R. Target/Moderator Optimization, M. Barbier, MITRE Corp.

Although the progress in pulsed-neutron source design has been remarkable, the target/moderator configuration is an area where work can be particularly rewarding. One hears talks of ever increasing proton beam currents and people today envision from hundreds of μA to tens of mA.

With the proton beam size growing, the target and cooling systems dimensions will increase and so will the distance at which one can place the moderators. At some point the neutron beam quality might not increase any more given the materials properties. With present-day technology, there could be an optimum reached with the best design depending only on the materials used. Finding whether this optimum exists and where it lies seems an important task. To achieve this one could:

- determine categories of users having similar needs in terms of beams
- optimize for each category according to particular needs such as brightness of source, angular resolution, time resolution, energy range, number of beams, or simply intensity
- include in the optimization process, target dimensions as well as moderator configuration.

This work will lead to the best target/moderator assemblies for the basic needs of the users community, and allow a determination as to whether there is a physical limitation in going to higher proton beam currents and target sizes, given by the neutron beam quality required.

S. Alternate Shielding Study for IPNS-I, M. Barbier, MITRE Corp.

The following considerations were used for this design study of the IPNS-I shield:

- make shield dismountable
- reduce iron volume
- absorb penumbra (radiation coming at a slant angle through beam tubes)
- make beam shutters adequate to absorb radiation coming from the target when in sight with slab geometry
- avoid having to pierce iron for choppers, equipment, filters, etc.

Figure II-S.1 shows the shield construction.

The iron was concentrated near the source, the shutters were incorporated in the neutron beam line shielding. The radiation scattered when the cascade neutrons hit the beam shutter is tertiary radiation, that is, low-energy; the cascade particles emitted in the 90° direction are low-energy with the most probably energy at 90° being 45 MeV. Also, the source strength is small (less than 10^{-6} of the cascade particles from the target).

The slots are a design suggestion to permit lowering equipment without piercing holes. They must be plugged with some iron on top of the equipment.

Figure II-S.2 shows the penumbra shield and beam gate when the target is below beam line. The penumbra shields consist of 1 ft. of iron slabs placed above (or below) the beam line, when the target is below (or above) it. They can be used as beam shutters when they are above, because beam shutters should always be lowered.

