

**U.S. Environmental Protection Agency
Science Advisory Board
Radiation Advisory Committee (RAC) RadNet Review Panel**

Summary Minutes of Public Meeting¹
December 19 & 20, 2005

Committee: Radiation Advisory Committee (RAC) RadNet Review Panel of the U.S. Environmental Protection Agency's (EPA's) Science Advisory Board (SAB). (See Roster - Attachment A.)

Date and Time: Monday, December 19 and Tuesday, December 20, 2005 from 8:30 a.m. to 5:30 p.m. eastern standard time (See Federal Register Notice - Attachment B).

Location: This meeting was held at the U.S. EPA National Air and Radiation Environmental Laboratory (NAREL), 540 South Morris Avenue, Montgomery, AL 36115.

Purpose: The purpose of this meeting is to review the Agency's draft report entitled "*Expansion and Upgrade of the RadNet Air Monitoring network: Concept and Plan,*" (Vols. 1 &2), dated October 2005. The Panelists are to receive presentations from the Agency staff and to begin drafting their response to the review.² (See Meeting Agenda - Attachment C.)

SAB/RAC RadNet Review Panel Attendees: Panel Members Dr. Jill Lipoti, RAC and RadNet Review Panel Chair, Dr. Bruce Boecker, Dr. Antone Brooks, Dr. Gilles Bussod, Dr. Brian Dodd, Dr. Shirley Fry, Dr. William Griffith, Dr. Helen Grogan (on conf call during a portion of the meeting), Dr. Richard Hornung, Mr. Richard Jaquish, Dr. Jan Johnson, Immediate Past RAC Chair; Dr. Bernd Kahn, Dr. Jonathan Links, Dr. Gary Sandquist, Dr. Richard Vetter, and Ms. Susan Wiltshire were present. (See Attachment A); Dr. K. Jack Kooyoomjian (Designated Federal Official) and Dr. Anthony F. Maciorowski, Associate Director for Science, and Ms. Vickie Richardson - SAB Staff Office, participated.

Agency Staff Attendees: ORIA, Washington, DC: Staff: Dr. Mary E. Clark (Dec 19 only), Ms. Elizabeth Cotsworth, Ms. Ann Davis, Ms. Sara DeCair, and Mr. Adam Klinger. ORIA/National

¹ NOTE: Please note that these minutes represent comments that are individual statements and opinions and are not necessarily consensus comments at this stage of the process in the review of any given topic. In all cases, the final SAB report to the EPA Administrator represents the consensus on the topic.

² See also the Feb 28, 2005 minutes where the RAC was briefed by the Agency's ORIA staff on the proposed National Monitoring System (NMS) Upgrade to the Environmental Radiation Ambient Monitoring System (ERAMS), now referred to as RadNet, as well as the December 1, 2005 public conference call minutes where the Panel discussed the charge, review and background materials, as well as specific charge assignments, and advised the Agency of any specific points needing clarification in the December 19 & 20, face-to-face meeting.

Air and Radiation Environmental Laboratory (NAREL) staff, Montgomery, AL: Mr. Michael Clark, Mr. Ronald (Ron) Fraass, Dr. John Griggs, Mr. Robert Lowry, Dr. Keith McCroan, Dr. Charles (Chuck) Petko, Cdr. Rhonda Sears (PHS Officer), Cdr. Scott Telofski (PHS Officer), and Ms. Mary Wisdom; and Indoor Environments National Laboratory (RIENL) staff in Las Vegas: Mr. Brian Moore.

Public Attendees: No members of the interested public were present at this face-to-face meeting at the NAREL Laboratory in Montgomery, AL. However, Mr. Stephen B. Etsitty, Executive Director of the Navajo Nation Environmental Protection Agency provided written comments dated December 19, 2005 to Dr. Kooyoomjian, DFO to the SAB/RAC RadNet Review Panel. These written comments provided background information on the Navajo Nation, history of the Navajo Nation Environmental Protection Agency (NNEPA), and written commentary pertaining to the EPA-SAB-RadNet Charge, particularly for Charge Question #2 pertaining to siting of monitors (See Attachment L).

Meeting Summary: The meeting followed the issues and general timing as presented in the meeting Agenda (see Meeting Agenda - Attachment C). Written comments were submitted to the Committee for the meeting from the Navajo Nation (See Attachment L), but no public verbal comments were offered during the course of the face-to-face meeting.

During the December 1, 2005 public conference call, further suggestions from the Panel included a request for information from the Agency on the following items to be discussed at the December 19-20, 2005 meeting:

- 1) monitoring device sensitivity and manufacturer specifications;
- 2) a brief presentation or demonstration on models that process information for decision-making;
- 3) data generated for models versus the modeling activity;
- 4) background on use of models (focusing on such things as what organization and who does the modeling) in emergency response activities and other systems, such as the Federal Radiological Monitoring and Assessment Center (FRMAC), standard National Atmospheric Release Advisory Center NARAC models, the Inter-Agency Modeling and Atmospheric Assessment Center (IMAAC) in Livermore, CA, etc.;
- 5) a discussion on work flow that is needed to optimize results;
- 6) the models that might be available if the Agency does not have data in certain areas, etc.; how the Agency utilizes feedback loops;
- 7) a presentation of a map or scenario showing detection within hours of an event(s), the identification of possible hot spots, etc.

The above items were addressed in the presentations and discussion that followed over the next two days and some of these items are reflected in the discussion summaries below.

Day One, December 19, 2005:

Welcome and Introductions: Dr. K. Jack Kooyoomjian, Designated Federal Officer (DFO), opened the meeting at approximately 8:37 a.m. with opening remarks. He introduced himself as the DFO for the Radiation Advisory Committee's (RAC) RadNet Review Panel, indicating that this Panel operates under the requirements of the Federal Advisory Committee Act (FACA) and is authorized to conduct business under the SAB Charter. He explained that, consistent with FACA and with EPA policy, the deliberations of the RAC's RadNet Review Panel are conducted in public meetings, for which advance notice is given. He explained that he is present to ensure that the requirements of FACA are met, including the requirements for open meetings, for maintaining records of deliberations of the RAC's RadNet Review Panel, and making available the public summaries of meetings, as well as providing opportunities for public comment.

