

Meeting of Scientific Committee 1-19
NCRP Office
7910 Woodmont Avenue, Suite 400
Bethesda, MD 20814

November 17-18, 2009

AGENDA

Tuesday, November 17

- 8:30 – 9:00 a.m. Welcome and introductions Tom Tenforde and John Ahearne
- 9:00 – 10:20 Overview of ADT systems and address list of questions developed at first meeting of SC 1-19 Major Schwarz and Dr. Silk
- 10:20 – 10:40 Break
- 10:40 – Noon Overview of ADT systems (continued) Major Shannon, Dr. Jones, and Mr. Norman (Dr. Jones and Mr. Norman by teleconference)
- Noon – 1:00 p.m. Lunch at NCRP
- 1:00 – 2:00 Status of SC 1-18's Commentary Ken Miller and Terry Pellmar
- 2:00 – 3:00 Discussion of morning presentations and relationship between SC 1-18 and SC 1-19 Commentaries
- 3:00 – 3:20 Break
- 3:20 – 5:00 Discuss and refine SC 1-19 Commentary outline (see Draft Revisions on SharePoint)
- 5:00 Adjourn Day 1

Wednesday, November 18

- 08:30 a.m. Convene Day 2
- 08:30 – 10:00 Discuss who will take lead on each section of the Commentary.
- 10:00 – 10:20 Break
- 10:20-10:40 Dr. Adelstein (by teleconference)

10:40 – 11:30	Additional information needed and from which agencies? Methods of acquiring additional information
11:30 – Noon	Schedule for submitting draft report materials and for third meeting of SC 1-19
Noon	Adjourn Meeting (Lunch to be available at NCRP)

Scientific Committee 1-19
Notes from the November 17-18, 2009 Meeting

The second meeting of Scientific Committee 1-19 was held at the offices of the NCRP at 7910 Woodmont Avenue, Suite 400, Bethesda, Maryland, on November 17-18, 2009. The meeting was called to order at 8:30 a.m. on Tuesday, November 17, 2009, by Chairman Ahearne. The following persons were in attendance:

Committee Members

Dr. John F. Ahearne, Chairman
Dr. Lawrence T. Dauer – Memorial Sloan-Kettering Cancer Center, New York, NY
Dr. Helen A. Grogan – Cascade Scientific, Inc., Bend, OR
Daniel Kassiday – CDRH/FDA, Rockville, MD
Dr. James C. Liu – SLAC, Stanford, CA
Kathryn H. Pryor – PNNL, Richland, WA
Scottie W. Walker – Sandia National Laboratories, Gainesville, FL
Dr. Norman Fost – U. Wisconsin, School of Medicine & Public Health, Madison, WI,
participated by telephone on both days.

NCRP Support

Dr. Thomas Tenforde, President, NCRP
Dr. James Adelstein, Advisor to Committee SC 1-19 – Harvard Medical School, Boston, MA, participated by telephone on the November 17.
Dr. John R. Frazier, NCRP Technical Staff Consultant, Knoxville, TN
Dr. Terry Pellmar, NCRP Technical Staff Consultant representing SC1-18

Other Attendees

Dr. Glen I. Reeves, MD, Consultant – Northrup Grumman A&AS
Dr. James Jones, Idaho National Laboratory, PITAS Program
Gary Norman, Idaho National Laboratory, PITAS Program
Maj. Gregory Schwartz, Defense Threat Reduction Agency
Maj. Michael Shannon, Ph.D., Naval Systems Engineering Resource Center, West Point
Dr. Jeffrey Snyder, Institute for Defense Analyses
Dr. James Silk, Institute for Defense Analyses, attended only the early morning session on November 17.

Meeting notes are indicated for each session of the agenda. The actual times of each session are listed.

Tuesday, November 17

8:30 – 8:40 a.m. Welcome and Introductions Tom Tenforde and John Ahearne
Drs. Tenforde and Ahearne recognized the committee members in attendance and noted that committee member Chris Donahue was unable to attend or otherwise participate in the meeting. Both expressed their appreciation for the attendance of the presenters from groups within DTRA.

