G. IPNS-I Neutron-Scattering Facility, Experimental Requirements, J. R. Ball, ANL

The design of the IPNS-I neutron scattering facility is based on meeting the goals of the neutron-scattering program and other experimental needs to the maximum extent feasible. These goals can be categorized as:

- geometry and layout
- neutronics
- flexibility
- versatility.

The specific requirements in each of these areas will now be discussed in more detail:

1. Geometry and Layout

The facility shall be capable of supporting up to 12 scattering instruments simultaneously with neutron flight paths ranging from ~ 5 m to ~ 50 m. The 12 beam tubes should view the moderators at an angle $\geq \pm 45°$ from the forward direction of the proton beam. There should be a vertical neutron-beam tube looking at a dedicated ultracold moderator. For the base design, all moderators should be laid out in a "wing" geometry so that no scattering beam tube views the target directly. Equipment cavities should be provided in each horizontal beam tube, as close to the moderators as possible, for installation of choppers or other experimental components.

2. Neutronics

A design objective is to provide maximum peak neutron flux at the face of each moderator. The moderator neutron pulses shall exhibit a minimum of pulse broadening from external sources such as reflected neutrons and delayed target neutrons. Compromise between these incompatible requirements shall be made according to specific instrument requirements.

3. Flexibility

Although the base design calls for the moderators to be arranged in a "wing" geometry with respect to the target, the facility design should provide for changing the target/moderator configuration to a "slab" geometry for any or all of the horizontal moderators. It is recognized that such a change would constitute a major modification and therefore the facility need not be designed to provide this flexibility in routine operation. Provision

should be made for operating any or all moderators as cold (~ 20 °K) moderators with solid or liquid moderator materials. A desirable feature of the design would allow the target to be positioned axially with respect to the moderators to selectively peak the neutron flux to a given moderator.

3. Versatility

Capability to provide for experimental needs other than neutron scattering should be accommodated wherever feasible. Provision should be made for proton irradiation experiments. Additional multipurpose neutron beams should be accommodated as may be feasible. Such beam tubes may fall within the $\pm$ 45° forward direction sector. Thermal-neutron irradiation facilities ($\geq$ 2 inch inside diameter) with time averaged fluxes > 1×10^{12} $cm^{-2} \cdot s^{-2}$ should be provided where feasible.

H. Remote-Handling Considerations for IPNS-I, N. J. Swanson, ANL

The activities associated with the handling of radioactive materials for IPNS-I are divided into two distinct categories. These are: a) the proton synchrotron and its beam-transport system, and b) the target/moderator/reflector systems for the neutron sources.

For the accelerator systems no remote handling systems, per se, are to be used. However, techniques used for remote handling applications will be applied for particular devices. These techniques will be used to permit easy and quick removal of items anticipated to require replacement. Replacements may be needed due to malfunction or failure and for improvement purposes. Included will be the application of quick disconnects for electrical connections, control and monitoring equipment, vacuum seals, water cooling piping, mounting and positioning mechanisms, and other similar devices. Shadow shields will be used for direct contact approaches by maintenance personnel. The degree of application of special techniques will be related to susceptibility for change. For example, the extraction system magnet of the Rapid Cycling Synchrotron has displayed frequent failures and contributes to poor proton extraction efficiency. Frequent changing of this magnet is expected for an indefinite period. Air pallets may be employed to assist in the removal of heavy items such as magnets.

For the target/moderator/reflector systems, the designs will include features for easy removal into shielding casks. The removal system will be