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National Institute of Standards and Technology
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October 3, 2008

John Jankovich, Ph. D.
U.S. Nuclear Regulatory Commission
Office of Federal and State Materials and Environmental Management Programs (FSME)
11555 Rockville Pike, MS T-8E24
Washington DC, 20852

7/31/08
73 FR 44780
46

Dear Dr. John Jankovich,

Thank you for providing NIST the opportunity to discuss the impact on the use of ^{137}Cs irradiators for instrument calibration facilities at the recent public meeting on the Security and Continued Use of Cesium-137 Chloride Sources held on September 29 and September 30, 2008.

Since the period for public comments, requested by the NRC, has been extended until October 15, 2008, we would like to attach this additional letter to the official document sent from NIST to the NRC addressed to Mr. Robert Lewis dated August 25, 2008. These additional comments take into account the extensive discussions held at the public meeting.

As was quite clearly stated at the meeting from the single manufacturer of CsCl sources in the world (PA Mayak) and manufacturers of ^{137}Cs irradiators and x-ray machines (J.L. Shepherd, Hopewell Designs, Best Theratronics, and Rad Source Technologies), absolutely no alternatives to ^{137}Cs for calibrating instruments exist at the present time.

During the panel addressing issue 3.1 from the Federal Register on Potential Rulemaking Issues, which met the morning of Tuesday September 30th, NIST briefly presented the impact of the potential loss of access to ^{137}Cs for instrument calibrations. NIST explained that the aspect that makes ^{137}Cs particularly critical for calibrating instruments is the characteristic gamma-ray energy of 662 keV emitted by this radioactive isotope. NIST explicitly stated that ^{60}Co cannot be used as a replacement since the mean energy of the gamma-rays emitted by this isotope, 1.25 MeV, differs considerably from the energy needed for instrument calibrations. The x-ray machines available today provide mean energies in the 200 keV range, much lower than those from cesium-137. In addition, the energy spectrum of x rays is much broader than that from ^{137}Cs and, therefore, not suitable for a single energy calibration.

The facts described by NIST, for which ^{137}Cs sources with activities up to 1200 Ci are indispensable for instrument calibration at calibration facilities nationwide, were supported by several additional speakers including: a manufacturer of detector instruments (Fluke Biomedical), Nuclear Power (Constellation Energy), the U.S. Army, private calibration facilities (RSCS), manufacturer of Cs-137 calibrators (J.L. Shepherd and Hopewell), etc…

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As mentioned at the meeting, the activities that are needed for calibrating instruments generally do not exceed 1200 Ci.

It became absolutely clear at the meeting that there are no alternative technologies currently available that can provide photons with an energy spectrum similar to that of ^{137}Cs. Furthermore, it became quite apparent that no near-term future alternatives are likely to become available. Dr. Alloy from the Mayak plant, was quite explicit in saying that although a scientific approach exists for developing other forms of ^{137}Cs, it is not evident that this scientific approach will eventually materialize into a technology that will allow the development of sources with activities that are needed for instrument calibrations (~1000 Ci). He explained that the process may prove to be unsafe and that development may not be possible. *Based on these and other comments held at the meeting, it is clear that any statement relying on future alternative forms of cesium is, at this point in time, only speculation.*

According to the speaker from Reviss, the initial, best guess for the timeline to develop a new technology was 2 to 5 years. However, this was followed by the scientist from the Mayak production plant and others with words of caution that the process involved in developing this new form of ^{137}Cs with higher activities could prove to be unsafe. Furthermore, Dr. Connell from Sandia National Lab added that, even if the new form of ^{137}Cs proposed by Reviss (glass-based ^{137}Cs) would become available, such a formulation would still not meet all the requirements to assure public safety and deter terrorists from acquiring radioactive cesium. The proposed new form of ^{137}Cs is insoluble (as opposed to CsCl which is soluble), but would still be dispersible.

In conclusion, to assume that in 10 years the U.S. will have a new form of ^{137}Cs to replace the current ^{137}Cs irradiators built with CsCl, and that a new standard for radiation dose will exist nationwide to calibrate instruments, is only a wild guess and speculation at this time.

To reiterate what was mentioned by several in the instrument calibration field at the meeting, if a ruling were to be made to eliminate the use of radioactive CsCl sources (with activities at or below 1200 Ci) based on an assumption that, some day, an alternative form of ^{137}Cs *may* become available, the result will be catastrophic to the nation. If alternatives were to prove to be unsuitable (very plausible based on many comments heard), there would be no source of the gamma-rays needed to calibrate radiation detector instruments. As a result, users of these instruments (including personnel in the Army, Navy, Air Force, Coast Guards, Custom and Border Patrols, Emergency Responders such as firefighters and police department, radiation workers at power plants, hospitals, clinics, HAZMAT teams, etc.) would no longer be able to perform their duties to ensure radiation safety for the public. This would be catastrophic and could have devastating consequences. The probability of this happening would be much higher than a person trying to obtain a radioactive CsCl source from a highly secured area (such as, for example, an Army facility, nuclear power plant or Federal facility) where most calibration facilities are currently located.

Based on the topics discussed extensively at the meeting, we recommend that any ruling towards eliminating the use of radioactive CsCl sources needed exclusively for instrument calibrations (activities up to 1200 Ci) be avoided and we recommend that the NRC continue to license the use of CsCl sources up to 1200 Ci for instrument calibrations. Regarding issue 3.3 of the Federal Register notice on "Government Incentives," we recommend that the government provide incentives to research alternative technologies. However, we discourage any type of incentives towards shifting users and manufacturers away from CsCl sources, used for instrument calibrations, at this time.

We hope that this letter, together with our previous letter send to NRC addressed to Mr. Robert Lewis dated August 25, 2008, helps in the decisions involved on this critical issue. Please do not hesitate to contact us if we can help in any way, including participation at any future meetings or potential task groups that may be formed to address this critical matter.

Sincerely,

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Attachment enclosed:
NIST official letter sent to NRC dated August 25, 2008 addressed to Mr. Robert Lewis.

Cc:
Dr. Charles Miller, Director, Office of Federal and State Materials and Environmental Management Programs (FSME), U.S. NRC.
Dr. Michael Lesar, Chief, Rulemaking Directives and Editing Branch, U.S. NRC.
Dr. Cynthia Jones, Sr. Technical Advisor for Nuclear Security, U.S. NRC.
Mr. Robert J. Lewis, Director, Division of Materials Safety & State Agreements, U.S. NRC.