

THE ACORN



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September Dinner Meeting

Dr Warren Sinclair, President Emeritus of the National Council on Radiological Protection, spoke to the ANS, the Society for Risk Analysis, the Health Physics Society, the American Institute of Chemical Engineers, and the League of Women Voters concerning radiation induced cancer risk and uncertainties associated with low radiation doses. Dr Sinclair is a proponent of the linear dose theory. The majority of his talk was in support of this theory, which he stated was a cautious and sensible methodology to use for radiation protection. In passing, he said the threshold theory arguments sounded quite good; however, evidence supporting the theory is scant. Dr Sinclair also discussed some data groups being reviewed. In Japan, young people (at the time of the bomb drops) are the focus of current studies; 94% of them are still living. The lowest dose from which a radiation effect was seen from the Hiroshima bomb was 200 mgy (20 rads). In response to a question on the threshold dose theory, Dr Sinclair listed several points which must be addressed by it's advocates:

1. What is the threshold?
2. Is it the same for all organs
3. What if it causes 1 cancer?
4. What becomes of rad protection given the statistical problems w/ low level radiation?
5. What is the margin of safety?

October Dinner Meeting

The October Dinner Meeting at Calhouns was scheduled to be a presentation by Dr Jim Walls on the Waste Isolation Pilot Plant. Unfortunately, Dr Walls was delayed in transit and did not make the meeting. Dr Uhrig, of UT, very capably stood in with a presentation on Expert Systems.

November Dinner Meeting - *contributed by Harold Denton*

On November 19, 1996, Mr. Michael Mobley, Director of Tennessee's Division of Radiological Healthy, spoke on the role of States in regulating radioactive materials. He indicated that the Tennessee regulatory program covers about 950 licensees and includes naturally occurring materials, source materials, radioisotopes used for medical diagnostic and treatment purposes, x-ray machines, linear accelerators, radioactive waste, industrial facilities, shippers and small quantities of special nuclear materials. His budget is about \$2.5 million, is largely fee-funded and is staffed by about 70 professionals. The major source of public exposure in Tennessee by far was said to be medically related. Public exposure due to nuclear power, weapons and transportation was said to be quite small. He thought that doses that were medicine related could be reduced by about 50% with no loss of value. With regard to the role of the Federal government, he would prefer that (1) EPA assume the policy role

for all radiation sources, (2) NRC implement policy for all materials, and uses, and (3) FDA implement for all machines and accelerators

January Dinner Meeting

Dr George Cunningham, the Technical Director of the Defense Nuclear Facilities Safety Board (DNFSB), addressed the January meeting attendees concerning roles and responsibilities of the DNFSB. Dr Cunningham gave a historical perspective on the evolution of the Department of Energy (DOE) from an expert based system complex to a standards based system complex. In an expert based system, knowledge and capability of the worker are the keys to performing work. In a standards based system, procedures implemented and controlled by line management are the basis for performance of work.

The DNFSB was formed in 1988 as a result of highly publicized incidents at DOE sites across the country. It consists of five board members appointed by the President for five year terms. Four Assistant Directors divide up the work of the DNFSB. All new hires are interviewed by all five Board members, outside experts are utilized to supplement the staff. The Board is funded separately and do not charge for reviews.

All of the Manhattan Project sites were built secretly and quickly. Since no one was supposed to know the big picture, communication interfaces were deliberately omitted to ensure information remained compartmentalized. This resulted in discontinuities between systems and organizations. For example, process lines would be installed and covered without being documented on drawings, etc. Compounding DOE's (and it's predecessor agencies) problems were compartmentalizing of actions and non-compliance with regulations (DOE Orders). [Editor's note: Defense Board recommendation 90-2 states that 1) DOE has not adequately identified the standards needed to operate safely, 2) DOE Orders are not adequate and may need to be enhanced, 3) DOE does not know the status of implementation for their most significant requirements.]

The DNFSB is not a regulator, as DOE is self-regulated. They make recommendations which the Secretary of Energy can accept, reject, or accept in part. In the event Board reviews disclose an imminent or severe threat to public health and safety, the Board is required to transmit it's recommendation directly to the President, as well as the Secretaries of Energy and Defense. The requirements to which DOE operated historically have been DOE Orders. [Editors note: In the late 1980s, DOE Orders were supplemented with OSHA and EPA requirements.] DOE is currently converting many of the Orders to Rules. The DNFSB is concerned that the DOE does not dilute requirements during the conversion process and that DOE continues to transition to a standards based system.