Dr. Kooyoomjian also commented on the status of this Panel's compliance with Federal ethics and conflict-of-interest laws. The RAC's RadNet Review Panel follows the Committee and Panel Formation Process, as well as determinations made by the SAB staff and others pertaining to confidential financial information protected under the Privacy Act. Each Panelist has complied with all these provisions; there are no conflict-of-interest or appearance issues for any of the Panelists, nor did any individual need to be granted a waiver or be recused. Dr. Kooyoomjian further noted that the Form 3110-48 Financial Disclosure, as well as Ethics Training was completed by all Panelists and is on file at the SAB, that there is no need for disclosure, and that there is no particular matter that may pose a potential conflict of interest. He advised that the Panel should briefly introduce themselves and their interest in relation to the RadNet review topic just to inform the parties present of their relations and experiences to the issues pertaining to the discussions to take place today. He also advised that the biosketches of each Panelist are posted on the SAB website (see Attachment J-10).

Dr. Maciorowski, Deputy Director for Science on the SAB Staff Office, provided some brief opening remarks welcoming members and participants (See Roster, Attachment A), and thanked the NAREL Laboratory staff for their hospitality in hosting the meeting in the facility where many of the RadNet staff and researchers are housed. He remarked that the SAB is viewed by many other agencies as a model for ethics and peer review in the Federal government. He then turned the meeting over to Dr. Lipoti.

At 8:50 a.m., Dr. Lipoti made brief opening remarks, thanking the NAREL Laboratory Staff for hosting the meeting in the laboratory, touching on previous reviews of this topic as ERAMS I and ERAMS II, and noting that Dr. Jan Johnson Chaired the ERAMS II review and is a part of this RadNet Review Panel to offer us the collective wisdom and institutional knowledge from the previous review, as well as to fully engage on the RadNet charge questions. She also recognized other Panelists, such as Dr. Bernd Kahn who was involved in the earlier reviews and who also brings some continuity to the current review. She noted that the SAB's Panel very much welcomed the opportunity to meet at the NAREL in Montgomery, AL where most of the ORIA/NAREL staff are located, to examine the facilities, to meet with the staff conducting the

work, to view the air samplers first-hand, and to fully engage with the Agency staff on the RadNet topic. She then briefly reviewed the meeting agenda (See Attachment C) and had the RAC's RadNet Review Panelists introduce themselves. Dr. Lipoti then asked the members of the ORIA Staff and the other participants to also introduce themselves.

Overview of the Meeting:

After the introductory remarks and statements of interest by the Panelists, and introductions of the Agency staff and other participants, at 9:09 a.m. Ms. Elizabeth Cotsworth, Director of ORIA provided an overview of EPA's RadNet Network. She touched on the design and conceptualization of RadNet, and noted that ERAMS has been operational since the 1950's for monitoring deposition of radioactive fallout in milk and drinking water. She then touched on the efforts beginning in 2003 as a part of the Homeland Security activity to consider the current planned upgrade to ERAMS with the air monitors. Ms. Cotsworth believes that the current plans for the upgrades of ERAMS to RadNet are robust and technically-based, and she welcomed the SAB review to see if they have a comprehensive, reliable and dependable system to meet the goals intended. She then asked Dr. Mary Clark, ORIA's Assistant Director for Science, to introduce the charge and the speakers for the presentations on the draft plan.

Dr. Mary E. Clark, Assistant Director for Science of ORIA, introduced herself. She directed the Panel to the NAREL web site (www.epa.gov/narel), and noted that the staff at the NAREL facility in Montgomery, AL, plan to have the monitors on display for the Panel to look at during a break, and that arrangements would also be made to tour the facility for those interested in doing this. She also noted that staff from the Radiation and Indoor Environments National Laboratory (RIENL) in Las Vegas, NV and the ORIA Headquarters (HQ) staff in Washington, DC, would also be present to engage in the review and provide support as needed.

At 9:13 a.m., Dr. Mary Clark re-capped the December 1, 2005 public conference call discussions and questions on the charge by the RAC's RadNet Review Panel. She indicated that the ORIA Staff planned to start with review of the emerging research with a presentation by Ms. Sara DeCair. Dr. John Griggs and Cdr. Scott Telofski will then touch on the Mission and Objectives. Ms. Sara DeCair will discuss the Deployable Monitors. Mr. Robert Lowrey and Mr. Brian Moore will discuss the Fixed Monitors. Ms. Mary Wisdom will touch on the QA/QC procedures, and Mr. Adam Klinger will present the Data Dissemination and Data Sharing. Dr. Clark cited the contributions of Dr. Chuck Petko as editor of the document. She also recognized Cdr. Rhonda Sears (PHS Officer) as ERAMS II Lead and Dr. Keith McCroan, as ERAMS I Lead.

At 9:17 a.m., Ms. Sara DeCair began the formal RadNet presentation (see ***Emergency Response Context for SAB Review of RadNet,*** by Sara DeCair, Attachment K-1). She introduced the National Response Plan (NRP) overview which provides the overall framework for emergency response in the NRP, and EPA's support or lead role in various contexts. She explained how the various agency's cooperate under the NRP and how the coordinating agency role goes to various Federal agencies, depending on the scenario. She also explained how and

where local and state responders fit in and if they are overwhelmed by a radiation incident, or if multiple states are involved, how the state(s) and locals can call on the Federal Radiological Monitoring and Assessment Center (FRMAC) to support the state and local response. She then explained ORIA's roles in radiological emergencies, and how there is a wide range of intra and inter-agency activities and cooperation pertaining to preparation and assistance before, during and after emergencies. She discussed how RadNet joins the EPA's "toolbox" of radiological response assets.

