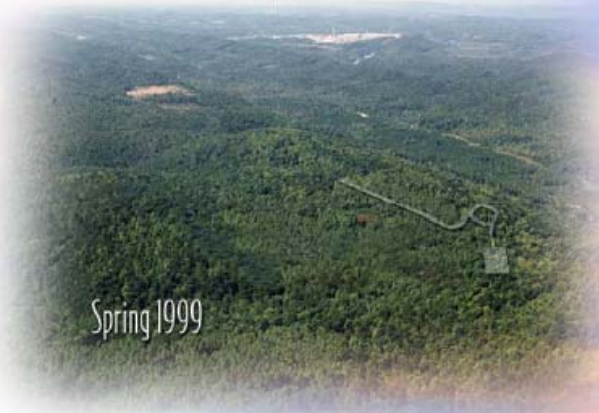
SNS 100000000-BL0005-R00

Spallation Neutron Source Project Completion Report



A U.S. Department of Energy Multilaboratory Project

SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Thomas Jefferson National Accelerator Facility • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

SNS

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10. KEY LESSONS LEARNED

Key lessons learned from the SNS project follow.

1. A clear mission need and program support are imperative.

High-cost projects will always be challenging, but it is essential that support from DOE-SC, Congress, and the scientific community never wavers.

1. **Build a strong, effective project management organization early**.

It is imperative that the project management team have a project (vs program) mentality. Although some managers may have success in building the mission need, it does not necessarily ensure success in execution. The transition from conceptual design to project execution must be considered when filling key roles. In addition, the project management team must consist of experienced professionals, project and team builders, chief schedule drivers, and communicators; these people must be able to plan the staffing transitions at the end of the project. Early establishment of effective project leadership will establish the right vision and will attract qualified staff. In addition, project leadership must have the authority to make decisions in a timely manner.

3. **Multilaboratory partnerships with clear responsibilities and centralized budget authority can be successfully used for new, big-scale projects.**

One of the keys to the success of the SNS was being able to use resources at partner labs, which extended the range of expertise and achieved a better product and allowed a slower, deliberate operations staff rampup. (see staffing chart in Appendix G). The success of a collaboration project in general, however, depends on the following:

- Strong leadership in the lead lab that will ultimately operate the facility. This is necessary to establish and enforce workable rules for collaborating, monitoring, and encouraging progress with all subprojects and for arriving at management decisions that equally respect the needs of the overall project and each of the subprojects.
- Technical expertise and strong systems integrator capability by the lead lab to manage integration and interfaces.
- Excellent communications between all partners with frequent and well-organized meetings, using state-of-the-art media technology.
- Strong support and commitment by the top management of each of the partner lab to accept institutional ownership and accountability, allocate adequate support (largely dedicated workforce), and help achieve project goals.
- A virtual single-site organization/approach; a structured agreement (memorandum of agreement) should be used to describe how the project will work.
- Influence by the lead lab on the partner labs' performance fee and key staff evaluations.

4. *Many* project management tools and processes are needed to manage project performance, but processes alone are not sufficient to effectively manage project performance.

Constant, unrelenting control of costs and scheduling using disciplined management systems is a must. This should include:

A. Maintaining and measuring against an aggressive schedule.
B. Planning work to fully use the annual budget authority.
C. Ensuring that the project's annual funding profile is appropriate from the beginning.
D. Obtaining competent, independent assessment and advice is imperative:

   i. using ad hoc reviews as needed for specific problems and
   ii. using routine, disciplined peer review processes on all aspects of the project. This ensures that lessons learned from other projects are routinely incorporated, and it is an excellent tool for understanding and managing risks and vulnerabilities.

E. Ensuring that vendor management is performed by experienced personnel.
F. Planning carefully, anticipating problems, actively managing changes, and staying on top of the details.
G. Keeping an eye on things such as EAC and risk; planning for known risks and unknowns to achieve performance objectives.
H. If a collaboration, managing contingency centrally; this is an important risk mitigation approach.
I. Establishing and incentivizing performance for risk minimization, such as incentive contracts (especially civil construction) and creation/retention of reserves by partners.

5. Planning for commissioning and operations should take place early.

Early planning for commissioning is needed to ensure cost estimates are within the TPC and to recruit operations staff. Additionally, the facility long-range upgrade strategy should be established early on between DOE and the Lab in enough detail to guide design decisions and facilitate future scope enhancements.

6. Innovative HR programs are key for successful recruiting and retention of staff.

During the early several years of the project, there were difficulties in recruiting candidates and securing rapid acceptance and relocation. Candidates perceived that the Project could be subject to cancellation and were unwilling to leave stable employment and/or to lose compensation including pay and/or benefits. The DOE-SC chartered a team, the Working Group, to develop a proposal for assisting SNS in recruiting. The team was composed of representatives from the Headquarters and Operations Offices and contractors with expertise in project management, compensation with expertise in variable pay plans, benefits with expertise in retirement plans, and recruiting. As a result, the DOE-SC director approved implementation of the SNS Project's Human Resources (HR) Working Group's recommendations which became known as the SNS HR toolkit. The toolkit included variable pay options, service-based benefits, and nonqualified tax-deferred retirement plan. SNS has experienced success in recruiting and retaining highly skilled staff to fill over 300 positions to date with an acceptance rate of about 85% and a turnover rate of about 4%. The SNS HR toolkit contributed to this success and effectively minimized issues associated with attracting highly qualified individuals to fill key positions. The toolkit use mitigated perceived differences in vacation and retirement benefits and eliminated the need to grant exceptions, base pay increases, and other actions that result in inequities. The cost impact of using these tools is negligible and in some cases recurring cost were avoided.

7. Safety requires the unrelenting attention and commitment of management and labor.

It is extremely important to place emphasis on a rigorous safety culture from the beginning. The safety program must be "Workforce friendly". SNS's approach to this included an on-site nurse's station for quick attention to work-related injuries which was also available for non-work related injuries. This helped maintain an environment that encouraged event reporting. Frequent "celebrations" were used to recognize workers with good safety performance. In addition, crafts participated in the Job Hazard Analyses and work process development.

The safety program must also be "Management driven". There must be a commitment from DOE, Laboratory management, the Construction Manager, and the subcontractors that safety is #1 priority. Actions by SNS included:

A. Only contractors with good safety records could bid.
B. "White Hat" oversight was utilized.
C. Safety inspections were made by the Construction Manager's corporate and insurance company.
D. A Master ES&H plan was used for all site work.
E. Precursor events were tracked and trended.

Specific lessons learned related to construction management can be found in the, *SNS Site Services Lessons Learned*, SNS 108010200-LL0001; specific lessons learned related to safety can be found in SNS 102000000-LL0001-R00, *Safety Lessons Learned for the Spallation Neutron Source*.