Dr Cunningham stressed the need for an integrated safety management plan for all activities involving hazardous materials. The plan should be implemented in the following five steps:

1. Define the work,
2. Evaluate hazards and analyze
3. Plan the work and implement controls to address the hazards
4. Perform the work,
5. Evaluate results, use feedback to improve processes

The hazards analysis is the key and should be done at the local level, as a local engineer will understand the analysis better. Dr Cunningham emphasized the need for DOE to have knowledgeable engineers site-wide. He stated that Oak Ridge had an opportunity to make use of its unique capabilities by taking the lead in difficult cleanups.

In response to questions from the floor, Dr Cunningham said the necessary and sufficient (N&S) process had inherent problems associated with it. He recommended the Standards/Requirements

Identification Document (S/RID) process. If N&S gets to the same endpoint as S/RID, then N&S is OK. [Editor's note: S/RIDs are the minimum set of environmental, safety and health requirements that government contractors must implement. Contracts also allow a contractor to identify N&S requirements applicable to their unique operations and replace S/RIDs with the N&S requirements. LMER is pursuing the N&S strategy, LMES is still using S/RIDs.] One questioner alluded to the French having a policy that second generation systems cannot meet modern standards. Dr Cunningham responded that aged facilities expected to operate long term must be modernized, especially in the areas of seismic and structural supports. When questioned about the recent recommendation that DOE facilities be converted to NRC regulation, Dr Cunningham stated that Congress must still act on DOE's proposal and that the Board was a creature of Congress. He questioned whether the NRC would give the emphasis to national security that the DNFSB does. He also was of the opinion that 80-90% of DOE facilities were not licensable.

. The DNFSB's web page URL is <http://WWW.DNSFB.GOV>.

Message from Tom Row

The local section has responsibility for the June 1998 National Meeting in Nashville at the Opryland Hotel. I have agreed to serve as General Chair and Larry Miller has agreed to be Technical Program Chair. We will need many of you to work with us on committees to accomplish this assignment. This is not the first time our section has been responsible for a national meeting, and we have been involved in many topicals so we have the experience to make this happen. Please call me or give me an e-mail indicating your willingness to participate. We have recruited some, but need many more so the job can be done well, and easily. Let's put that experience to work and make Nashville '98 one of the best meetings the Society has seen in a long time. My work phone is 574-5974, home 482-9096 and my e-mail address is (rowth@ornl.gov). Let me hear from you!!!!

DOE News

Beryllium Health Standard

The DOE has concluded that current health standards for beryllium exposure may not adequately protect workers. Beryllium has long been used in DOE nuclear operations. Inhalation of beryllium dust can cause chronic beryllium disease, a degenerative lung disease. Current permissible exposure limits for beryllium were adopted in 1970 from an OSHA Health Standard. DOE has found that some cases of chronic beryllium disease have occurred after exposure to levels below the OSHA Standard. Concluding that current Standards may be inadequate, DOE is moving toward development of a better Standard.

Those at greatest risk of chronic beryllium disease were those persons exposed prior to cessation of weapon production activities in 1989. DOE is concerned that future exposures could occur during upcoming decommissioning activities. The department has been screening workers and former workers for many years. New monitoring techniques developed within the last ten years has enabled DOE to identify workers with beryllium sensitivity earlier than ever before. This allows DOE to better manage future beryllium exposures so as to minimize adverse health effects. Thousands of workers have been screened for chronic beryllium disease to date.

Storage and Disposition of Surplus Plutonium

DOE has decided on a dual track approach for disposing of surplus plutonium. The strategy, which is documented as a Record of Decision, allows for immobilizing plutonium in glass or ceramic forms or burning it as mixed oxide fuel (MOX) in power reactors. This dual approach will also provide needed flexibility and leverage in discussions with Russia on reducing their excess weapons plutonium stockpiles.

