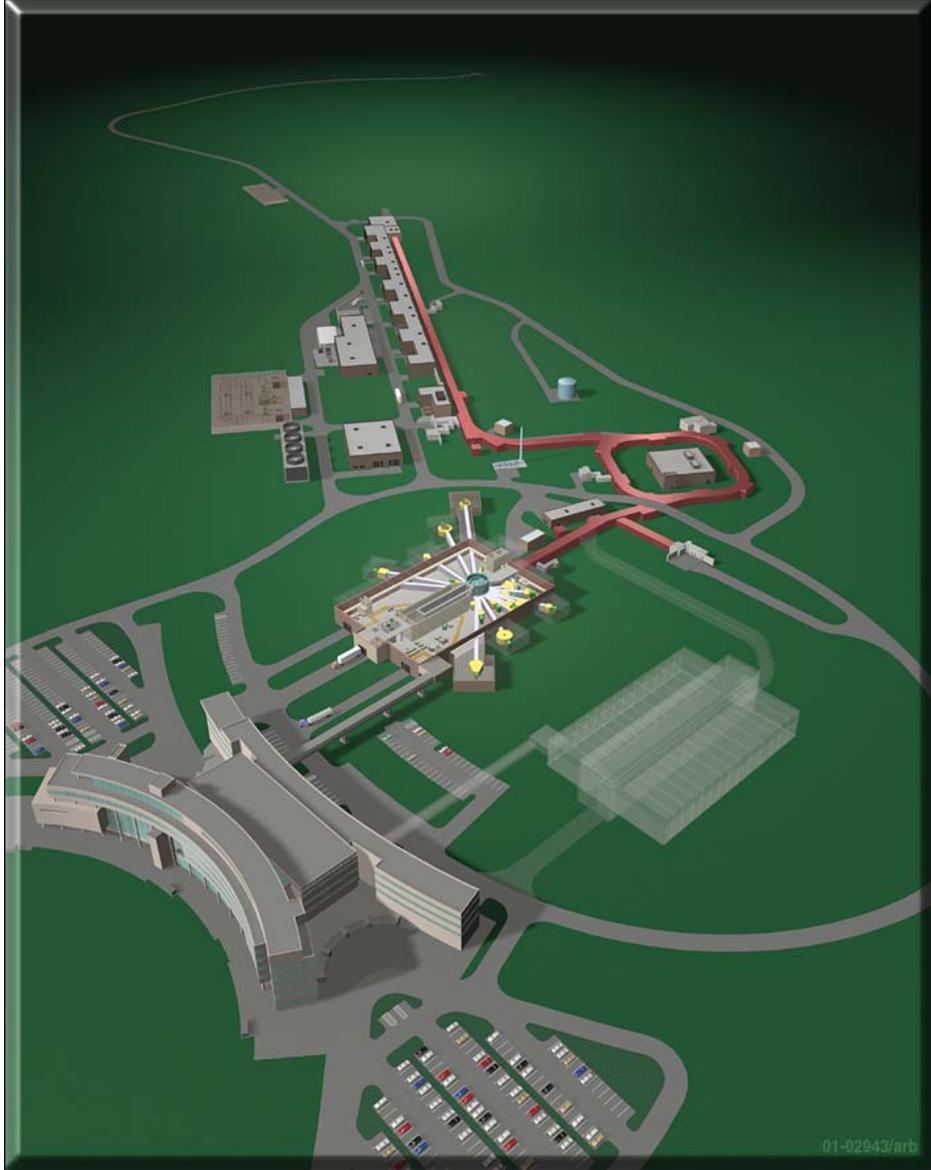


# Conventional Facilities Design and Construction Requirements for Instrument Development Teams (IDTs)



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

## **Conventional Facilities Design and Construction Requirements for Instrument Development Teams (IDTs)**

### Purpose:

The purpose of this document is to provide the standards to be used for designing and constructing facilities to house Instrument Development Teams (IDTs) neutron instruments on the SNS site.

### Background:

The SNS conventional facilities are currently under construction and the planned completion date is December 2004. This is being managed by the SNS Conventional Facilities Division (CFD), and the work is being performed by construction contractors, who are contracted to Knight/Jacobs, the projects Architect Engineer/Construction Manager (AE/CM) for the project. The construction of conventional facilities for IDTs will be managed by the SNS CFD. The construction will be performed by the AE/CM in a manner similar to SNS, until December 2004. After that time, CFD will contract independently for the construction of facilities.

Knight Associated Technology is the Architect Engineer partner of the Joint Venture and has provided the design for the conventional facilities, including the Target Building and Beamline Buildings 2TU and 11TU. Knight may be employed by the IDT developer for the design of future instrument buildings/enclosures, however, that is not a requirement. Whoever performs the design will be required to be consistent with the design and architectural approaches that Knight has employed. All design documents (drawings, specifications, and calculations) shall be sealed by a Professional Engineer registered in the state of Tennessee.

### CAD Design

All SNS design drawings have been prepared with CAD software AutoCAD 2000. The design of facilities for IDTs shall be performed using the same software. The AE shall prepare complete discipline based model files for each new instrument facility. Each new instrument facility will be divided into sectors for the creation of AutoCAD plot files (drawings). SNS will assign the sector designations for each new instrument facility and building numbers.

