MEETING OF THE
ADVISORY COMMITTEE ON THE
MEDICAL USES OF ISOTOPES

April 28-29, 2008

MEETING SUMMARY

PURPOSE: To discuss issues related to the implementation of the medical regulations in 10 CFR Part 35, "Medical Use of Byproduct Material."

OUTCOME: The Nuclear Regulatory Commission (NRC) staff gained a better understanding of the views and opinions of the Advisory Committee on the Medical Uses of Isotopes (ACMUI), as well as other stakeholders' views and opinions. The staff will consider these views in its continuing effort to make 10 CFR Part 35 more useful, practical, and not overly burdensome on licensees, while maintaining public health and safety.

MONDAY, APRIL 28, 2008

PET RADIOPHARMACEUTICAL PRODUCTION

Ms. Sally Schwarz, ACMUI, provided an overview of clinical positron-emission tomography (PET) production at Washington University in St. Louis (WUSTL). Ms. Schwarz described the different cyclotrons at WUSTL and their functions. Ms. Schwarz also discussed the safety procedures, quality controls, and transport systems used for radionuclides produced at WUSTL. Radionuclides discussed included fluorine-18, oxygen-15, and carbon-11. Ms. Schwarz answered several questions about the WUSTL cyclotrons and the various uses of radionuclides at the facility asked by ACMUI members.

Dr. Charles Miller, Director, Office of Federal and State Materials and Environmental Management Programs (FSME), presented Ms. Schwarz with a certificate of appreciation and recognized her hard work and dedication on the ACMUI over the past eight years.

OLD BUSINESS

Ms. Ashley Tull, NRC, provided updates on the status of the 51 recommendations, action items, and motions from ACMUI meetings held in 2007.

ACMUI made subsequent motions after discussing NRC's action for Motion (10) from 2007. Motion (10) stated that NRC staff should allow more than one Radiation Safety Officer (RSO) on a medical use license with a designation of one RSO as the individual in charge. NRC staff determined this was not allowable under current regulations.

ITEM (1): NRC staff should provide the basis for the decision to only allow one RSO per license.

NRC staff provided the requested documentation during the meeting the next day.

ITEM (2): NRC staff should pursue rulemaking to allow more than one RSO on a medical use license with the indication of one RSO as the individual in charge.

The motion passed unanimously.

ACMUI offered another follow-up motion after discussing Motion (33) from 2007. Motion (33) was made in response to NRC's proposed revision to 10 CFR 35.75 to read "5 mSv/**year** (0.5 rem/**year**)." ACMUI did not support this revision; however, NRC staff is issuing a Regulatory Issue Summary stating staff's position that staff is moving forward with rulemaking to ensure alignment with NRC's original intent.

ITEM (3): NRC staff should promptly notify ACMUI members in a separate memo when an ACMUI recommendation is not accepted.

The motion passed unanimously.

NATIONAL ACADEMY OF SCIENCES REPORT BRIEFING

Mr. Robert Lewis, Director, Division of Materials Safety and State Agreements, summarized the findings and recommendations from the National Academy's *Radiation Source Use and Replacement* report. Mr. Lewis discussed NRC's actions since the release of the report as well as NRC's path forward.

Dr. Richard Vetter expressed appreciation for the opportunity for ACMUI to provide input on the report. Dr. Subir Nag reinforced his earlier comments on the report about the differences between cesium-137 and cesium-131 and the importance of distinguishing between the two. Dr. Nag added that a distinction should be made between cesium chloride and other forms of cesium (e.g. ceramic-based). Ms. Gilley raised the issue of waste disposal, and Mr. Lewis responded that the sources would be classified as Class C low-level waste. Mr. Lewis stated that there is currently no permanent disposal option; however the National Academy would probably view government possession as a means of temporary storage until a permanent solution is found. Dr. Bruce Thomadsen pointed out that aggregating sources in storage may pose security-related problems. Mr. Lewis responded that the amount of material would be relatively small.

Mr. Lewis indicated NRC would like to engage the ACMUI to further evaluate issues outlined in the NAS report. Subsequently, ACMUI formed a subcommittee.

ITEM (4): Dr. Leon Malmud, ACMUI Chairman, requested ACMUI form a subcommittee, which includes*: Dr. Darrell Fisher, Mr. Ralph Lieto, Dr. Bruce Thomadsen (Chair), and Dr. Richard Vetter. The subcommittee's charge is to evaluate the efficacy and cost of cesium chloride versus current and proposed x-ray technologies and cobalt. The subcommittee will also evaluate security issues.