Disposition will be performed by immobilizing the plutonium in a glass or ceramic material for disposal in a geologic repository. At least 8 metric tons of the US stockpile will be disposed of in this manner due to impurities which make it impracticable to use as fuel. Burning excess plutonium as mixed oxide fuel in existing reactors would be consistent with U.S. nonproliferation policy. Spent fuel from the process would be sent to the geologic repository.

DOE has decided to retain the option of using MOX fuel in CANDU reactors also. Usage of plutonium in this manner would be dependent upon completion of a multilateral agreement between Russia, Canada, and the US.

DOE is also consolidating plutonium storage locations by upgrading and expanding existing facilities at Pantex and Savannah River. Weapons-usable HEU will continue to be stored at Y-12 in upgraded and consolidated facilities.

Fast Flux Test Facility (FFTF)

DOE has decided to maintain the Fast Flux Test Facility in "hot standby" while it is evaluated for a possible role in the department's tritium production strategy. DOE's dual track strategy for tritium production consists of usage of an accelerator or a commercial power reactor to produce the tritium gas. Tritium is necessary to maintain reliable and effective nuclear weapons.

Report of the DOE Working Group on External Regulation

DOE has been investigating regulatory questions for the past year. Initially, an Advisory Committee on External Regulation of DOE Nuclear Safety made the following key recommendations:

1. Essentially all aspects of safety at DOE's nuclear facilities should be externally regulated;
2. Existing agencies rather than a new one should be responsible for external regulation;
3. Worker protection authorities should be transferred to OSHA, if possible;
4. The EPA should continue to regulate environmental protection;
5. States with authorized programs should initiate or continue to have roles in regulation of environmental protection, facility safety, and worker protection;
6. Under any regulatory scheme, DOE must maintain a strong internal safety management system.

Their report did not indicate a preferred external regulator nor did it provide implementation guidance. The Secretary of Energy created a DOE Working Group to provide recommendations for implementing the Advisory Committee's recommendations. Initially, eight options for implementing external regulation were discussed. Two options were focused upon, with one of these being recommended for implementation.

Option 1 broke DOE facilities into separate regulatory areas. Selected Defense Program (DP) and Environmental Management (EM) and all Nuclear Energy and Energy Research Facilities would be regulated by the NRC. DP and EM facilities currently provided oversight by the DNFSB, would receive strengthened oversight by the DNFSB. The DNFSB's authority would be increased to include approval of DOE standards and approval of facility authorization bases for high hazard facilities. The DNFSB would be required to provide cost/benefit analyses and other means of establishing balance and accountability for their recommendations and approval actions. The Working Group did not consider full regulation of all DOE facilities by the DNFSB to be reasonable or viable.

Option 2 has a ten-year time line divided into 3 phases. In this option all DOE facilities come under NRC regulation within 10 years. The DNFSB is merged with the NRC at the conclusion of this period.

Option 2 was selected by the Working Group. The Group believes that having a single external regulator for DOE nuclear facility safety will significantly improve safety and health at its facilities and also improve public confidence and trust in DOE.

The Working Group's report is available at <http://tis-nt.eh.doe.gov/extreg> or by calling 1-800-473-4375.

Phase I Clinical Trails of BNCT Initiated @ MIT

Two patients with a highly malignant form of brain cancer called glioblastoma multiform were recently treated at MIT's MITR-II reactor. The treatment process is called Boron Neutron Capture Therapy (BNCT) and involves infusing boronated pheylalanine into the patient and irradiating them in an epithermal neutron beam from the reactor. The boron in the boronated pheylalanine captures a neutron and splits into an alpha particle and a lithium atom which ionizes the cell in the vicinity of the capture, thereby destroying it. The boronated pheylalanine concentrates in tumors at a ratio of 3-4 times more than in healthy cells, thus the resulting dose to cancerous tissue is 3-4 times that of healthy cells.

The Phase I clinical trials are being performed to determine the safe and maximum effective dose level. Follow-on Phase II trials will determine if BNCT is effective in tumor control and destruction. Phase I trial patients will still be examined for signs of tumor control even though these trails have another purpose.

MIT has been treating melanoma patients with the BNCT procedure for the past two years in Phase I and II trials. Of the five patients irradiated in Phase I trials, three have shown total or partial tumor response.

Any person wishing to contribute to the newsletter may do so by sending their article, comment, or opinion to:

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Historical recollections are especially welcomed.

Thank You

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