Names for all new model files and all new plot files will conform to the file naming convention established in the SNS CAD plan. Structure and format of all CAD files shall be in accordance with that specified in the SNS CAD plan.

### Design Reviews

The Conventional Facilities Division of SNS will review the designs for planned facilities to assure consistency of architectural approaches as well as design features. The developer of the IDT should submit their preliminary design for review. After the design process begins, the design should be submitted for approval at the 50% and 100% completion stages. The CAD drawing files submitted for review shall be submitted as Adobe Acrobat PDF files. The final design shall be submitted for record copy in a full set of model files and drawing files in AutoCAD 2000 native format.

At each review point, the IDT developer shall submit a detailed estimate for the construction work. Conventional Facilities will review this estimate and provide comments to the IDT developer. The intent is to develop a design, which does not exceed the budget.

#### Documentation Requirements

The documentation submitted shall comply with the SNS project records requirements outlined in SNS-IO-P01, Creation, Distribution, and Management of Spallation Neutron Source Records and the SNS Configuration Management Plan, 102010200-PC0002.

Submitted documentation shall include any information that documents configuration of the facility during construction and operational phases. This documentation must reflect the actual configuration of the buildings, equipment, and software at the time of turnover for operations. The documentation is to be sent to the SNS Document Control Center (DCC), 701 Scarboro, where the DCC staff will perform a quality check, index, and upload into the SNS information system, iMAN. Examples include design review documentation, drawings, design change notices, specifications, calculations, and procurement packages.

All records must be accurate, complete, and legible. All listed attachments and/or enclosures, and signed approval pages, as applicable, should be included. To the greatest extent feasible, documentation should be provided in an electronic format that can be converted to portable document format (pdf), version 4.05 or higher. Approved drawings, in paper format, with signatures and PE stamps, should be provided to the DCC at the time they are certified for construction.

#### Labor Standards Review

Work that is planned to be performed at SNS requires a Labor Standards review by the DOE Oak Ridge Operations Office. This review is to classify the work into construction work, technician work, maintenance work, etc. The IDT developer shall coordinate with his Conventional Facilities contact to prepare and submit the documentation to DOE. The work that is determined by DOE to be "construction" is the work that will be performed by the AE/CM if construction begins prior to January 2005.

#### Technical Requirements

Design and construction of all facilities to house IDT neutron instruments shall be in compliance with the SNS Standards for Design and Construction of the Target Facility (SNS 102030102ES0012-R0) and consistent with the System Requirements Document for the SNS Target Station and Beam Dumps Conventional Facilities (SNS 108030700-SR0001-R01) and the SNS Interface Control Document Interfacing WBS Elements 1.7 – Instrument Systems and 1.8 – Conventional Facilities (SNS 107000000-IC0001-R01).

General requirements include:

- Facilities shall meet the requirements for PC-2 structures in DOE STD 1020-94.
- The 1997 Standard Building Code (SBC) is the building code of record.
- Buildings and structures shall be made of noncombustible or fire resistive construction materials.
- The external skin of the facility shall be comprised of insulated metal panel of the same color and type as the Target Building or cast in place concrete.

- The roof shall be composite built-up roofing over metal decking.
- Access to any of the operations areas shall be appropriately controlled and monitored. Access from outside areas and other buildings to the main floor shall be controlled. For this purpose, any external structures housing neutron scattering instruments or associated neutron beam lines shall be considered to be part of the Target Building, with no access control barriers between such satellite buildings and the Target Building required.

#### Available Utilities/Services

The following utility systems are available in the Target Building and may be accessed by the IDT facilities:

- Electrical power system, including on-site backup AC power supply and uninterruptible power supply (UPS)
- Separate insulated/isolated instrumentation grounding system
- Addressable protected premises fire alarm system as a part of the site-wide SNS proprietary fire alarm system
- Communication systems to include telephone and public address
- "Backbone" fiber optics infrastructure for ICS and instrument networks
- Deionized (DI) water system
- Tower cooling water system
- Chilled water system
- Heating water system
- Process (non-potable) water system
- Sanitary waste system
- Potable water system
- Compressed air system
- Gas distribution systems for helium and nitrogen
- Instrument air distribution system
- Fire Suppression System inside the Target Building (a wet-pipe sprinkler system) that protects the zones that interface with or border the target cell or its structural and shielding components.

The IDT developer shall identify what utility systems are required, including the capacities needed. SNS will identify the tie-in locations. The IDT developer is responsible for the cost and installation of all connections and tie-ins with these systems.

The two instrument bays are serviced by a thirty-ton bridge cranes running longitudinally through the Target Building. The IDT developer will be allowed usage of these cranes, which must be scheduled with SNS.

#### Geotechnical Requirements

Seismic design shall be in accordance with the 1997 Uniform Building Code (UBC) and shall use the site-specific seismic response spectra in the Report of Phase III Geotechnical Exploration prepared by LAW Engineering and Environmental Services, Inc. and issued 6/30/2000.

Settlement/deflection of floors that support beam guides, instruments, and other alignment-critical equipment housed in external IDT facilities shall be within acceptable limits with regard to the target as defined by the SNS Interface Control Document Interfacing WBS Elements 17 – Instrument Systems and 1.8 – Conventional Facilities (SNS 107000000-IC0001-R01). The use of friction piles, deep piles, spread footers, or similar devices may be necessary.