A negative hydrogen ion beam injection scheme has been known to be effective for cycling acceleration and beam storage to realize a high-energy and high-intensity proton beam. The material and thickness of a stripping foil in this scheme should be chosen paying careful attention to the charge exchange efficiency, robustness against heat load and mechanical strength, as well as the degradation of beam quality through the foil passage. The activation of surrounding structures and that of the foil itself are another big concern, because they limit the access to the machine and allowed working time for maintenance. Possible causes of activation are: (a) activations of surrounding structures induced by a proton beam skirt due to the foil passage, (b) activation of surrounding structures induced by neutrons/protons produced in the foil, and/or, (c) activation of the foil itself induced by beam protons.

The 3-GeV RCS (Rapid cycling Synchrotron) in J-PARC uses a Hybrid type thick Boron-doped Carbon (HBC) stripping foil [1, 2]. In the present work, possible nuclear reactions in the foil, and the production of a proton beam skirt due to the multiple elastic scattering in the foil and the foil supporting structures are evaluated. The ACAT (Atomic Collisions in Amorphous Target) code [3] has been modified through extending the capability to calculate multiple collisions in the HBC foil up to RCS proton energy. The effect of SiC fibers supporting the HBC foil also has been included. The results of gamma-ray spectroscopic measurement from the activated components are compared with evaluation obtained from the ACAT calculation including nuclear reactions in the HBC foil and surrounding materials.