*Dr. Malmud added the following members to the subcommittee on April 29, 2008: Ms. Debbie Gilley, Dr. Orhan Suleiman, and Dr. James Welsh.

ELEKTA PERFEXION™

During the October 28-29, 2007, meeting, the ACMUI formed a subcommittee to address issues with 10 CFR 35.600 as they relate to the Gamma Knife® Elekta Perfexion™. The subcommittee

included: Ms. Debbie Gilley, Mr. Ralph Lieto, Dr. Subir Nag (chair), Dr. Bruce Thomadsen, and Dr. James Welsh. The subcommittee consulted with other individuals, as necessary.

Dr. Nag provided a copy of the subcommittee's suggested revisions to 10 CFR 35.600, 35.635, 35.645, and 35.2645. Specifically, the subcommittee suggested that words such as 'helmet' and 'trunnion' be replaced with more generic terms such as 'collimation output', 'collimation system', etc. Other revisions were suggested as well.

ITEM (5): NRC staff should incorporate the subcommittee's recommendations for the Gamma Knife® Elekta Perfexion™ in future rulemaking.

The motion passed unanimously.

PERMANENT IMPLANT BRACHYTHERAPY

ACMUI initiated a discussion on ACMUI's path forward for the upcoming permanent implant brachytherapy rulemaking (10 CFR 35.40 Written Directives and 10 CFR 35.3045 Medical Event Reporting). ACMUI made the following motions:

ITEM (6): Dr. Subir Nag suggested ACMUI form a subcommittee to discuss the permanent implant brachytherapy rulemaking. The subcommittee would include : Dr. Nag, Dr. Bruce Thomadsen, and Dr. James Welsh. The subcommittee could consult with other knowledgeable individuals, as necessary.

The motion did not pass.

ITEM (7): Dr. Leon Malmud, ACMUI Chairman, requested NRC staff email Dr. Nag separately once the permanent implant brachytherapy proposed rule is published.

NRC staff agreed.

ITEM (8): NRC staff should arrange a public full Committee teleconferenced meeting in July to discuss the permanent implant brachytherapy rulemaking.

The motion passed unanimously.

BYPRODUCT MATERIAL EVENTS SUBCOMMITTEE REPORT

During the October 28-29, 2007, meeting, the ACMUI formed a subcommittee to annually review byproduct material events, perform analyses, and report to the full Committee at the spring meeting. The subcommittee included: Mr. Ralph Lieto (chair), Dr. Subir Nag, Dr. Orhan Suleiman, and Dr. Bruce Thomadsen. The subcommittee consulted with Ms. Debbie Gilley, representing the Agreement States.

The subcommittee grouped the events into the following categories: 10 CFR 35.300; 10 CFR 35.400; 10 CFR 35.600; 10 CFR 35.1000; and Other. The subcommittee also suggested two improvements for the Nuclear Materials Events Database (NMED): allow creation of reports by specific licensee type and allow searches with multiple key words.

For the 10 CFR 35.300 category, the subcommittee evaluated seven events and concluded that the error rate was estimated at 0.04% for approximately 18,000 therapeutic procedures. Human error continued to be the main contributing factor.

For the 10 CFR 35.400 category, the subcommittee evaluated seven events and concluded that the error rate was again very small and that human error was the main contributing factor.

For the 10 CFR 35.600 category, the subcommittee evaluated 17 events and concluded that approximately one third to one half of the medical events in this category occurred during vaginal cylinder high dose rate (HDR) brachytherapy treatments. Dr. Nag commented that vaginal cylinder treatments are the simplest form of brachytherapy treatment and usually physicians who do fewer brachytherapy treatments perform vaginal cylinder treatments. Overall, the majority of errors in this category occurred during the treatment planning phase.

For the 10 CFR 35.1000 and Other categories, the subcommittee evaluated 25 events which included treatments with yttrium-90 (Y-90) microspheres, various treatments to pregnant women, lost sources, leaking sources, and teletherapy source retraction failures, to name a few. The subcommittee concluded that both the number of Y-90 microspheres events and events involving doses to fetuses increased from fiscal year (FY) 2006 to FY 2007. The subcommittee concluded there was either no change or a decrease in the number of events for lost or leaking sources.

