



**News Letter of the American
Nuclear Society-
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**Oak Ridge/Knoxville
Section
Vol. 96-2**

SECTION HIGHLIGHTS

MARCH

Oliver Kingsley, TVA's Chief Nuclear Officer, spoke to the Local Section on March 19th at the Foundry. His talk dealt with nuclear-related issues confronting the TVA. The recent startup of Watts Bar 1 required 28,000 component tests, 1,500,000 man-hours of testing, and 200,000 man-hours of NRC inspections. Watts Bar 1 has no firm schedule to be on-line, although it is expected to be available during peak summer loads. TVA expects to have all five nuclear plants running this summer. TVA has enacted some challenging standards. Their goal is to be the most competitive, lowest cost, and most efficient nuclear utility. Towards this goal TVA's outage durations are trending downward at 38 days/outage; plant events are down 90% in the last ten years. Overall, production costs are down and generating time is up. TVA is also preparing a debt reduction program. For the future, the TVA has no plans to restart Browns Ferry 1 or finish Bellefont, a \$4.5 billion investment. Kingsley foresees no spent fuel storage problems for TVA up through the year 2000.

APRIL

Dr. Myron Pollycove spoke to the Local Section on April 16th at Calhouns at the Marina. His talk concerned the positive effects of low level radiation exposures. Some of the topics he discussed are summarized elsewhere in this Newsletter.

MAY

Deputy manager of the Oak Ridge Operations Office, Steve Richardson, gave a presentation in May on the Future of Oak Ridge. He indicated that the DOE plans to significantly transform and reduce its presence at the site by the year 2010.

This year, the budget authority for OROO is \$2,031.7 M, with Environmental Management allocated \$805M., National Security \$427.4 M, Energy Research \$274.2 M, and Energy Resources \$187.5 M. Support for other Federal Agencies, such as NRC, is \$183 M and funding of Management and other activities is \$154.4 M. By 2010, it is DOE's intent to reduce considerably Y-12 defense activities, to re-industrialize both the Y-12 and K-25 plants, complete site environmental restoration activities and enhance the core strengths of ORNL. For example, Mr. Richardson estimates that Defense Programs in 2008 will require less than 15% of the Y-12 space. He expects K-25 to be completely defederalized by 2010 and says DOE is actively seeking commercial interest in both Y-12 and K-25. Also, all TRU

shipments are expected to be complete by 2010, and legacy wastes eliminated. For ORNL, upgrades are planned for the High Flux Isotope Reactor and a Center for Biological Sciences is envisioned, as is a Spallation Neutron Source. Overall, the costs to DOE are expected to be reduced considerably by strategic alignments with regional industry and privatization.

FUTURE PROGRAM PLANS *Harold Denton*

The Program Committee is planning to include speakers on the following subjects: 9/26/96 - *The Results of the Recent NCRP Meeting* (Dr. Warren Sinclair, NCRP); 10/22/96-*The Status of WIPP(TBD)*; 11/19/96 -*State of Tennessee's Regulatory Program* (Mike Mobley,, State of Tennessee); 1997 - *Developments in the Food Irradiation Industry* (TBD); *Message from the President of ANS* (Dr. Miller); *Nuclear Medicine* (TBD); *Local Area Activities* (TBD).

The first meeting of our Local Section will be held jointly with the Risk Analysis Society on September 26 at the Elks Club in Oak Ridge. The speaker will be Dr. Warren Sinclair who will summarize results of the recent meeting of the National Committee on Radiation Protection (NCRP). Fundamental research in molecular genetics and cellular has progressed extensively in the last five years. Anyone interested in the ongoing scientific and policy debates now occurring about the actual health effects of low level radiation, and the associated costs to industry and medicine of the present assumptions, should find this meeting most informative.

