This experiment sought to determine through characterization, the most suitable thickness of MCP alloys that confer the most protection and shielding for patients when undergoing radiation therapy using cobalt 60 gamma irradiation. Different MCP alloys of different thickness were used; MCP alloy 1 is MCP-200, it is composed of 91% tin and 9% zinc. MCP alloy 2 is MCP-150; it is a non-eutectic alloy of Bismuth and Tin. MCP alloy 3 is MCP-137; it is a non-eutectic alloy of Bismuth and Tin. The linear attenuation coefficient and buildup factor are a few of the important characteristics that need to be studied and determined prior to using a material clinically in radiation treatment and protection. The linear attenuation coefficient and buildup factor, as well as several other properties, will be determined for MCP-200 alloy to assess its use in radiation therapy. A narrow collimated beam of γ-rays from sources with varying energies will pass through various thicknesses of MCP-200 alloy. The attenuation in the intensity of the beam will be determined for each varying thickness of the alloy. Plotting the thickness of the alloy versus the corresponding logarithmic intensity of the beam will allow calculation of the linear attenuation coefficient.

The narrow beam geometry will then be replaced by the broad beam geometry to
determine the buildup factor. Additional radiation is obtained through the broad beam geometry as a result of scattering and secondary radiation. Comparing the broad beam geometry to the narrow beam geometry allows determination of the buildup factor. Since the buildup factor depends upon the thickness of the MCP-200 attenuator, the energy of the beam, and the source-to-attenuator (STA) distance, it will be calculated using three parameters. It will be calculated as a function of thickness of MCP-200 alloy by using various thicknesses of the alloy; as a function of the energy of the incident radiation beam by using several sources with different beam energies; and finally, as a function of the source-to-attenuator distance by changing the position of the MCP-200 attenuators.