Overall, the subcommittee concluded that number of medical events reported have remained fairly constant since 2004.

CAUSES OF MEDICAL EVENTS

During the October 27-28, 2007, meeting, the ACMUI requested NRC staff add an item to the spring 2008 agenda for Dr. Bruce Thomadsen, ACMUI, to give a presentation on the causes of medical events. Dr. Thomadsen was also to provide suggestions for questions that NRC should ask to receive more accurate information on the causes of events.

Dr. Thomadsen used event-analysis diagrams to help ACMUI members and NRC staff understand the causes of various events. Dr. Thomadsen also discussed latent and active errors and proximal and progenitor causes as they pertain to the event-analysis diagrams. Dr. Thomadsen concluded his presentation by summarizing corrective actions that are typically ineffective such as policies, restraint, higher expectations, increased attentiveness, and supervision.

Dr. Subir Nag commented that repetition in his practice appeared to reduce errors. Dr. Richard Vetter asked if it was possible to get information from the root causes analyses required by the Joint Commission. Dr. Thomadsen responded that Congress does not allow release of information obtained in the root cause analysis reports.

POTENTIAL REVISION TO ABNORMAL OCCURRENCE (AO) CRITERIA

Ms. Angela McIntosh, NRC, described the current Abnormal Occurrence (AO) criteria and explained that NRC was seeking the ACMUI's input with regard to a proposed revision. Ms. Sandy Gabriel, NRC Region I, talked briefly about an informal review Region I staff performed to determine if all brachytherapy events meeting the AO criteria were expected to result in significant adverse health effects to patients. Ms. Penny Lanzisera, NRC Region I, proposed

several options for revisions to the current AO criteria. Ms. Debbie Gilley asked if it was standard for NRC to use a consulting physician to determine impact to the patient. Ms. Gabriel replied that NRC always has the option and in some circumstances is required to use a consultant. Dr. Subir Nag added that he has served as the medical consultant on several occasions and believed it was important for NRC to have the opinion of a consultant from the medical community. After considerable discussion, the ACMUI made the following recommendation:

ITEM (9): NRC staff should revise the AO criteria to read, "A medical event that results in: 1) death; or 2) a significant impact on patient health that would result in permanent functional damage or a significant adverse health effect that would not have been expected from the treatment regimen, as determined by an NRC or Agreement State designated consultant physician."

The motion passed with one abstention.

EMERGING TECHNOLOGY

Dr. James Welsh, ACMUI, provided information on radioiodine labeled phospholipid ethers (PLEs), which are being proposed as both a diagnostic tool and a means of treatment for brain, prostate, breast, and other cancers. Dr. Welsh described how the body handles radioiodine PLEs on a cellular level and illustrated the excellent imaging characteristics of iodine-124 PLE compared to PET imaging. Dr. Welsh indicated that formal human clinical trials were pending.

Dr. Subir Nag inquired about the radiation safety implications of the new technology. Dr. Welsh responded that patient release issues, similar to those for iodine-131 thyroid cancer treatments, would need to be considered.

COMMISSION BRIEFING PREPARATION

The ACMUI went into a closed session to prepare for the April 29, 2008, meeting with the Commission. For additional details on the Commission meeting see topic on page 8.

TUESDAY, APRIL 29, 2008

RULEMAKING 101

Mr. Mark Delligatti, NRC, provided an overview of NRC's rulemaking process. Mr. Delligatti described the types of rulemaking, the importance of a technical basis, and the process and timelines for proposed and final rules. Mr. Delligatti emphasized that the rulemaking process was a collaborative and deliberative process that ensures rules are meant to stand the test of time. Mr. Ralph Lieto asked if rules could be published in redline-strikeout format, as is done for other documents sent for review to ACMUI. Mr. Delligatti indicated that NRC was limited on what could be published in the *Federal Register*, and Dr. Donna-Beth Howe, NRC, added that NRC is also limited with posting redline-strikeout text due to the Americans with Disabilities Act. Mr. Delligatti did indicate this item could be considered for further discussion. As a response to another question by Mr. Lieto, Mr. Delligatti stated that the next major 10 CFR Part 35 rulemaking could begin in 2009 or 2010.

MICROSPHERE GUIDANCE

Ms. Ashley Tull, NRC, gave a presentation proposing new modifications and confirming previously recommended changes to the current yttrium-90 (Y-90) microsphere licensing guidance.