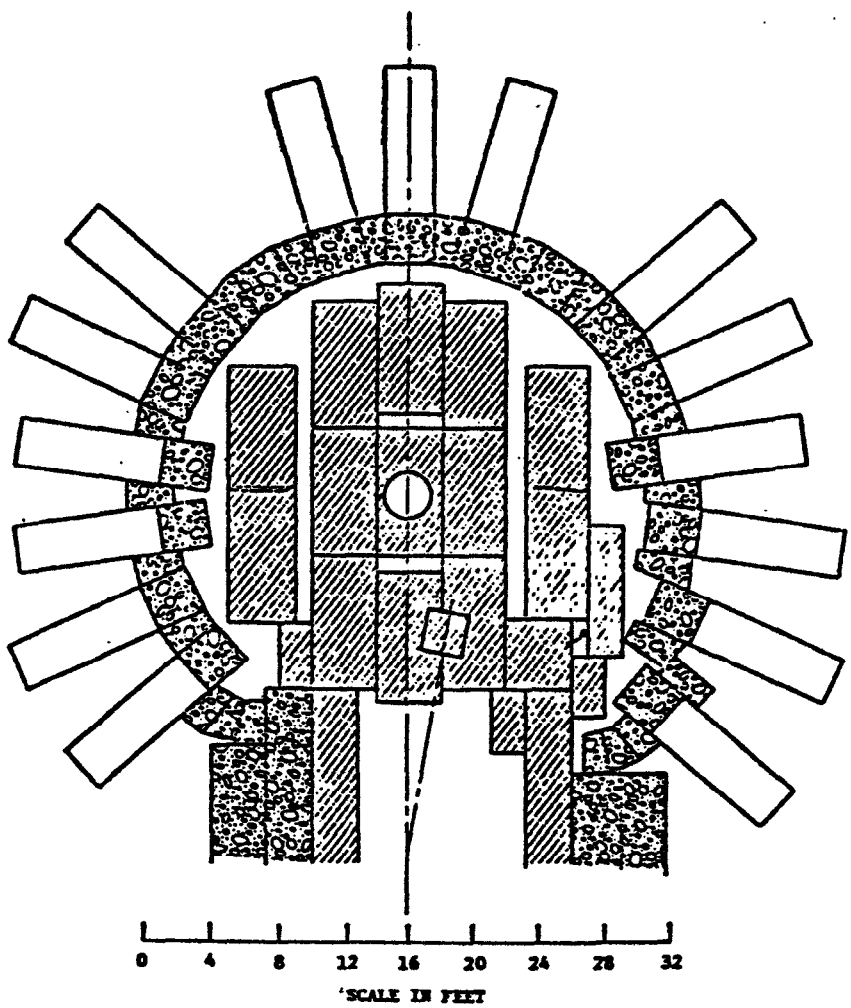

Fig. II-S.1. Alternate shield configuration for IPNS-I.

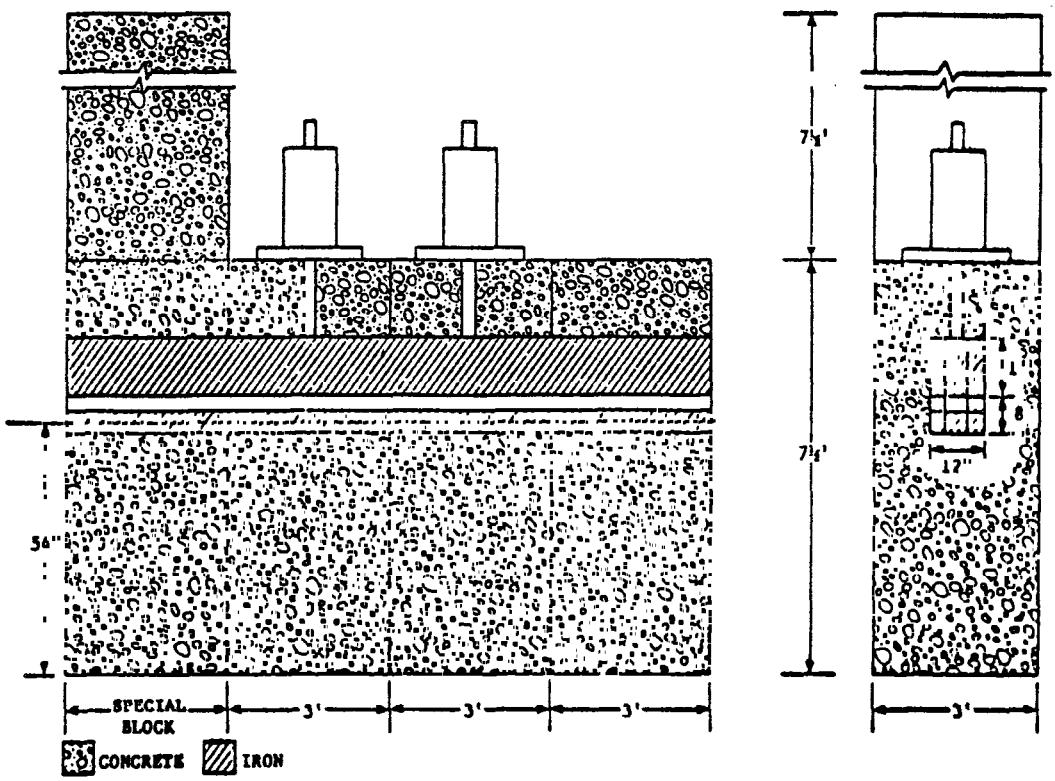

Fig. II-S.2. Penumbra shield and beam gate for the alternate IPNS-I shield configuration.