FROM THE CHAIR *Larry Miller*

The Oak Ridge/Knoxville Section of the American Nuclear Society is looking forward to another productive and interesting year. Some of our members are developing educational programs for schools and the general public. Others are planning conferences and investigating issues of current concern to members of the Society. Our dinner meetings provide excellent opportunities to gain new insights and to make new acquaintances, and agenda for several meetings are being planned. We are constructing an excellent Web Home Page, and we can watch it develop at

<http://www.engr.utk.edu/org/ans>

This site will keep us posted on chapter activities and will provide a vehicle to communicate with individuals who share common interests. It will be an educational resource to students and professionals, and it will provide links to useful data bases. If you have ideas or information you are willing to share, please communicate with any board or committee member or use our new web site. I look forward to seeing you at chapter functions and board meetings, and please let us hear from you if you have ideas on how to facilitate our common goals.

VOLUNTEERS NEEDED

Volunteers are needed to help with some Education Committee activities. If you can make yourself available to assist with an upcoming Boy Scout Jamboree on October 5, and / or an In- service Session for Knox County Science Teachers on November 5, please contact Julie Gaudons (576-5712) or Bill Hill (574-1554). Peggy Emmett (574-5276) also could use assistance with SHADES sessions. Your support would be appreciated and you will be contributing to a good cause.

WWW Hanna Shapira

The ANS-Oak Ridge/Knoxville Section now has a Home Page on the World Wide Web.

Look us up! - Our URL is <http://www.engr.utk.edu/org/ans/>

Our page is still under construction. In the future however, it will provide information about scheduled meetings, local activities, access to current and archived News Letters, links to other chapters and HQ and educational material.

We plan to create a dynamic bulletin board which will address any issue of interest and allow viewers to post their opinions or questions directly on the web "page."

Membership *Mike Westfall*

Membership co-chairs, Norb Grant and Mike Westfall,, have pursued several approaches to expanding the Section's roster. A good response was received from inactive members as a result of correspondence which summarized the Section's activities along with the potential benefits deriving from participation. A similar mailing is being prepared for new national ANS members residing in East Tennessee. Norb has built a membership database which allows sorting by several parameters for producing mailing lists. The Section has 162 currently-active members and 622 national members reside in the Section.

Update on Galileo

The nuclear powered Galileo space probe is continuing to make new discoveries. The Galileo probe utilizes decay heat from plutonium dioxide pellets encased in iridium to produce approximately 470 watts of electricity via the Seebeck effect. One major new discovery was made at Ganymede, one of Jupiter's moons which is 3/4 the size of Mars. Ganymede was found to contain its own magnetosphere, a bubble shaped region of charged particles which surround many planets. No moon was known to have it's own magnetosphere prior to this discovery. A sensor also indicated high densities of charged particles near the surface, which could be indicative of a thin ionosphere. On Europa, a moon approximately the size of Earth's moon, Galileo's images indicate that warm ice or liquid water may exist beneath Europa's icy crust.

Galileo will tour Jupiter for a total of 23 months and be exposed to a total of 123,000 rad. The nuclear power source on Galileo is insensitive to the cold of space and virtually invulnerable to high radiation fields.

Positive Health Effects of Low Level Radiation in Human Populations

There has been much discussion concerning the health effects of radiation since the dawn of the nuclear age. Determining the effects of low level radiation has been especially difficult to ascertain. Historically, American workers have been regulated according to the linear risk hypothesis. This hypothesis assumes any radiation exposure is harmful and increases the potential for contracting cancer. New studies are showing that low levels of radiation may potentially have positive effects on human health. For instance, populations exposed to high natural background radiation have been noted to have increased lifetimes and 15% lower mortality and cancer death rates than those populations exposed to lower background levels. Several recent studies have also demonstrated that exposure to low or intermediate levels of radiation have apparently resulted in positive health effects.