For the first topic Ms. Tull described an obstacle that physicians are encountering in obtaining the necessary training and experience (T&E) needed to become authorized users (AUs) for the use of Y-90 microspheres by limited specific medical-use licensees that are not currently licensed for Y-90 microspheres. A solution was proposed to allow simulated case experience, in lieu of the 3-case experience, for those physicians who are unable to obtain the 3-case experience. Dr. Samuel Putnam, an interventional radiologist representing Sirtex, gave a brief overview of Sirtex's current training program and provided information on how Sirtex could meet the three simulated cases requirement proposed in the March 2008 guidance. Dr. Riad Salem, and interventional radiologist representing MDS Nordion, described MDS Nordion's training program, TheraSphere University (TSU), and provided information on how he believed MDS Nordion was currently implementing the proposed simulated cases requirement at TSU. After a detailed discussion that included both Y-90 microsphere manufacturers and NRC staff, ACMUI made the following recommendation.

ITEM (10): NRC staff should incorporate the three hands-on, *in-vitro,* simulated cases approach as proposed during the meeting. Additionally, NRC staff should indicate when it is appropriate for a licensee to submit a license amendment to add the AU or Y-90 microspheres to the license. Lastly, NRC staff should add a statement to the guidance to require the manufacturer to proctor the first three cases performed by an AU.

The motion passed with one abstention.

Ms. Tull also suggested additional minor changes to: (1) add wording throughout the document to state the licensee shall commit to certain provisions in the guidance; (2) add wording to the Written Directive section of the guidance to note that the date and signature of the AU is required both before and after patient treatment; and (3) format the guidance document for grammar and readability.

Ms. Tull confirmed that NRC staff accepted and made changes to the guidance accordingly for the 2007 motions with regard to the Y-90 microsphere brachytherapy guidance, with one exception. After consideration of ACMUI's vote (5 in favor, 4 opposed), NRC staff did not accept ACMUI's recommendation to allow a physician to perform three work experience cases with one type of microspheres and be authorized for both types of microspheres.

ACMUI accepted all of the changes as proposed in the March 2008 Y-90 microsphere brachytherapy guidance with one amendment.

ITEM (11): NRC staff should make all of the changes as proposed, except on page 2 the word "post-operative" should be replaced with "post-procedural."

The motion passed unanimously.

STATUS OF ACTIVE PETITIONS FOR RULEMAKING

Mr. Dennis Rathbun, NRC, provided an update on the status of three Petitions for Rulemaking (PRMs): PRM 35-18 (Stein); PRM 35-19 (Crane); and PRM 35-20 (Ritenour).

Mr. Rathbun stated that NRC determined rulemaking was not warranted in response to the Stein petition, and this decision was published in June 2007. Mr. Rathbun stated that decisions had been reached on both the Crane and Stein petitions, and the decisions were pending approval from NRC's Executive Director of Operations. Mr. Lieto inquired about the timeline for publishing the decisions on the pending petitions, and Mr. Rathbun indicated the decisions would be made public soon. Ms. Tull clarified that pre-decisional documents stating NRC's decisions had been sent previously to ACMUI members.

Naturally-occurring and Accelerator-produced Radioactive Material (NARM) UPDATE

Mr. Duane White, NRC, provided an update on NRC's efforts to implement the requirements of the Energy Policy Act of 2005 for certain NARM. The final NARM regulations were published on October 1, 2007, and were effective November 30, 2007. Mr. White also provided a status update on the guidance associated with the NARM regulations. The following major guidance documents were published since the last ACMUI meeting: NUREG-1556 Volume 21, "Program-Specific Guidance About Possession Licenses for Production of Radioactive Material Using an Accelerator"; NUREG-1556 Volume 13, Rev. 1, "Program-Specific Guidance About Commercial Radiopharmacy Licenses"; and NUREG-1556 Volume 9, Rev. 2, "Program-Specific Guidance about Medical Use Licenses." Mr. White also confirmed that all waivers for Agreement States have been terminated, as well as waivers for Federal Government agencies, Federally Recognized Indian Tribes, Delaware, District of Columbia, Puerto Rico, U.S. Virgin Islands, Indian, Wyoming, and Montana. NRC plans to terminate the remainder of waivers for non-Agreement States by summer 2009. Notification of termination for the remainder of waivers will be published in the *Federal Register.*