At 9:27 a.m., Dr. John Griggs provided a presentation (see "***Planned Upgrade and Expansion of the RadNet Air Network***," Attachment K-2). He gave a background on the project and its mission and objectives. He covered the current RadNet system, the changing roles of the system over the years, key historical events impacting ERAMS & RadNet, such as Three Mile Island, Chernobyl, the Los Alamos and Hanford fires, the impact of the 9/11/2001 terrorist attacks, and the role of the SAB advisories in the 1990's. He then focused on the mission and objectives of the RadNet air network, along with its key considerations, as well as what RadNet is not designed to be. He outlined the key changes with the addition of near-real-time measurement capability, the use of both fixed and deployable monitors, increasing the number of fixed monitors, and the telemetry features for the data to a centralized database at NAREL.

At 10:00 a.m., Cdr. Scott Telofski of NAREL presented the briefing entitled "***Planned Upgrade and Expansion of the RadNet Air Network, Fixed Monitor Siting***," (See Attachment K-3). He provided an overview on the siting objectives and decisions, the customer needs, the siting approach, effects of previous decisions and the modeling activities. He discussed the siting objectives for the RadNet mission, and the primary decisions for siting the monitors being the customer needs (modelers, decision-makers and the public). He discussed the primary drivers for siting, and other customer needs such as in agriculture, business & tourism, as well as border coverage. He also discussed the population and geographic metrics, EPA's siting approach, and development of a population database. He reviewed the top 180 populated cities, and gave examples of clustered cities, such as Los Angeles, CA, Santa Anna, CA, and Riverside, CA. He discussed the previous siting decisions, the population and geographic metrics and how customer needs were met. He also discussed the proposed locations for the RadNet fixed station locations, and results of the confirmatory modeling.

At 10:22 a.m., the Panel took a break and re-convened at 10:46 a.m.. At 10:46 am, Ms. Sara DeCair presented a briefing entitled "***RadNet Deployables***,"(See Attachment K-4). She discussed what is a deployable, the concept of operations of such devices, the three siting options, incident-specific siting plans, personnel field tests, as well as the field exercise to be conducted in 2006. The three siting options covered (Option 1- Targeted Coverage to Supplement Fixed Monitors; Option 2 - to surround a localized incident site, and Option 3 - the combination of surrounding an incident site and filling in between the fixed station. She reviewed incident-specific siting plans, the setup parameters, the local siting criteria, and the response personnel procedures. She discussed the operator qualifications, results from the field tests and what they learned from an exercise that was modeled after EPA's 2004 large-scale field exercise called "Ruby Slippers." From this they learned, for instance, how long it really takes to

set up the deployables, how to conduct safe transportation of the units, and the nuances of telemetry and IT security processes. They learned that the deployables function well in both hot & cold climates, and that shipping can be inexpensive. She also discussed the goals & objectives to further improve operational readiness. If the staff had to use the deployables tomorrow, they are in place with shipping plans, and the draft plans currently in place would be implemented. Her presentation ended at 11:06 a.m.

At 11:06 a.m. the group took a break to tour the monitors located on the grounds outside the NAREL Laboratory. Handouts were provided to accompany the monitoring equipment tour (See Attachment K-5). At 11:49 a.m., the Panel and participants re-convened in the NAREL conference room.

At 11:49 a.m., Ms. Mary Wisdom made a presentation on Quality Assurance (QA) and Quality Control (QC), entitled “**Quality Assurance and Quality Control for RadNet Near-Real-Time Air Monitoring**” (See Attachment K-6). She outlined the EPA quality system requirements for QA/QC of near-real-time monitoring data. This included documentation for the RadNet QA, training and quality control for the operators, instrument calibration and maintenance, assessment and evaluation of data, QC limits for automatic data evaluation, verification and review of transmitted data, alerts and corrective action decision-making, and audits and periodic evaluation of RadNet.

At 12:06 p.m., Mr. Adam Klinger made a presentation entitled “**Making Data Available**” (See Attachment K-7). This involved sharing RadNet Data with others. The philosophy is that EPA seeks to share as much data as possible, as soon as possible. Mr. Klinger described EPA’s approach to data sharing. His presentation included how to serve particular audiences, dividing audiences into access groups, developing access control procedures, providing data and information on the internet with appropriate context and explanation, and to establish time frames. His presentation ended at 12:16 p.m., and the Panel took a lunch break.

The Panel reconvened at 1:21 p.m. with a question and answer (Q/A) session of the types of detectors on the fixed and deployable monitors and how the measurements from both monitors would be integrated for decision-makers.

A discussion followed on exposure pathway detectors for scenarios which include the inhalation route as the primary dose driver. It was acknowledged that the plume typically passes in a couple of days, and that the inhalation route is the primary driver during that time.

The biggest concern of the Panel appeared to be issues relating to the siting plan. For the overall gross pattern, it appears reasonable, but it does not address microclimate effects from small perturbances. Part of the challenge is to address how the Agency can assure the exposed public that the sample is representative. Dr. Griggs of NAREL explained that the OAQPS siting criteria was incorporated, but there are always constraints in an urban environment.

The Panel asked if there were explicit criteria for pre-deployment. The Agency responded that they get requests for different circumstances, and usually defer to office and laboratory directors on the deployments, as well as to the Team Commanders in the field. Based on historical requests and responses, there are usually a handful of responses per year at the maximum, so these events are very manageable.

The Panel asked if there were any exercises focused on public communication, such as the following scenario: *“An event occurred, now what are we going to tell the public?”* The Agency staff responded that the 2006 exercise will be their first real test. The Agency staff noted that simply making the data available to the public without interpretation is not adequate. The Agency staff acknowledged that they need to deal with the ongoing challenge for RadNet to explain the results to the public.

The Panel posed a question, namely the following: *“If radionuclides at 100,000 picocuries/liter are present in the milk, is the person harmed or safe?”* The Panel asked if there is a formal process in place for what to communicate to the public. Some Panelists had misgivings to release RadNet raw QC'd data to the public. However, others in the Panel argued that there are technically proficient people in the public and that the days of keeping anything from the public is long gone. It was acknowledged by the Panel that in a crisis, everything has to go through the incident command center.

