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Newsletter



NEW ENGLAND CHAPTER OF THE HEALTH PHYSICS SOCIETY

Volume XXXVII No. 5
February 2001

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March Meeting Announcement

Joint Meeting with the NE Section of the ANS

Date: Thursday, March 15, 2001

Location: Papa Razzi Restaurant
16 Washington Street, Wellesley, MA

Time: 5:30 p.m. Registration/Cash Bar
6:30 p.m. Dinner
7:30 p.m. Guest Speaker

Topic: Epithermal Neutron Irradiation Facility at the MIT Research Reactor

Speaker: Dr. Otto Harling
Professor of Nuclear Engineering, MIT

Menu: Italian Style Buffet

Cost: \$20.00 Members, \$30.00 Guests, and \$10.00 Students

DIRECTIONS TO PAPA RAZZI RESTAURANT

From 128 North or South take the Route 16 West exit. Follow 16 West for ~ 1/4 mile and the restaurant is on the left. Free parking is available across the street in the former Grossman's parking lot.

Registration Deadline is March 8, 2001.

Cancellations must be made before March 12 , or you are responsible for payment.

Name: _____ Phone: _____

Mail registration (with check to NECHPS) to: Ninni Jacob
Box 1914
164 Angell Street
Providence, RI 02912

OR Register online at www.nechps.org

OR call Ninni at 401 863 1738

'Hot' Waste Plan Cools Off

BY SHIA KAPOS

THE SALT LAKE TRIBUNE

Submitted by William Lorenzen

Envirocare of Utah, which operates a radioactive-waste landfill in remote Tooele County, had decided not to ask the Legislature and governor this year for permission to bring "hotter" wastes to Utah. "We're just not going to pursue the legislative approval this session," Envirocare President Charles Judd said Saturday. "It got to be a timing issue." Envirocare is trying to be licensed to dispose of so-called "class B" and "class C" wastes, which are significantly more radioactive than the waste Envirocare currently handles. To get such a license, the company first must gain a number of administrative and legislative approvals. "Timing" became an issue when it was clear the public-comment period for a tentative approval from the Utah Division of Radiation Control would not be completed until the first of March, after the Legislature adjourned.

Envirocare had believed this year's Legislature could consider a bill to approve the class B & C waste permit simultaneously with the regulatory review. But "legislators seemed concerned about that," said Judd. "So we thought it would be appropriate to hold off." Judd said his company would take its proposal to the 2002 Legislature instead. The decision drew praise from Envirocare's opponents. "There's a process. And that process should run its course," said Marilyn Welles, a Salt Lake County environmental activist. Envirocare's decision not to go to the Legislature comes after a public hearing last week in which most of the more than 100 people in attendance denounced the company's plan. A new public-opinion poll released last week also showed overwhelming public opposition to the Envirocare proposal.

Company officials and others believe much of the opposition is due to confusion between Envirocare's proposal and an unrelated plan being pursued by the Goshute Indians, who want to store spent nuclear fuel rods on their reservation in Skull Valley, about 40 miles southwest of Envirocare's landfill. Spent nuclear fuel is a "high-level" radioactive waste, significantly more radioactive than class B & C wastes, which are in the "low-level" category of nuclear waste. "There are a lot of differences between the two proposals," said Judd. "But we don't think people are aware or know the differences.

And that's what we're going to try and clarify." Envirocare currently is permitted to process and dispose

of class A wastes, another type of low-level waste, which primarily consist of contaminated soils from uranium mills and atomic-weapons sites from around the country. The B and C wastes it is seeking to dispose of are radioactive materials from nuclear power plants, research labs and hospitals – and are hundreds of times more radioactive than the A wastes. A large percentage of the class B and C wastes would come from sources that were planning to send their waste to South Carolina, which last year restricted the amount of radioactive waste going to its disposal site in Barnwell. Envirocare's decision not to go forward this year in its application process may mean the company will have to make some cutbacks, including layoffs, according to Judd. "The market we're in is on the downhill side," he said. Envirocare, with annual gross revenues between \$70 million and \$80 million in recent years, considers a class B and C license necessary for its continued viability. The company is not the only one vying for the B and C wastes. Waste Control Specialists has requested permission from the Texas Legislature to dispose of low-level radioactive wastes at its site near the New Mexico border. So far it has been unsuccessful. Texas lawmakers meet this month, but even if they approve Waste Control Specialists' proposal, the company would need to submit a license application that would take another six to 18 months to process. If it could have had its way, Envirocare would have already been in the market by then. To date, its plan had received the required approval from the Tooele County Commission. And Bill Sinclair, director of the Division of Radiation Control, last week gave a tentative OK to technical and safety aspects of the plan. After the public comment period on Sinclair's action, all Envirocare needed was the blessing of the Utah Legislature and a nod from Utah Gov. Mike Leavitt, who has vigorously opposed the Goshute proposal but has not taken a stand on the Envirocare proposal.