A recently completed ten-year study of nuclear shipyard workers by Johns Hopkins contradicts the linear risk hypothesis. Shipyard workers (700,000) were segregated into three groupings: non-nuclear (33,352); those with lifetime doses <500 mrem (10,462); and those with a lifetime dose > than 500 mrem(28,542). Deaths in each group were categorized by cause. The non- nuclear workers' death rates exactly matched the death rates of the general population. The nuclear worker group with the highest exposures had the least cancer rates of any group.

Society has viewed radon gas as a causal factor for lung cancer for many years. Current guidance, which is based on the linear threshold theory, ranks radon as a Class A carcinogen. The US

Environmental Protection Agency estimates radon causes between 7,000 and 30,000 deaths per year from lung cancer. The American Cancer Society estimates are similar at 16,000 deaths per year, due to radon induced lung cancer. Epidemiological studies in the US, Sweden, Finland, and China have all demonstrated a negative correlation of lung cancer with radon concentration. The most recent study in the US was performed by the University of Pittsburgh. This study demonstrated that the linear no-threshold prediction (which is the basis for the EPA and ACS estimates) of radon-induced lung cancer grossly over-estimates mortality due to low doses.

RADIATION HORMESIS

Hormesis is defined as 'any physiological effect that occurs at low doses and which cannot be anticipated by extrapolating from toxic effects noted at high doses.' It may be characterized as a process whereby low doses of an otherwise harmful agent may result in stimulatory or otherwise beneficial effects. Vitamins, which may be toxic at high doses, but are beneficial at low doses, are hormetic examples.

Numerous studies document the positive effects of radiation exposures at low levels. It is theorized that low exposures stimulate various defense mechanisms in the body so as to overcorrect and predominate. These same defense mechanisms are overwhelmed at high exposure levels. The linear effects theory does not take into account the predominance of the defense mechanisms at low exposures, but extrapolates the effects at high dose levels as being linearly destructive at low exposure levels.

DNA Damage

DNA is not as structurally stable as once thought. On the contrary, thermodynamic decay processes as well as reactive molecules formed by metabolic processes cause natural DNA changes. Spontaneous DNA damage (changes) are thought to occur at a rate of approximately 70,000,000 times/cell/year per person. In comparison, 1 rad of radiation delivered over a 1 year time period would cause less than 1 DNA damaging event per cell/day (natural events would cause 200,000 events per cell/day). Background radiation in Oak Ridge causes approximately 10 DNA events /cell per year. Clearly, spontaneous DNA changes are many orders of magnitude greater than changes caused by low levels of radiation exposure. Further studies in this area are needed to better understand the protracted effects of low level radiation exposures.

544TH QUOTABLE QUOTES

Quotations from members of the 544th Amphibious Unit of the US Army. The quotations pick up after the Hiroshima bombing, and before the Nagasaki bombing. The unit was heading to Japan for invasion.

They went because the attack was still planned. But the US dropped a second atomic bomb two days later on Nagasaki, and the war ended on September 2. When the 544th arrived later that month with several thousand soldiers on the beach at Wakayama, Japan, it was a cleanup operation. What they cleaned up, shook members of the unit.....

"Unbeknownst to a lot of people the Japanese were such great camouflage artists and there were many, many gun mounts we didn't know about." "They would've blown us out of the water."

During cleanup, "we worked for 3 days, 24 hours a day, to get all the ammunition off the beach, and we'd go 20 miles out to sea and dump it over the side," "I guess on about the fifth day, the Squad Commander took out a briefcase and pulled out a piece of paper. He said, 'I got this report from Army intelligence.'

"This is what it said, '*Army intelligence had reported it would take five waves to get the first live*

American on shore'. I was in the third wave. When people talk to be about Harry Truman dropping the bomb. I want to punch 'em in the mouth. I wouldn't be here if it wasn't for him."

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

William Hill

Research Reactor Division

ORNL - Building 7917

Oak Ridge, TN 37830-6399

or

E_mail: hillwe@ornl.gov

Historical recollections are especially welcomed.

Thank You

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