The Agency staff recognized that it is Agency policy that whatever is generated in the Agency is in the public domain. However, in a radiological crisis, there are procedures in place for the information to be disseminated by the Federal Radiological Monitoring Assessment Center (FRMAC), and they put it all together. If the Department of Homeland Security (DHS) is in play, then the “federal family” has to abide by what they say. While there is a need for the public to be informed, there is also the responsibility to provide QA on the data that will ultimately be distributed to the public.

Questions were raised by the Panelists pertaining to distinguishing between three types of events and the capabilities of the portable and permanent detectors in the field involving these three different scenarios. One incident involved a nuclear device, another a “dirty bomb,” and yet another involved a slow release. A discussion followed on the fission products, the possible time lags, equipping the field personnel with gross alpha and gross beta detectors, and other requirements for proper measurements to take place.

The Panelists were interested in the mechanism for data gathering and sharing in the first 24 hours of an incident, and how the responders likely would be expected to obtain essential information in the time-frame of a few hours. It may be that the RadNet system would not detect some of these scenarios in that time-frame. QA/QC takes a lot of time when answers are needed within hours, and these events and accidents may require special attention by the Agency or other entities in the “federal family” before releasing such information. What might be needed during an incident is a trained person to receive and interpret what is going on during an incident. However, real-time data offers a lot of challenges. The Panelists believed that if there was an

incident with a nuclear weapon or dirty bomb, the Agency officials monitoring this will know about it soon enough.

Some Panelists were curious if raw data is more useful than relying on data from hand-held meters and responders. The NAREL Staff replied that many of the Agency's Stakeholders (e.g., state & local responders) find the RadNet raw data to be often valuable to them, but there is the need for an iterative review to get better information.

Public Comment: At 2:22 p.m., Dr. Kooyoomjian asked if there were any members of the public who wished to address the Panel. He did note that written comments were received from Stephen B. Etsitty, Executive Director of the Navajo Nation Environmental Protection Agency (See Attachment L), and that information was provided to all participants and left on the handout table for any interested participant, but no other comments were offered to the Panel.

The public comment period concluded at 2:22 pm.

Continued Round-the -Table Panel Discussion:

The Panel resumed their discussion and Q/A session. There was a general question regarding the RadNet concept and the actual plan to implement the system, including the possible intermediate versus the long-term goals and objectives. The Agency staff cautioned that while the current RadNet system is not precluded from being enhanced for some of the desired system characteristics being discussed, it was not principally designed to be an early warning system as envisioned by some of the Panelists. The Agency staff cautioned that such expectations may be frankly beyond the current system's capabilities.

The Panel discussed modeling as a tool that should be utilized in harmony with the RadNet data analysis, including use of modeling for strategic locational decisions for the fixed and deployable monitors, and in trends and plume analysis in order to achieve maximum utility from the data. With enhanced modeling capability, it is anticipated that the various scenarios might be tested more rigorously. For instance, with modeling, the results might be telling the decision-makers that the plumes that may occur could have huge implications, or may not be a major concern. There is also the issue of integrating the data, and this is a challenging exercise, and perhaps a bigger issue than the Agency currently realizes. Some of the Panelists thought that standardizing the data would also be helpful, especially if one is hoping to eventually integrate data from other systems at the federal, state or local level.

Break 2:50 p.m. Reconvene 3:20 p.m.

Continued Round-the-Table Panel Discussion:

An issue raised by some Panelists is the challenge of communicating to the public when there is an uncertain situation. Concern was expressed, for instance, where a decision is to be made on the basis of results from only one (1) monitor or a single measurement in an entire city.

The Agency's intent is to look for any increase in gamma activity and then investigate it. The intention is to up-load the complete gamma spectrum file. The Agency will not look at individual radionuclides.

A discussion followed on Minimum Detectable Activity (MDA). The MDA's that the Panel was given represent the MDA's from the prototype unit. In fact, every location will be different. The Agency NAREL staff emphasized that they are committed to reporting actual values including non-detects. A suggestion was made by one Panelist to convert from Roentgen Equivalent Man (REM) to activity for each different isotope. A discussion followed on minimum detection levels (MDLs). It was also recognized that the radon daughters need to be subtracted out to find out what the MDL is.

One Panelist asked if the Agency staff has a prototype of what the web page will look like. The Agency Staff observed that the sample data runs were provided to the Panel.

Some Panelists expressed concern with the configuration of the high volume sampler. From a physical observation of the detectors during the demonstration, it appears that there is a physical size bias, and the new detector as currently configured will restrict larger (20 micrometer) particles. It was observed by the Agency staff that larger particles should have already deposited before they get there, if you are 20 miles away from the source. Another Panelist observed that it is like a "baffle" depositing on the detector. It may not be necessary to change the configuration of the detector, but to look at what the bias might be, and to correct for it.

At 4:10 p.m., Dr. Helen Grogan joined the Panel by telephone.

A Panelist asked about the connection between RadNet and the Emergency Response Team (ERT) activity. It was recognized that coordination is needed between external gamma measurements. It was recognized that the ERT has some similar equipment, as well as different specialty equipment. The Panelists like both fixed and deployable monitors. However, the ERT does not want to man the RadNet equipment, and arrangements have been made to have others handle the RadNet equipment.

The Panelists asked for the Agency staff to describe the Radiological Emergency Response Team (RERT-EPA). It is comprised of 40 people housed at 2 laboratories. The Department of Energy Radiological Assistance Program (DOE RAP) teams have a 6-hour response time frame. The EPA RERT takes time to deploy and will be there within a 12 to 48 hour time frame.

A communication issue was raised by a Panelist regarding a dirty bomb scenario involving an explosion which the EPA staff does not know about. In major cities, there usually is enough equipment to pick up the event. However, decisions are needed whether to deploy mobile units to supplement the fixed monitors. An advantage of the fixed system is that they are always in operation to pick up whatever is going on. One Panelist observed that it is remarkable

how localized some plumes are. You can be 2 blocks away and be at background. The Panelists acknowledged that RadNet is a very coarse big picture event system. It was thought that overall, RadNet with fixed monitors may not be helpful or strategic with a dirty bomb, but with deployables, the system has the capability to be very strategic.