A Sheepish Hunt for Missing Fuel Rods

By DAVID M. HERSZENHORN

Submitted by William Lorenzen

WATERFORD, Conn., Jan. 6 If they could enlist the public in their high-pressure search, officials at the huge Millstone nuclear power plant here would be forced to post a sign saying something like this: "Lost: two spent nuclear fuel rods, 12 feet long and slender as a pinkie finger. Last seen in April 1980. Highly radioactive. May have been mistakenly shipped to South Carolina or Washington. Reward."

It may sound like a scene from "The Simpsons," but Millstone's predicament is quite real and, federal regulators say, unprecedented in the nation's highly regulated atomic energy industry. While there is virtually no risk to the public wherever they are, the rods are almost certainly stored safely, officials say. Their misplacement has both alarmed people who live near Millstone and highly embarrassed the plant's operators.

The episode is the latest black eye for Millstone, which is about to be sold and has been trying to rebuild its reputation after garnering one of the worst safety records of any nuclear power plant in the country. In the mid-1990's, all three of the reactors at Millstone were closed for safety violations; units 2 and 3 have since reopened. Officials decided it was not cost effective to reopen Millstone 1. And in 1999, the nuclear subsidiary of Northeast Utilities, which owns Millstone, pleaded guilty to 23 federal felonies and was fined a record \$10 million.

Rather than fear, the general reaction on all sides has been a mixture of frustration, dark humor, disgust and disbelief. "It seems unbelievable to me, with all the experts you have over there, how you could lose something like this," a grandmother and retired correction officer, Billie Staub, told plant officials at a public hearing in Waterford Town Hall on Thursday night. Another person asked if they realized they were the "laughingstock" of the industry.

Chagrined Millstone managers seemed to realize this only too well. At the hearing, they offered two theories, that the rods were still somewhere in the plant's spent fuel pool or that they had mistakenly been shipped to an out-of-state disposal center. "We're not at all pleased that it happened," said the decommissioning officer for Millstone 1, Frank Rothen. "The feeling is that's the only two places it could be."

While a mistaken shipment of spent fuel would constitute a violation of federal regulations, neither scenario would present any danger to the public,

regulatory officials said. Still, the explanations were met with anger and derision from local residents who have long been suspicious of Millstone because of its checkered past. "Maybe they're in the town dump," one heckler at the meeting called out. "Or on the Little League field."

For conspiracy theorists, the disappearance of two highly radioactive fuel rods offers a chance for breathless speculation. Reconstituted fuel rods could, theoretically, be used to make plutonium. Perhaps the rods were stolen by international terrorists. Or domestic militia members. Or maybe it was a political plot, an effort to discredit Northeast Utilities just as it is preparing to sell Millstone to Dominion Resources, a Virginia energy company.

But even some of Millstone's staunchest opponents concede that there is virtually no way the rods could have left the plant in anything but a properly protected shipping cask without setting off numerous alarms. "Superman, maybe," said Pete Reynolds, a former Millstone employee who worked on the refueling floor and said he was fired in 1994 after reporting safety violations. "These are not made out of kryptonite. He's the only one I know of that could have walked away with it."

Mr. Reynolds added, "Anybody with any common sense that knows anything at all about nuclear power, they are just laughing."

The federal Nuclear Regulatory Commission, however, did not seem amused. "Obviously we are concerned that they are not able to trace where these rods are," said Diane Screnci, an agency spokeswoman. "We are maintaining close contact to stay up on the status of this investigation."

Officials discovered that the two rods were missing in November during a routine inventory conducted as part of the effort to decommission the plant's original reactor, Millstone 1, permanently. Millstone documents last account for the rods in April 1980, listing their location in a container in the plant's spent fuel pool. But as of September 1980, plant records no longer accounted for them.

