

FROM THE EDITOR

CARBON-14 PRODUCTION IN AIRPORT SECURITY DEVICES

A few of our colleagues, upon receiving a radiocarbon date younger than they expected, have wondered if X-rays in airport security devices might have increased their ^{14}C content. Unfortunately for them, our colleagues have been forced to find alternate explanations for the uncooperative dates. Airport X-rays simply cannot produce ^{14}C . However, a new security technology is almost ready for installation at Kennedy Airport for some international flights, and, according to the Wall Street Journal, 100 additional units are planned for other high-risk airports. The new device will detect high concentrations of nitrogen (a component in explosives) by thermal neutron activation (TNA). Since TNA on a global scale is the process by which nature produces virtually all ^{14}C in the atmosphere, some ^{14}C must be produced in high-nitrogen materials, such as bones, as they pass through a neutron activation airport security device. The question important to the radiocarbon dating community is how much effect can the ^{14}C thus produced have on the ^{14}C date?

According to Peter Ryge, of Science Applications International Corporation (SAIC), in Santa Clara, California, one pass through this TNA security device, developed by SAIC, will produce a maximum of 3.6×10^{-12} μCi (8.0×10^{-6} disintegrations per minute (dpm)) of ^{14}C in one gram of nitrogen. This is equivalent to adding about $3.4 \times 10^{+5}$ atoms of ^{14}C . In terms of calculated effects on actual samples, 10 grams of carbon from bone protein containing about 1 gram of nitrogen for every 3 grams of carbon, could thus increase its ^{14}C activity by 7.2×10^{-4} dpm (add $3 \times 10^{+6}$ atoms) in 3 passes through the airport nitrogen detector. This is 3 orders of magnitude below detection limit of virtually all radiocarbon dating systems. A bone specimen originally containing "no" ^{14}C before neutron activation, would acquire a hypothetical ^{14}C age of 116,000 years. Clearly, the airport nitrogen detector, with expected routine use, would have no measurable effect on the ^{14}C age of samples intended for dating. So goes another potential explanation for spurious dates.

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