BNCT is a binary system that, in theory, should selectively deliver lethal, high-LET radiation to tumor cells infiltrating normal tissues. Most of the radiation dose originates from $^{10}B(n, \alpha)^{7}Li$ reaction and is confined to the tumor cells containing sufficiently high concentration of ^{10}B and exposed to thermal neutrons. Nevertheless, radiation dose deposited in normal tissue by gamma and fast neutron contamination of the neutron beam, as well as neutron capture in nitrogen, hydrogen, and in boron present in blood and normal cells, limits the dose delivered to the tumor cells. It is, therefore, imperative for the success of BNCT to optimize the irradiation geometry and to limit the volume of normal tissue exposed to thermal neutrons. As of February 23, 1998, 38 glioblastoma multiforme patients received BNCT under several treatment protocols at the Brookhaven Medical Research Reactor. Single- or double-field irradiations were applied depending upon location and depth of the tumor. The peak of thermal neutron flux from ipsilateral beam was localized in the tumor volume. For larger tumors, a second field was used, which increased the neuron flux in the deepest parts of the target volume (tumor + 2 cm). In order to spare the contralateral hemisphere where the presence of infiltrating tumor cells is less probable, the combinations of ipsilateralalateral, posterior, and superior, rather than opposed lateral, fields were used in most cases.