Fuel Rods continued on next page

Fuel Rods, from previous page

Last month, officials carried out an initial search of the pool, more than 900 square feet of borated water, 40 feet deep, where old fuel rods and other radioactive garbage and debris are kept. The pool contains nearly 2,900 bundles of rods called fuel assemblies. But they found no sign of the two missing rods.

One reason they are difficult to locate is that they were not part of a bundle that rods are usually kept in.

The General Electric Company, which manufactured the rods, had removed them from the bundle in 1972 to make some repairs. In the process, one was damaged and the other could not be refitted into the bundle. Instead, they were stored in a container and put into the spent fuel pool, said Peter Hyde, a Millstone spokesman.

A team of experts from G.E.'s nuclear division are now in Waterford to assist Millstone with a more thorough search of the spent fuel pool. Millstone officials, who stressed that whatever mistake that was made occurred two decades ago, said they are also searching through hundreds of thousands of pages of old records to figure out what happened.

If the rods are not in the pool, one possibility is that they were mistaken for long tubelike radioactivity monitors that plant employees use and often dispose of in the spent fuel pool. Discarded monitors are often cut up and shipped off with other radioactive garbage to low-level waste centers. The radioactive waste is wrapped in a liner and shipped in a special cask, both of which are made with lead and concrete. At the dump sites, the waste is buried in accordance with federal regulations.

On the streets of Waterford and neighboring Niantic, those who knew about the missing rods seemed more disappointed than scared. "The fact that there was an error is ridiculous," said Deborah Cohen, a tile artist, standing outside a local supermarket. "This shouldn't happen in a nuclear power plant ever."

At the public hearing, Ellen Lazerow asked if Millstone officials "behind closed doors" had ever looked at each other, uttered an expletive and wondered, "What's the worst-case scenario?" Larry Temple, the general manager of Millstone 1, pondered the question for a couple of seconds before replying, "I would have to say, yes."

**www.we-need-your-
h e l p . c o m**

The New England Chapter is looking for a volunteer with web design experience who would be willing to donate time maintaining the Chapter's web page. If you have a few free hours to assist with this task, please contact Tom O'Connell at toconnel@world.std.com, or any Board member listed on the cover of the Newsletter.

Invitation for Articles

Deadline for submitting articles to the Newsletter for publication in the next issue is March 21, 2001. Articles must be of interest to the membership, and any published article entitles the submitter to a certificate good for free admission to a NECHPS dinner meeting. The certificate is good for one year from the date of issue and is not valid for the Annual Meeting. Send articles for publication to the Editor at tara.bandini@rcp.dph.state.ma.us.

PACKAGING AND SHIPPING OF RADIOACTIVE WASTE

Many of us need to meet the DOT Training requirements, and the courses that are available are few, expensive, and not always local to us. If there is enough interest, we can arrange for DOT Training in the Boston area at a reasonable cost. If you would like to attend, please contact Ninni Jacob by calling 401 863-1738 or sending an email to: ninni_jacob@brown.edu.

Nuclear revival

Power woes renew interest in 'pebble-fuel' reactors

By Ross Kerber of the Boston Globe

Submitted by Tara Bandini

Sitting atop a filing cabinet at the Massachusetts Institute of Technology, they look no more exciting than a pair of graphite-colored eight balls. But if experiments go well, the two spheres could lead to a new generation of nuclear power plants across the country.

The balls represent a form of uranium fuel for a proposed nuclear plant design, known as a pebble-bed modular reactor, which is gaining currency in nuclear industry circles. At a time when California is suffering from rolling blackouts, a demand for new generating sources is reviving interest in the pebble-fuel concept, which dates to the 1950s.

Such a reactor was fired up in December at China's Tsinghua University. At MIT, a team including nuclear engineering professor Andrew Kadak has received research grants of more than \$1 million and hopes to build a demonstration reactor in Idaho.

The group also plans to cooperate with the Chinese researchers. And Chicago-based Exelon Corp. has invested \$7.5 million in a pebble-fueled reactor project in South Africa, in hopes the design will prove commercially viable.

New reactors in North America would help rehabilitate an industry staggered by safety problems in the mid-1990s - including some at the nuclear-engineering company where Kadak was once chief executive. But now he and other advocates hope pebble-fuel designs will prove suitable for scores of existing nuclear sites, among them several in New England.