STATUS OF SPECIALITY BOARD RECOGNITION

Ms. Cindy Flannery, NRC, provided an update on the status of recognition for specialty boards. Ms. Flannery indicated that the recognition status of the listed boards remain unchanged since the last meeting. Ms. Flannery stated that NRC published an article in the Winter 2007 Newsletter (published in February, 2008) intended to raise awareness that under certain circumstances, a diplomate who obtained his or her certification before the effective date may be considered for RSO, AMP and AU status under the board certification pathway on a case-by-case basis. The article states that there are two boards (American Board of Nuclear Medicine and American Board of Radiology-Diagnostic Radiology and American Board of Radiology-Radiologic Physics) offering this review for their diplomates.

Dr. Vetter asked a question about recertification, and NRC staff responded that original certification dates remain unchanged as individuals are recertified on a regular basis. Mr. Lieto asked if the board recognition criteria was amendable. Dr. Ronald Zelac, NRC, responded that the Commission required a process be established prior to the 10 CFR Part 35 rule publication in 2005. Dr. Donna-Beth Howe added that the process could be amended; however, the process is based on regulatory requirements (10 CFR 35.50(a), 35.51(a), .35.55(a), 35.190(a), 35.290(a), etc.) so a rulemaking would be required to essentially change the process.

Specialty Board:	Status:	Recog. Date:
Board of Pharmaceutical Specialties	35.55	March 6, 1996
American Board of Nuclear Medicine	35.190, 35.290, 35.390	October 20, 2005*
Certification Board of Nuclear Cardiology	35.290	October 29, 2000
American Board of Health Physics	35.50	Jan. 1, 2005
American Board of Science in Nuclear Medicine Nuclear Medicine Physics and Instrumentation Radiation Protection	 35.50 35.50	 June, 2006 June, 2006
American Board of Radiology (Radiation Oncology) American Board of Radiology (Diagnostic Radiology) American Board of Radiology (Radiologic Physics) Medical Nuclear Physics Diagnostic Radiologic Physics Therapeutic Radiologic Physics	35.390, 35.490, 35.690 35.290, 35.392 35.50 35.50 35.51	June, 2007 June, 2006* June, 2007* June, 2007* June, 2007*
American Osteopathic Board of Radiology (Rad. Onc.) American Osteopathic Board of Radiology (Diag.Rad.)	35.390, 35.490, 35.690 35.290, 35.392	May 1, 2007 July 1, 2000
American Osteopathic Board of Nuclear Medicine	35.290	May 18, 2006
American Board of Medical Physicists	Awaiting input	
Certification Board of Nuclear Endocrinology	Awaiting input	
Canadian College of Physicists in Medicine	Awaiting input	
*Board is verifying the qualifications of diplomates who have obtained their certification prior to the recognition date.		

CLOSING

Ms. Ashley Tull, NRC, briefly summarized the items proposed by ACMUI as recommendations and action items for the current meeting and suggested dates for the next ACMUI meeting. Based on availability of the conference room and ACMUI members, Ms. Tull tentatively scheduled the next ACMUI meeting for October 27-28, 2008, at NRC Headquarters.

COMMISSION MEETING

ACMUI brought two topics before the Commission: (1) 10 CFR Part 35 Training and Experience Implementation Issues and (2) Increased Controls and Fingerprinting Orders Implementation Issues.

Dr. Eggli provided ACMUI's perspective on several important issues with regard to the first topic: removing the attestation requirement for board certified individuals; revising regulations to allow for group consensus attestations for individuals awaiting board certification; and replacing the word 'competence' in attestations for individuals seeking authorization via the alternate pathway.

Dr. Vetter provided ACMUI's perspective for the second topic. Dr. Vetter highlighted several issues: cost to licensee; lack of justification; inability to grandfather individuals previously determined trustworthy and reliable; and limited opportunity for ACMUI input.

Detailed information from the ACMUI meeting with the Commission can be found using the following links:

Slides
http://www.nrc.gov/reading-rm/doc-collections/commission/slides/2008/20080429/

Transcript
http://www.nrc.gov/reading-rm/doc-collections/commission/tr/2008/20080429.pdf

Staff Requirements Memorandum
http://www.nrc.gov/reading-rm/doc-collections/commission/srm/meet/2008/m20080429.html