8:40 – 8:50	<p>Response to questions from SC-1-19</p> <p>Maj. Michael Shannon</p> <p>Maj. Shannon distributed copies of the responses to questions that had been prepared by SC 1-19 at the first meeting and submitted to ADT program representatives. [A copy of the questions and responses is on file.] He noted that several of the questions could not be answered at that time because the answers to those questions pertained to technical performance parameters that had not been determined (or measured). Answers for several other questions indicated SC 1-19 should consider a wide range of potential uses and application of ADT systems with a wide range of potential radiation exposure scenarios.</p>
8:50 – 9:20	<p>Overview of ADT systems</p> <p>Dr. Jeffrey Snyder</p> <p>Jeff Snyder briefed the committee with a presentation entitled, “Active Interrogation” [see his handout]. He compared passive and active interrogation approaches for detection of special nuclear materials and focused on the advantages of active interrogation to detect weapons grade uranium (WGU), the primary material being sought. He described four fundamental interactions that are the basis of active interrogation techniques, namely, photon-induced fission (photofission), neutron-induced fission, proton-induced fission, and muon-induced muonic atom cascade x-rays. He compared the calculated efficiencies of the four processes as well as the theoretical flux (fluence rate or flux density) at the target (postulated as 25 kg WGU) necessary to achieve the same detection sensitivity. He also described specific considerations of each interrogation technique that can enhance or limit the usefulness of the technique. He concluded his presentation with a comparison of the calculated dwell times (interrogation times) for examples of passive and active interrogation techniques having approximately the same sensitivity, concluding that the times are 29 minutes and 30 seconds for selected passive and active techniques, respectively.</p>
9:20 – 10:30	<p>Photonuclear Inspection and Threat Assessment System (PITAS) James Jones</p> <p>Dr. Jones gave a detailed presentation that described the PITAS program [see his handout]. He reviewed the concept of active interrogation as it pertains to the use of intense photon beams generated by an electron linear accelerator (LINAC). He described the details of the “Maritime Concept” for active interrogation, including potential scenarios for source (LINAC) deployment, irradiation geometries, and detection arrays and geometries. He also described the integration of system components for a mission objective with an application conduct of operations (ConOps). He presented an overview of the history of PITAS at Idaho National Laboratory, including the design, development, and testing of a developmental prototype system. The testing included measurement of photon beam properties (e.g., beam intensity and radiation dose rate) under highly controlled conditions on land and on water (a barge with target above the water line).</p>
10:30 – 10:45	Break
10:45 – Noon	<p>Overview of PITAS & Related Dosimetry Research</p> <p>Major Shannon</p>

Maj. Shannon opened his presentation by noting that the photon (bremsstrahlung) interrogation system is the most mature of DTRA efforts to date. His presentation was a continuation (and elaboration) of the earlier presentation of PITAS by Dr. Jones, with significant additional details of the radiation dose modeling, calculations, and field measurements (under highly controlled conditions) performed to date for PITAS. He noted that although much work has been done to assess potential radiation doses from use of PITAS, there are many challenges ahead. He noted that future assessments of radiation doses must consider effects due to weather conditions, deployment methods and limitations, and a wide range of potential exposure scenarios. Dr. Tenforde noted that it is important to define a parameter space in which “ConOps” can be developed. Maj. Shannon noted that technology has outpaced the “ConOps”.

[DTRA personnel left at the lunch break.]

Noon – 1:00 p.m. Lunch at NCRP (Discussion during lunch.)

1:00 – 2:00 Status of SC 1-18 Commentary Terry Pellmar
Ken Miller was unable to attend the meeting, so Dr. Pellmar summarized the progress of SC 1-18. She reported that SC 1-18 had met twice and had been briefed by technical personnel with the ADT program. (For the most part, the briefings were by the same personnel who have briefed SC 1-19.) She reported that SC 1-18 had prepared an expanded outline of their commentary and made writing assignments to committee members. She noted that a draft commentary is scheduled to be completed by the next meeting of SC 1-18 (expected to be held at the end of January 2010) [actually held on February 4, 2010]. The draft will be reviewed and revised at that meeting and the revised draft can be available for review by SC 1-19.

Dr. Pellmar noted that SC 1-18 had many of the same questions that she has heard in this meeting of SC 1-19 about the technical details of the design and deployment of systems being considered for the ADT program. She noted that the commentary being written by SC 1-18 can be completed without answers to many of those questions.

2:00 – 2:35 Discuss morning presentations and relationship between SC 1-18 and SC 1-19
Committee members noted that many questions pertaining to the technical details of the interrogation systems (such as the questions prepared at the first meeting) must be answered before the first SC 1-19 commentary can be completed. Committee members reiterated that the technical details of ADT systems are almost exclusively associated with the photon beam system (LINAC) such as PITAS. Members also noted that there was very little new information presented in the morning sessions pertaining to other ADT systems (other than LINAC-based systems). Dr. Grogan suggested that the committee develop criteria for ADT systems based on photon interrogation systems (LINAC-based systems) and then see if the criteria can be applied to systems other than photon interrogation systems.