The Panel thought that the sum total of the RadNet design with the fixed and deployables is some reassurance to the public. However, with only one detector in Washington, D.C. and none in New York City, this is viewed as an issue needing to be addressed by the Agency staff.

A session followed, where the Panelists also made suggestions to improve the current RadNet System. It was thought that understanding the baseline is very helpful. The re-configured system should improve readiness to provide QA/QC'd data that is helpful to decision-makers and the public. The Agency staff was encouraged to continue the data analysis, including pre-event and baseline analysis.

One Panelist observed that the deployable monitors record wind direction and speed, while the fixed monitors do not record the parameters of wind direction and speed. The Agency staff recognized that meteorology is very important, such as the effects of local canyons, and acknowledged that meteorologists have had inputs into the system design for the monitors. It was remarked that adding weather equipment adds to the overall costs of the network. The Agency Staff indicated that they do have options to include meteorological equipment, and that this is "still on the table."

The Panelists also brought up the need for a dependable supply of electricity for the monitoring stations. The main body of the report on pages 55 & 56, as well as Appendix G has this information.

A discussion followed on manpower needs, advantages for co-location of monitoring stations that allows the Agency to "piggy back" on use of an operator who is at that station. The Panelists discussed the realities of staffing and equipment challenges in the field for operating and maintaining equipment, such as the stations getting hit by lightning during storms, and other practical considerations for people, power, etc.

It was acknowledged that there are benefits for RadNet to move toward Homeland Security applications and to have a clear chain-of-command structure. The Panelists were concerned with where and how the data analysis will lead to data integration, and how the incident chain-of-command will work with the other agencies, departments and commissions. At the same time, the RadNet continues to collect their traditional milk samples to detect radioactive deposition patterns and to establish baseline levels.

There is the universal "Who is in Charge?" question. In many areas, the U.S. EPA is simply not the lead agency or the main actor. However, EPA has a history of collaboration as a "credible convener," and there is no universal answer as to how that works. The Agency staff have made efforts to coordinate and to co-locate their monitors where it makes sense.

A discussion followed on dealing with the public and their perceptions of the risks. For instance, if there was another hurricane in New Orleans, LA, the Agency staff is unlikely to have to re-assure someone in San Francisco that they are going to be okay. However, if people have a dirty bomb event in Dallas, TX, it won't affect Chicago, but the people in Chicago may not be sure that this is the case.

A discussion followed on the importance of "zeros" in the measurement data base. Also discussed was whether agriculture and food crops are affected as contaminated food sources for the population. Giving the public an unambiguous and unified message was thought to be very important by all the participants, and several examples were discussed. A prototype demonstration and simulation exercise took place. It demonstrated the capabilities of the RadNet system to observe and track simultaneous multiple events (See Attachment K-8). This demonstration offered the opportunity for more engaging conversation by the Panelists and the various participants regarding goals and desired operational characteristics for such a system. Also discussed were possible ties of RadNet data to existing U.S. weather stations.

Further discussion covered how the air filters from the monitors (both fixed and deployable) would be analyzed. It was concluded that the analysis would be essentially the same as for the existing ERAMS system.

Action items:

At 5:27 p.m. the discussion concluded and Dr. Lipoti re-capped the assignments to the Panelists and the action items as follows:

- 1) The EPA Manual for Instruments could be copied onto the LapTop;
- 2) Will look at the photon dose equivalent within the software and calculate the 4-day REM to MDAs;
- 3) Will look at radon compensation information;
- 4) Will look at projection of ERAMS data as it currently exists on the web site;
- 5) Will look at publically available data on the IMAAC scenarios;
- 6) Will look at simultaneous multiple RDDs and a nuclear power plant;
- 7) Will group comments something like the following:
 - a) 1st Group: Communications: To include integration of state & local information, and first responders;
 - b) 2nd Group: Detectors: To include what are you measuring, and Minimum Detectable Levels (MDLs); and
 - c) 3rd Group: Modeling Interface: To include near & far field modeling. How do you deal with the worth and value of real-time data? How do you employ and use real-time data?
- 8) Will organize the written text by the charge questions, such as modes of transmission (CQ # 3b). For the present, we will have an item known as "Issues Beyond the Charge."

There being no additional business to discuss for the day, Dr. Lipoti thanked all the participants and adjourned the meeting at 5:48 p.m.

Day Two, December 20, 2005:

Dr. Kooyoomjian reconvened the Panel at 8:32 a.m. with brief remarks, echoing the previous day's comments pertaining to ethics, disclosures, and compliance with FACA. He then turned the meeting over to Dr. Lipoti, Chair of the RAC. She touched on planning expectations for the day's activities.

An open discussion followed at 8:45 am. The Panel asked about funding and if the Agency receives more funds, could that help on placing more deployables and fixed monitors. The answer from the ORIA Staff Director, Ms. Elizabeth Cotsworth indicated that the budget is a flat budget, and the expectations are that such increases might not be likely. The NAREL staff is fairly sure that they will acquire 50-60 additional monitors, and that this upgrade and expansion over what they have in place is most likely to occur.

The Panel also was concerned with the modes of data transmission. The Agency was expecting to receive advice in this area from the Panel. The Agency plans to use basic information about telemetry.

The Panel asked the Agency staff what are the aspects that they might be least confident about. The Agency staff responded that what is being asked is a very broad question, and given the process the Agency went through with the stakeholders, the Agency staff views the process as a very reasonable and logical one, and accepts that there are other ways to array the fixed and deployable monitors. Specifically with regard to instrumentation, the technology is a moving target as instrumentation evolves and improves. With regard to information sharing, some states want all information, while others do not want all information. This is a major challenge to the EPA staff, and it gets at the heart of the question as to who or what is the "federal family" to receive and share such information. The Agency staff views this as a real network in the real world, and they are looking for how to make it most relevant and useful to all the stakeholders.

