AbstractID: 14607 Title: Shielding-What do you need to tell your Vendors? How Mistakes Happen

Radiation Shielding Design: From concept to reality - without the mistakes! Shielding Design is a process which has inherent risks for mistakes. You, the designer must consider the needs of the facility, the space requirements for the equipment, the limitations of the available space, the shielding materials available, the cost of the solution, and the possibility of future changes. Your success in this process depends on your ability to communicate with the people whose experience will help identify the best solution.

Parameters: The parameters for the treatment room must be identified prior to calculating shielding barriers and then verified following the architectural design. These include applicable regulations, treatment modalities, patient workload, adjacent occupancies, machine energy(s), and permissible exposure levels. The parameters along with the proposed room layout and size are required to efficiently and accurately design the required attenuation in the radiation shield barriers.

Room Layout: A number of room layouts are available for you and the architect to choose from. Each of these options has unique implications on the use, space and cost of the treatment room. Traditional layouts incorporate radiation shield doors and include direct entry, maze entry, and the hybrid mini-maze entry. There are also layouts without doors which utilize either a specially configured maze or an extra long maze with an extra turn.

Material Options: Current radiation shielding materials include air, water, earth, concrete, steel, lead and neutron panels. Each material has unique attenuation properties specific to the energy and quality of the radiation source. Concrete is available in a variety of mixes which range from standard density (140-150 #/ft^3) all the way up to very high density (320 #/ft^3). Concrete may be either poured in place (PIP) or pre-cast into modular radiation shield block, which are available in a variety of shapes, sizes and density. The choice of material will directly impact the thickness of the radiation shield barriers and consequently, the space and cost required to construct.

Unique (and often overlooked) **Conditions:** Several details unique to the radiation treatment room require penetrating the shielding barrier. Maintaining shielding integrity at these penetrations is essential to the success of your design. Typical penetrations include the dosimetry pipe, openings for mechanical equipment, and the radiation shield door. Additionally, special attention is required where the building structure obstructs or prohibits the placement of shielding. Alternate materials or methods will need to be employed to prevent failure of the shielding integrity.

Summary: Mistakes can happen - but they need not happen to you. There is no "one size fits all" solution for these treatment rooms. Know your options, understand their

impact, and design the best radiation shielding solution for the facility, now and in the future.

Educational Objectives:

1. Gain knowledge of the process to develop a successful shielding design
2. Understand room layout options and their impact on the shielding design
3. Understand the material options available and their impact on the project
4. Recognize the risks and prepare for success