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## Effects of Surface Paint Coatings on <sup>232</sup>Th Surface Contamination Detection

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In conducting surface contamination measurements, the efficiency for measurement is highly dependent on surface conditions – surface depth of contamination and surface coatings. A common coating encountered for building surfaces is paint. Paint coatings can cause significant attenuation of the electron fluence from the surface, thereby reducing the overall detection efficiency. A study was conducted using paint samples from a <sup>232</sup>Th decommissioning project to evaluate electron attenuation for paint coating of varying thicknesses and to determine the overall effect on detector efficiency for thin window gas flow detectors. For 53 mg/cm<sup>2</sup> paint density thickness, the source efficiency for the <sup>232</sup>Th decay decreased by a factor of 4.0. For 103 mg/cm<sup>2</sup>, the reduction was a factor of 6.5; and for 174 mg/cm<sup>2</sup>, the reduction was a factor of 11. The relatively minor decrease between 50 and 100 mg/cm<sup>2</sup> density thickness appears to reflect the attenuation of essentially all low energy electrons at 50 mg/cm<sup>2</sup> and the higher penetrating factor for the remaining higher energy electrons. In summary, for <sup>232</sup>Th surface contamination and paint density thickness exceeding a few 10's of mg/cm<sup>2</sup>, the electron attenuation can be significant; the reduction the source efficiency could jeopardize the ability for detecting low levels of <sup>232</sup>Th (decay product) radioactivity under painted surfaces. The results of this study were compared with those performed by ORISE as presented in NUREG-1507. From these data, a correlation was developed between electron energy, paint thickness and detector efficiency. This correlation provides a basis for establishing acceptance criteria for conducting characterization and final status surveys for painted surfaces in keeping with established DCGL's, considering detector efficiency as a function of the contamination electron energy and paint thickness.

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