They also hope the concept will prove simpler, safer, and cheaper to operate than today's aging fleet of commercial reactors. For one thing, they say, the fuel spheres would be meltdown-proof.

"We wanted to get rid of the big boogeyman of the technology," Kadak says of the design, which he refers to as "the politically correct reactor."

"If it can be made to work reliably, it could blow the pants off any competing electric source," said Exelon vice president Ward Sproat.

The fuel spheres that form the basis of the design are

made from uranium particles. Each sphere might power a 100-watt light bulb for a dozen years. That output might not seem like much. But a reactor filled with 400,000 such pebbles could produce the same energy as a gas-fired power plant, potentially for similar costs.

Nobody thinks such a plant could open in the United States for at least five years, since a host of questions remain. Most obviously, the pebbles themselves would become hard-to-dispose-of radioactive waste. Some earlier-generation plants like Maine Yankee have vowed never to host nuclear power sources again.

Other nuclear-power utilities like Southern Co. are noncommittal toward pebble-bed designs, or say they would prefer to build larger nuclear plants with designs the government has already approved. Said Southern vice president Louis Long, "We're not out there to prove new concepts. We're out with proven products to put on the ground to generate electricity."

But for utilities to publicly contemplate the construction of any new nuclear plants demonstrates what a turnaround the industry has undergone since just a few years ago. Then, in addition to safety issues, new natural-gas supplies and the deregulation of the generating industry led to a gas-plant construction boom.

Rising fossil-fuel prices have changed the economic picture significantly since then, however. Reactors such as Vermont Yankee, which once seemed like white elephants, are now the subjects of bidding wars as generating companies look to secure long-term power sources.

Last week, representatives from Exelon met with officials at the Nuclear Regulatory Commission to discuss the process of licensing a pebble-fuel design. The meeting coincides with a renewed lobbying initiative by a utility trade group, the Nuclear Energy Institute, which hopes to speed the development of new reactors.

Ron Simard, a senior director at the institute, cites the changed economics and says the problems with power deregulation in California have been exacerbated by the lack of new generating capacity there. Simard's group has been reluctant to discuss its lobbying plans in the past, but now, he said, members hope public opinion and the Bush administration might prove more receptive.

Entergy Corp. executive Jerry Yelverton made a similar point in an October interview with the National Journal: "If the US sees a hot summer next year, like the South did [in 2000], and electric prices go real high, nuclear could be a much more acceptable option."

Nuclear Revival, continued on next page

Nuclear Revival, continued

Most American nuclear plants today use 12-foot-long rods of radioactive fuel to heat up water, which is then used to transfer energy to electric turbines. A pebble-fuel reactor would contain hundreds of thousands of fuel spheres cooled by flowing helium.

Technically, each fuel sphere would be made up of about 15,000 uranium particles, each about half a millimeter thick and coated with silicon carbide. The spheres could be removed from the reactor, a few at a time, to be inspected and retired as their energy output is depleted over several years. Designers say the feature would eliminate the costly refueling shutdowns big reactors now require every 18 months or so.

The concept of fuel pebbles dates to the 1950s and drew much attention in Europe. In Germany, a pebble-based reactor built for research ran 22 years, and a commercial version ran for four years before the government stopped funding it in 1987. The halt was due partly to technical problems and partly to antinuclear sentiment following the Chernobyl accident in Ukraine.

Still, the results of the German project were encouraging enough to come to the attention of energy planners in South Africa, who wanted to reduce the country's dependence on coal-burning plants. Today a utility there, Eskom Enterprises, is weighing whether to build a pebble-fueled reactor in a suburb of Cape Town. Construction could begin as soon as 2002.

Along with Exelon, other investors in the Eskom project include British Nuclear Fuel and the Industrial Development Corporation of South Africa. Meanwhile a 10-megawatt Chinese reactor, at Tsinghua University near Beijing, began operating Dec. 1. Last March, MIT obtained Energy Department permission to work with researchers at Tsinghua. Kadak, who has visited the site, said substantial cooperation can't begin until China agrees to restrict the export of nuclear technology.

Few environmental groups endorse nuclear power because of waste issues and the industry's recurring safety problems. For instance, in 1999, Connecticut's Northeast Utilities pled guilty to 25 felonies and paid \$10 million in penalties for lying to regulators and dumping chemicals near its Millstone plant.