The Agency is gaining more experience with the deployables by getting out in the field and testing the devices. There is a balance between obtaining false positives and false negatives, the higher level of information gathering, and the ability to have a quick turn-around on quality data. There are also short cuts possible in the level of review without seriously compromising quality controls. Originally 180 stations were planned to be operated by 2007, but budget limitations and competing demands on resources for proper maintenance of the existing system called for consideration of a protracted schedule for deployment of the monitors through 2012.

The Panel discussed the speed of rollout of the unused stations, and a variety of scenarios. The Agency staff stressed that they are seeking opportunities to get the monitors out in the field

and to work with them. The existing monitors generate a sample load to the laboratory for analysis. It was observed that the old (59 of them) fixed monitors have been remarkably reliable. However, some of the older monitors are wearing out and need to be replaced. Discussions included the cost of telemetry, the cost of electricity, the routine maintenance costs, as well as the ongoing monthly bill for telemetry, especially for the satellites. There are different costs for different modes of data transmission.

At approximately 9:25 a.m. there was a RadNet website demonstration (See Attachment K-8). It was pointed out by the EPA staff that in 1997, the SAB noticed that EPA was using monitors for many years, but that the monitoring data was not easily available. The SAB/RAC encouraged the Agency to get the word out regarding ERAMS (now known as RadNet). The website was developed to encourage public use. A demonstration with several simulated events took place. One scenario included the release of one Radiological Dispersive Device (RDD), and two large nuclear events all occurring either simultaneously or in rapid sequence. The RadNet fixed stations were observed responding to the events. Additional simulations included 3 terrorist RDDs and other events, such as a Cesium 137 source at about 60,000 curies. A question and answer session followed, and the sense of the discussion was that the system is good for large events, but detecting smaller events might pose special issues. It was discussed ... *"What if instead of a 60,000 curie event, we had a 2,000 curie event?"* A discussion followed on detectors and detection levels.

One Panelist did not want to lose site of the fact that RadNet (as the old ERAMS) is a very good system. She did not want the Agency to add so many "bells and whistles" to the system that they lose in any way the basic intelligence gathering capabilities that currently exist. A discussion followed on scenarios for optimum sampling distribution for a finite number of samples to get the best coverage, and the realization that model optimization might be very helpful in this process. A philosophical discussion followed on a system that might be model-driven and not a population-based system.

At 11:11 am, the written materials prepared by the Panelists was handed out by the DFO (See Attachment M containing correspondence dated December 19 & 20, 2005), and a "reading time" was declared from 11:14 a.m. to 12:05 p.m.

LUNCH: At 12:05 p.m. the Panelists took a lunch break and reconvened at 1:10 p.m.

At 1:10 p.m., the Panelists re-convened their writing session, but stayed together as a Panel. They started out with Charge Question (CQ) #1, as follows:

Charge Question (CQ) #1. *"Are the proposed upgrades and expansion of the RadNet air monitoring network reasonable in meeting the air network's objectives?"*

The short answer to CQ #1 is that it can be a very good system for large events and trends analysis, but may not be good for localized events. A discussion followed regarding the Agency preference for 25 miles, rather than 50 miles to cover a large population center. After some

discussion, it became apparent that the Agency's vision of 180 stations has a strong probability of not being installed in the next 5 years, due to budgetary pressures. A discussion followed on the likely sensitivity changes within the system with only 100 stations. The Panelists thought it would be highly productive for the Agency to do more work with a view toward optimum siting. It was further encouraged for the Agency to look more closely at who is using the data and how it should be used, and to re-examine the important assumptions and driving forces, if less monitors are installed than originally planned.

The Panelists suggested that the Agency would be well served to consider a process on how to refine their choices. For instance, one area deserving of some attention is over-lapping monitors in certain locations. Also, the Agency may need atmospheric modelers to answer the question whether one or three monitors may be necessary. For instance, there might be a scenario where up to 40 deployables could be used in an urban setting to answer a variety of questions.

One Panelist observed that CQ #1 deals with upgrades and expansion, whereas CQ #2 deals with location and siting of the monitors.

The Agency staff observed that fixed monitors give a baseline, but may not be necessarily useful for a homeland security incident. The Panelists observed that the charge questions are logical and sequenced, but one question that hasn't been asked is the types of detectors that should be used. The detectors are not principally designed as first response instruments. It would be helpful to analyze what the fixed detectors can do and what the deployable detectors can do, and what additionally might be needed. A discussion followed on the need for follow-up aerosol tests, as well as the need for an assessment of the quality of the results. It was concluded that once an event takes place, the plume should be characterized, and that one monitor isn't going to do this.

A discussion followed on fixed monitors as not providing all that is needed for an event in a city, for instance. The deployables may possibly be the items that will likely give better answers as follow-up to the incident. A discussion followed on whether a modeled parameter or actual field measurements should be trusted. It was clear that what is needed is a "representative" measurement and that a field measurement would be much more valuable than a modeled parameter.

The Panel recognized that the charge questions are focused on the air monitoring parameters and not the traditional milk, food web deposition data. It was further observed that the event distribution and the geographic distribution will likely be tightly linked. A discussion followed on the consequence of the 100 station scenario versus the 180 station scenario and the need to aggressively decluster.

Charge Question (CQ) #2. *“Is the overall approach for siting monitors appropriate and reasonable given the upgraded and expanded system’s objectives?”*

A discussion followed on CQ #2 regarding the reasonableness of the approach to siting of the monitors. The basic conclusion is that the choices are reasonable, and the system is capable of doing what the Agency says it should do. A discussion followed on energy dependence, decision rules, and what would be the proper action point or trigger level in the regions of interest. Are there 300,000 decisions/week? Are there 300 false positives/week? The Panel recognized that there is an interplay to answer the question of use of fixed monitors versus deployable monitors. It was further recognized that the fixed monitors are for the long-term trends and establishing the baseline levels. What is needed is a clear vision as to how the fixed and deployable monitors should be used.

