**DEPARTMENT OF THE AIR FORCE**
AIR FORCE INSTITUTE FOR OPERATIONAL HEALTH (AFMC)
BROOKS CITY-BASE TEXAS

14 April 2006

MEMORANDUM FOR AFMOA/SGPB
170 LUKE AVENUE
BOLLING AFB DC 20332-5113

FROM: AFIOH/SDR
2350 Gillingham Drive
Brooks City-Base TX 78235-5103

SUBJECT: Consultative Letter, IOH-SD-BR-CL-2006-0037, ADM-300 "E" Kit (Cs-137/ Th-232 Check Sources) Certification

1. Introduction: The Air Force Institute for Operational Health (AFIOH) has been requested to evaluate whether the ADM-300 "E" kits require commercial recertification. A review of applicable American National Standards Institute (ANSI)[1] and Air Force standards indicate the kits do not require commercial recertification. The manufacturer (Nuclear Research Corporation, bought out by Canberra, Inc) and the equipment item manager (311 HSG/TAO) have been consulted as well to ensure all instrument specific concerns have been addressed. The check source kits are designed to ensure proper operation of the ADM-300, not as a National Institute of Standards and Technology (NIST) traceable calibration. This letter provides guidance for users to calculate acceptable response values for instruments in the ADM-300 kits.

2. Background: When the Air Force purchased the ADM-300 for use as the standard radiation and contamination monitoring instrument, they also purchased check sources to verify the instrument will operate properly prior to being used. The sources consisted of a nominal activity Cs-137 (~ 8 Ci) point source encapsulated in epoxy and a nominal activity Th-232 (~ 30 nCi) source. These source activities are **not** NIST traceable. The manufacturer compared typical response values for the internal Geiger-Mueller (G-M) detector and the BP-100 probe with the Cs-137 source and the XP-100 and AP-100 probes to the Th-232 sources. The manufacturer also extrapolated the typical response values in the future. Cs-137 source was decayed using its radiological half-life while the Th-232 values did not change due to its long half-life. The extrapolated dates on the sources are now starting to expire.

3. Recommendations:

a. Inspect sources: Visually inspect sources. If damage or extreme wear is observed or the instrument response is outside the acceptable range for a recently calibrated instrument, contact

1. N323a-1997, paragraph 4.2.1.1.

Distribution: Approved for public release; distribution unlimited.

your Installation Radiation Safety Officer to obtain a swipe of the Cs-137 source and wipe the perimeter of the Th-232 source. Do not wipe the active area of the Th-232 source. Your installation radiation safety officer (RSO) should submit the swipe(s) to AFIOH/SDRR for analysis. If detectable activity is present, your Installation RSO will advise you on appropriate contamination control procedures, such as placing the source in a bag and securing the source for proper disposition.

b. Internal G-M and BP-100: If the source dates on the lid of the kit are still current, no additional action is required. If the dates are expired, use the correction factor of 0.933 to account for the radioactive decay of the Cs-137 to get the value of the next range of three years on the check source chart.

Example: If the last date range is 2003-2005, multiply each of the last acceptable values by the 0.933 correction factor to get the range for years 2006-2008. This simple calculation can be repeated again for 2009-2011.

Internal G-M
Upper value = 4.31 mR/hr * 0.933 = 4.02 mR/hr
Lower value = 3.29 mR/hr * 0.933 = 3.07 mR/hr

BP-100
Upper value = 90.1 Kcpm * 0.933 = 84.1 Kcpm
Lower value = 60.6 Kcpm * 0.933 = 56.5 Kcpm

c. AP-100 and XP-100: No decay is required for the Th-232 check source due to its long half-life. Upon receipt from calibration, each AP-100 and XP-100 detector should be placed against the Th-232 source per the manufacturer's response check instructions. The user should calculate acceptable response values for those probes at that time. Acceptable values are $\pm$ 20% [1]. To calculate this value, multiply the source activity by 0.8 for the lower acceptable value and multiply the source activity by 1.2 for the upper acceptable value. Document each detector specific acceptable response values with calibration records and with the detector.

Example: The AP-100 indicates 6.4 Kcpm when placed on the Th-232 check source.

AP-100
Upper value = 6.4 Kcpm * 1.2 = 7.68 Kcpm
Lower value = 6.4 Kcpm * 0.8 = 5.12 Kcpm

4. Although this procedure has not yet been incorporated into Technical Order 11H2-2-31, *ADM-300A Survey Meter and ADM-300A Radiological Assessment Kits*, this procedure has been coordinated with HSG/TAO, AFCESA/CEXR, and to ensure consistent guidance to all Air Force ADM-300 system users.

5. If you have any comments or questions concerning this letter, please contact your Installation RSO or Capt Krystyn Clark at DSN 240-4297 or by e-mail at krystyn.clark@brooks.af.mil.

//signed//

SCOTT M. NICHELSON, Lt Col, USAF, BSC, CHP, CIH
Chief, Radiation Surveillance Division

cc: AFCESA/CEXR
HSG/TAO/TASS
AFMOA/SGPR