On the other hand, nuclear generation doesn't create the emissions believed to cause global warming. At MIT, Kadak became interested in reviving the pebble-fuel design about three years ago when he helped lead a seminar on how nuclear power might address environmental and economic concerns.

In 1998, Kadak's group began receiving grants that have totaled more than \$1 million from the Energy Department's Idaho National Engineering and Environmental Laboratory to study fuel-performance and safety issues. The Universities of Tennessee and Cincinnati are also involved.

The project represents a new career move for Kadak, who from 1989 to 1997 was chief executive of the Yankee Atomic Electric Co., a consortium of utilities that operated the now-retired Yankee Rowe power plant in Rowe, Mass. Yankee Atomic also provided services to other reactors, including Maine Yankee. In 1998, regulators cited the plant for using faulty engineering calculations performed by Yankee Atomic, problems that contributed to the plant's closure. Yankee Atomic's current owner, Duke Engineering & Services, says regulators never cited the company for wrongdoing.

While he cautions technical difficulties remain with the pebble-fuel design, Kadak is enthusiastic that such a plant could become financially viable. For instance, he imagines several reactors could be built on a single site, at costs low enough they could be financed by venture capitalists rather than public bonds.

He also cites Eskom's estimates its plant could generate power at around 1.7 cents per kilowatt hour, versus 3 cents or more for the same amount of gas-fired generation in the US.

Kadak's current research involves the reactor's safety. He says a pebble-based fuel core is "virtually impossible to melt" because, even if the helium coolant escaped from the reactor vessel, German experiments suggest the fuel pebbles wouldn't heat beyond 1,650 degrees Celsius - below the 2,000-degree level at which the spheres would begin to deteriorate.

This leads to some conclusions that could become controversial. For instance, Kadak suggests new pebble reactors could be built without the expensive emergency-cooling systems and safety zones that now surround nuclear plants.

South Africa's Eskom makes a similar point on its Web site: "The inherently safe design of a PBMR [pebble-bed modular reactor] renders the need for safety grade backup systems and off-site emergency plans obsolete and is fundamental to the cost reduction achieved over other nuclear designs."

Nuclear Revival, continued on next page

Nuclear Revival, continued

Dave Lochbaum, a nuclear engineer for the Union of Concerned Scientists in Washington, says the company has a point. In theory, pebble-based designs wouldn't need complicated machinery to cool fuel during an emergency, since the fuel would be cooled by contact with the atmosphere.

In practice, safety would depend on the quality of the fuel's manufacture, Lochbaum said. He also voiced concern that if the graphite in the pebbles was to catch fire, it couldn't be extinguished by denying oxygen to the blaze because air would still be needed as a coolant.

Lochbaum said he plans to attend the NRC's upcoming meetings on the issue. If the plants prove safer and they lead to the shutdown of existing reactors, Lochbaum said, he might support their construction.

Then again, he said, "if you keep the existing fleet of reactors and you're adding more, I'm not sure that's the right answer. You aggravate your waste issues and you don't gain anything in the bargain."

Membership Dues

Members are reminded that overdue dues should be paid as soon as possible to assure inclusion in the 2001 Member Handbook. Dues status is printed on the mailing label of the Newsletter.

Remember that the current By-Laws state that dues are \$10.00 per year, however, a payment of \$40.00 will get a member 5 years of Chapter membership.

Please send your payment to Robert L. Gallagher, Treasurer, at the MA Radiation Control Program, 174 Portland St. 5th Floor, Boston, MA 02114. Dues are always accepted and payable at the Chapter's technical meetings.

Cover Yourself!

The New England Chapter is selling T-shirts and golf shirts with the yellow and magenta NECHPS logo. They are available at all Chapter meetings as well as by mail; proceeds directly fund the Student Awards. Contact Bob Gallagher at robert.gallagher@state.ma.us or call 617.727.6214.

For more information see www.nechps.org.

Reminder to Students – Travel Funds Available

Students who submit a paper for presentation at the National HPS Annual meeting are eligible for consideration of a travel award funded by the New England Chapter.

The travel award will go to a student whose paper has been accepted for presentation at the National HPS meeting, which is in Cleveland next June. The student will present the paper both at the NECHPS annual meeting and at the National meeting. NECHPS will contribute \$500 to the travel costs of the student.

For more information contact Tom O'Connell, Awards Committee Chairman, at 617.983.6891 or e-mail toconnel@world.std.com.

