Experimental determination of the overall perturbation correction factor for the NACP chamber in electron beams at depths greater than d_{max}

Current dosimetry protocols recommend using parallel-plate ionization chambers for electron beam output calibrations at d_{max}. The new TG-51 protocol uses a new reference depth for electron beam calibrations that is beyond d_{max} which is in a region of dose gradient for energies greater than 12 MeV. The overall perturbation correction factor, p_q, is defined as the product of the replacement correction factor, P_{repl}, and the wall correction factor, P_{wall}. Although p_q is known at d_{max}, there are little data available for it at depths beyond d_{max}. This correction factor was obtained for the NACP parallel-plate ionization chamber by intercomparing measurements made with this chamber and with a diamond detector[1] at incident electron energies of 12, 16 and 20 MeV at depths near the 90, 80 and 50 % of dose maximum. Our results show that p_q is unity within the experimental uncertainties for mean energies at depths from 2 to 18 MeV and percentage depth-dose gradients ranging from 0 to 3.5 %/mm. We recently published measurements of p_q at similar depths for the Markus, Attix and Farmer chambers relative to the NACP chamber for which we assumed p_q to be unity.[2] This work confirms our assumption. Our results along with an error analysis will be presented.

[1] PTW Type 60003
[2] C.S. Reft and F.T. Kuchnir, Med. Phys. **26**, 208 (1999)