The plan does appear to provide sufficient flexibility for placing the deployable monitors to accommodate different types of events (CQ #2c).

The Panel does believe that the deployable monitors need to be in the “thick of things,” and observed that it is a good thing that the Agency has deployables. The Panel articulated some situations where and how they might need to be used in emergencies. Placing some of the deployables near the fixed monitors could be a part of the testing and monitoring program. The Agency staff articulated that for those cities that require rooftop collectors, there is a weight problem. The Panel sees the fixed monitors for more baseline monitoring, but there may be circumstances where the fixed monitors may be helpful in emergency response. The Panel encouraged the Agency staff to be more aggressive in spatial clustering for the fixed monitors. The Panel also encouraged the Agency staff to consider using the deployables to dynamically optimize the location of the deployables through meteorology and advice from the IMAAC, and others.

Some of the Panelists argued on the side of more pre-deployment than less for the deployables. It was suggested that the deployables could be strategically located at obvious sites of interest, such as Times Square on New Year’s Eve, etc.

Charge Question (CQ) #3. *“Given that the system will be producing near real-time data, are the overall proposals for data management appropriate to the system’s objectives?”*

The Panelists observed that the hand-held PDA option was there on the deployables, and that it would be nice to get the dose-rate reading on a PDA as a read-out. It was also observed by the Panelists that there are 6,000 members of the Health Physics Society who could operate equipment. It was also observed that for those staff that do not have expertise in Health Physics, they can get training to operate the equipment, and that there is a need to emphasize the types of training that the broader population might need in order to be proficient in operating the equipment.

The Panelists also thought that contingency plans are needed to cover the range of

techniques and events that might occur, such as contingency plans for an alternative power supply for the monitors following a large-scale destructive event. The Panelists also thought that a contingency plan should be in place for the event that the emergency generator might have been stolen.

It was observed that the approach to data display may be different depending on the audience. While there is a need to get the numbers out as quickly as possible, additionally, there are other considerations with fixed versus deployable monitors, routine versus acute events, quality assurance (QA) and quality control (QC), and other dimensions to understanding the overall picture. It was thought that the public needs simple, direct messages, such as ... "*What do I do?*" rather than the reporting of a measurement in microcuries/meter following an event. It was thought that there is a logical need for a social scientist to engage in an exercise and to evaluate the messages that would be given, and that EPA needs to be a convenor in this exercise. There are also roles for the FRMAC or IMAAC. It was recognized that each audience has a need for their own form of QA/QC on the data and the events taking place.

The Panel recommended the continued routine reporting of data. The Panel thought it would be useful to better clarify the mission of the fixed and the deployable monitors, and to recognize the need for QA/QC time in the laboratory. The Panel also stressed that with all kinds of international and conventional units, a consistent message must be conveyed to the public regarding units. It was thought that the data release should be in the same time frame as the routine measurements, except when decisions need to be made to expedite the QA. It was thought that all the deployable data should go to the FRMAC, and that the policy pertaining to release of data on fixed versus deployable monitors is different. It was not yet demonstrated that the QA/QC procedures are yet appropriate for the near real-time data.

Break: The Panel took a break from 3:13 p.m. to 3:33 p.m..

Public Comments: At 3:33 p.m. Dr. Lipoti called for public comments. No verbal comments were provided by the participants. However, written public comments were faxed to the Agency from the Navajo Nation and were provided to the Panel and the participants (See Attachment L).

At 3:33 p.m., a "Round-the-Table" discussion followed to re-cap the charge questions and to give each panelist an opportunity to re-cap any important messages that needed emphasis to the Agency staff. It was thought that one model for all the data would be helpful to examine scenarios such as dropping from 180 monitoring stations to 150, and what the effect would be. It was also thought that the big problem is the source term, and that to make sense, one has to start with a scenario. Applying a range of scenarios is helpful, and one should select a few likely scenarios. It was also recognized that there are different trigger points, and there is complexity within the different data screens. It was again thought that EPA might be a logical conveynor of different groups to bring the parties together and to provide a consistent message.

The Panelists agreed generally with the population-based approach, but thought that more aggressive de-clustering was appropriate, and that models for geographic coverage should also be employed.

A discussion followed on the fixed versus deployable monitors, and suggestions were offered. It was thought that it would be helpful to consult with an aerosol physicist where part of the filter is occluded by the detector. There were additional questions on the trigger levels, and it was recognized that more work needs to be done on this area. The Panel urged the Agency to continue to compile the traditional milk, water, and ambient contamination data, as this is recognized as important baseline data. The Panel also recognized the importance of “non-detects” as a part of the baseline.

With regard to CQ #3a, the Panel had a strong recommendation to engage the IMAAC in a modeling exercise, and to consult with DHS when new technologies arise. The Panel liked the idea of downloading with a PDA on the deployable monitors. There was a concern by the Panel with the current volunteers who have no or very little training, and it was thought that the Agency RAC could draw on the HPS and other radiation-oriented persons as volunteers.

There was a discussion on the role of the fixed versus deployables in routine versus emergency situations. With regard to the deployables, the Panel is thinking that electrical power and security might be a problem and needs more attention by the Agency staff. Making data tailored to the audience is thought to be a good goal, as well as to characterize and report fixed versus deployable monitor data, as well as routine versus special data. It was thought that a social scientist might be helpful in working on the appropriate messages to different audiences.

Putting out routine data for the fixed monitors should be continued. It was also encouraged to have expedited QA for the fixed monitors. The Panel also urged the Agency and the federal, state and local partners to use consistent (SI, i.e., International) units.

Another point, which is illustrated by the Navajo Nation public comments, is the political consideration to locate collectors on their and other sites. This begs the question of the robustness of the Agency’s siting protocols. There should be contingency plans to have other systems and detectors and link them into the RadNet.

It was judged at this time by the Panel to be premature for them to conclude in CQ #3(d) that the QA/QC is appropriate for real-time data. There is also an issue on obtaining a representative sample, and perhaps consulting an aerosol expert may be helpful. There was a recommendation to be outside the 2 meter area around buildings, because of the possible wake effect near buildings or high in the air, etc.