2:35 – 3:15	Break	
3:15 – 4:15	Discuss and refine SC 1-19 Commentary outline Changes to the preliminary outline that was prepared at the first meeting (primarily by Dr. Dauer) were discussed and Dr. Dauer incorporated the changes into a revised outline. [Copies were distributed to committee members.]	Committee Members
	Dr. Tenforde reported that Dr. Foss may join SC 1-18 to provide support as an ethicist on that committee.	
4:15 – 4:30	Writing assignments of expanded outline Chairman Ahearne led a discussion of the next step for SC 1-19. Committee members agreed that the revised outline should be expanded based on the information presented earlier in the day. Committee members chose sections of the initial outline for which they would prepare an expanded outline during the evening.	Chairman Ahearne
	Dr. Tenforde asked Dr. Reeves to request Dr. James Silk of the Institute for Defense Analyses to participate, if possible, by phone on Day 2 to provide additional information on the details and status of proposed ADT systems.	
4:30	Adjourn Day 1	
Evening	Work on expanded outline	Committee Members

Wednesday, November 18

08:30 a.m.	Convene Day 2 and introduction of first speaker Chairman Ahearne expressed his appreciation for the attendance (on very short notice) of Dr. James Silk, Deputy Director of the Science and Technology Division of the Institute for Defense Analyses in Alexandria, Virginia.	Chairman Ahearne
08:35 – 9:35	Description of Advanced Interrogation Systems Dr. Silk described details of ADT systems not included in previous presentations to SC 1-19 by DTRA personnel. He described the advantages of the use of proton beams, noting that proton spallation reactions provide a useful fission signature and that delayed neutrons from fission can be detected with multiple detectors to measure decay rates that uniquely identify the target material. He reported that a proton beam can produce a neutron interrogation field having a radius of several meters. He said that an obvious limitation of the use of proton beams is their short range in air. He also noted that another limitation is that delayed neutron information for many elements is not included in most calculation codes. Another limitation is interference from oxygen in air and iron and lead at or near the target.	Dr. James Silk

Regarding neutron sources for ADT systems, he noted that an on-site (or on-ship) neutron source could be used. Committee members commented that such use introduces another potential exposure scenario.

Dr. Silk noted that the goal of the use of muon beams in ADT systems is to produce muonic X rays from uranium. Muon beams are produced with tandem accelerators – one to produce the muons and the other to accelerate them to have the desired beam properties. A disadvantage of the use of muon beams is that muon beams will generate many neutrons and their interactions will generate many gamma rays (that can overwhelm detection of muonic X rays from uranium).

He noted that, for any ADT system, interferences are much more complicated on land than for seaborne vessels. He also described “clutter” as multiplicative noise, not additive noise. He noted a “compound” referred to as “shiponium” having chemical formulation of FeSi (CHON)₂ (with a density of 0.3 g/cm³) is used as an approximation of the elemental contents of a ship.

After Dr. Silk left the meeting, committee members commented on the breadth and depth of his knowledge of proposed ADT systems and the usefulness of the information that he provided to the committee during the meeting for identifying potential exposure scenarios.

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| 9:35 – 10:20 | Review the Expanded Outline
Each committee member described the expanded outline that they had prepared for the section(s) of the commentary for which they were responsible. Some members provided copies of their expanded outlines. All members were requested to submit expanded outlines of their respective sections before the next meeting of SC 1-19. | Committee Members |
| 10:20 – 10:40 | Input from Dr. Adelstein (by teleconference)
Dr. Adelstein agreed to provide specific information on the relationship between beam pulse structure and biological responses. Additionally, he agreed to address non-stochastic risks from uses of interrogation beams. | |
| 10:40 – 11:30 | Discuss schedule for commentary production and next meeting
Committee members committed to review the expanded outline of their respective sections of the commentary and provide an updated outline prior to the next meeting. Committee members were unanimous in their opinion that writing text for the commentary is premature and should be scheduled to follow the next meeting. It was agreed that an important reference point for the work of the committee will be the commentary generated by SC 1-18. Dr. Pellmar had reported previously that a revised draft of that commentary was expected to be available in February 2010. Consequently, committee members agreed that the third meeting of the committee should be held after receipt and review of the draft commentary of SC 1-18 (in the first quarter of 2010 with the specific dates to be determined). | Ahearne |
| 11:30 | Meeting adjourned | |