At 4:32 p.m., the Panel completed their summary of recommendations. At 4:33 p.m. Dr. Lipoti proceeded to make assignments to the Panelists. The following is a summary of that exercise:

CQ #1: The initial grouping of Panelists included the following: Boecker, Fry,

Hornung, Sandquist, Vetter & Wiltshire.

Following this exercise, Links to take lead; Kahn, Johnson, and Boecker to take lead on instruments; Brooks to address use of data; Kahn & Griffith to address decision rules;

- CQ #2: Co-Lead - Bussod & Johnson;
CQ#2 Working Group Includes Bussod & Johnson (Co-Lead), Grogan, Kahn & Links; Group will address CQ #2 a thru d);
- CQ #3: The initial grouping of Panelists included Brooks (espec 3b&3c), Dodd, Griffith (Communications Systems & Data Systems), Jaquish, and Wiltshire.

Following this exercise, the detailed assignments are listed below:

- CQ #3a: Data Collection: Griffith (Lead) & Links;
CQ #3b: Data Transmission: Dodd (Lead) and Jaquish;
CQ #3b: Elec Power Contingencies and Security for Deployables:
Fry (Lead)
CQ #3c: Review & Eval of Data: Brooks (Lead) and Kahn, Griffith, Jaquish, Links, Vetter, and Wiltshire;
CQ #3d: Qual Assurance & Control Procedures & Parallel Data Base of SOPs: Sandquist (lead);

Issues Beyond the Charge: Lipoti (Lead).

Dr. Lipoti thanked the EPA staff for their excellent and open dialogue to make this as productive an exercise as possible.

There being no additional business to be discussed, Dr. Lipoti adjourned the meeting at 4:48 p.m. on December 20, 2005.

Respectfully Submitted:

Certified as True:

_____/S/
K. Jack Kooyoomjian, Ph.D.
Designated Federal Official
Radiation Advisory Committee (RAC)
RadNet Review Panel

_____/S/
Dr. Jill Lipoti, Chair
Radiation Advisory Committee (RAC)
RadNet Review Panel

List of Attachments

The following meeting materials are available on the SAB Web site, <http://www.epa.gov/sab>, at the [December 19-20, 2005 RAC RadNet Review Panel Meeting](#) page.

<u>Attachment</u>	<u>Description</u>
A	Radiation Advisory Committee (RAC) RadNet Review Panel Roster dated November 22, 2005;
B	<u>Federal Register</u> Notice: November 16, 2005, Vol. 70, No. 220, pages 69550- 69551
C	Meeting Agenda dated November 22, 2005

The following meeting materials are available in hardcopy from the SAB Staff Office, U.S. Environmental Protection Agency (MC-1400R), 1200 Pennsylvania Ave, NW Washington, DC 20460:

<u>Attachment</u>	<u>Description</u>
I	ORIA Review Document entitled " <i>Expansion and Upgrade of the RadNet Air Monitoring Network, Volume 1 & 2, Concept and Plan,</i> " Prepared for the Radiation Advisory Committee RadNet Review Panel, Science Advisory Board, U.S. Environmental Protection Agency, Prepared by the office of Radiation and Indoor Air, U.S. Environmental Protection Agency, 2005
K	<u>Agency Presentation Materials:</u>
K-1	Emergency Response Context for SAB Review of RadNet, A Presentation for the SAB Radiation Advisory Committee RadNet Review Panel, Sara DeCair, December 19, 2005;
K-2	Planned Upgrade and Expansion of the RadNet Air Network, Presentations for the SAB Radiation Advisory Committee RadNet Review Panel, by the Office of Radiation and Indoor Air, December 19, 2005;
K-3	Planned Upgrade and Expansion of the RadNet Air Network, Fixed Monitor Siting, December 19, 2005, Presentation for: SAB Radiation Advisory Committee (RAC) RadNet Review Panel, Presentation by: Scott Telofski, USEPA/NAREL;
K-4	RadNet Deployables, A Presentation for the SAB Radiation Advisory Committee RadNet Review Panel, by Sara DeCair, December 19, 2005;
K-5	<u>Monitoring Handouts:</u> Contains the Following:
K-5-1 1)	Testing of Polyester Fiber Filters For Collection Efficiency, Yung Sung

- Cheng, Ph.D., Lovelace Respiratory Research Institute, Sept 13, 2005,
- K-5-2 2) Specification sheet for fixed monitor satellite packet data terminal,
 - K-5-3 3) Footprint map for MSAT-2 Satellite,
 - K-5-4 4) Specification sheet for fixed monitor cellular telephone modem,
 - K-5-5 5) Gamma detector response to varying radon concentrations,
 - K-6 Quality Assurance and Quality Control for the RadNet Near-Real-Time Air Monitoring, A Presentation for the SAB Radiation Advisory Committee RadNet Review Panel, Mary Wisdom, December 19, 2005;
 - K-7 Making Data Available, A Presentation on Data Sharing for the SAB Radiation Advisory Committee RadNet Review Panel. By: Adam Klinger. December, 19, 2005;
 - K-8 RadNet Simulation Demonstration of Fixed Field Station Response to Events from 3/27/2005 Through 3/30/2005 (Contains Fixed RadNet Monitor Detecting Contamination in Real Time, Fixed RadNet Monitor Detecting Contamination after Laboratory Analysis, and Fixed RadNet Monitor Not Detecting Contamination);
 - K-9 NAREL Response to Recommendations of the SAB/RAC
- L Public Comments: Memo Dated December 19, 2005 from Stephen B. Etsitty, Executive Director, Navajo Nation Environmental Protection Agency (one page letter with 4 pages of attachments, They include background of Navajo Nation, 1 page; History of NNEPA, 1 page, and EPA-SAB-RadNet Charge Commentary by NNEPA especially on Charge Question 2 a dealing with locations of the fixed monitors, 2 pages)