The Impact of Low-Level Radioactive Waste Management Policy on Biomedical Research in the United States (2001)

Submitted by William Lorenzen

The National Research Council, Commission on Life Science, Board of Radiation Effects Research through the Committee on the Impact of Low-Level Radioactive Waste Management Policy on Biomedical Research in the United States has recently released its assessment of the effects of the current policy for LLRW. The document is a culmination of information gathered from researchers, state and institutional officials, and radiation safety officers regarding the effects of the existing LLRW disposal situation, including the effects of the lack of access to disposal facilities on institutions that conduct biomedical research and on hospitals where radionuclides are crucial for the diagnosis and treatment of disease.

The text of this report (as a searchable book) can be found at <http://books.nap.edu/books/0309073316/html/>.

NELRAD Annual Meeting

Wednesday, April 25, 2001
Henderson House, Weston, MA

Topic:

**Low Level Radioactive Waste:
NOT A PROBLEM**

For more information, contact
Dr. David Drum
dedrum@earthlink.net
617.732.6987 page 11161

January Meeting of the New England Chapter

Submitted by Tara Bandini

The New England Chapter held its most recent meeting on January 25 at Papa Razzi's Wellesley restaurant. The cold weather (no snow this time!) didn't deter the attendance at all, and there were some new faces present as well.

Elizabeth Gilman, a Certified BioSafety Professional, spoke about "Biosafety for the Radiation Safety Professional." The talk covered aspects of laboratory biosafety ranging from definitions of laboratory classifications, to decontamination, to waste disposal. This was a timely topic for radiation safety personnel who also have to deal with laboratories using other biohazardous agents.

For a complete overview of good laboratory biosafety practices, Ms. Gilman suggests the CDC's *Biosafety in Microbiological and Biomedical Laboratories*. To biosafety professionals, this is known as the "BMBL" and is one of the preferred reference books. The Fourth Edition has been printed and is available from www.cdc.gov/od/ohs/biosfty/bmb14/bmb14toc.htm.

The Italian buffet made for a great dinner and the mini cannoli for dessert was a wonderful treat. NECHPS is returning to Papa Razzi again in March, so come join us for dinner!

Call for Award Nominations

Know someone who should be recognized?
Let us know!

Volunteer of the Year Award

The National Health Physics Society created a Volunteer of the Year Award in 1999 as a way for the local chapters to recognize up to three chapter members who have contributed their services and expertise to the local chapter. The local chapter selects and presents this award.

The New England Chapter's first recipient of this award was Bob Scott. We want to continue to recognize the contributions made by our members of the local chapter. Please submit your nominations to Tom O'Connell, Awards Committee, 11 Dunbar Street, Worcester, MA 01603. The deadline for submission is April 27, 2001.

National Health Physics Society Awards

Each year the National Health Physics Society (HPS) presents awards to individuals who have made outstanding contributions to our profession. Each chapter of the HPS is encouraged to submit nominees to the HPS Awards committee for its consideration. As you are aware, the New England Chapter has many members who have made and/or continue to make outstanding contributions to the health physics profession.

If you would like to nominate an individual to any of the six awards: Distinguished Scientific Achievement Award, Robley D. Evans Commemorative Medal, Elda E. Anderson Award, Founders Award, Fellows Award or the Outstanding Science Teachers Award, please submit the informational package to Tom O'Connell, Nomination Committee, 11 Dunbar Street, Worcester, MA 01603.

SAVE THE DATE- JUNE 5, 2001

The annual meeting of NECHPS will be held on June 5 at the Westford Regency, Westford, MA. We have a great meeting planned. The theme is going to be "Latest Developments in Medical Health Physics". Some of our local experts will speak on topics from the following areas: Intravascular Brachytherapy, patient doses in interventional procedures, PET imaging, release of patients with high doses, and much more. Dave Allard, Director of Pennsylvania's Bureau of Radiation Protection, will be paying us a visit and speaking on monitoring of solid waste from hospitals. Please invite your friends and colleagues to this meeting. Watch for details in the next newsletter.

One last tidbit...

Submitted by William Lorenzen

Researchers working on the Human Genome Project discovered 130 genes dedicated to repairing human DNA, and expect that many more will be found in the future. "New clinical applications relating to human DNA repair genes are certain to emerge," says a report from scientists at the Imperial Cancer Research Fund in England.

The human genetic code, or genome, is under constant attack not only from cancer-causing compounds and ultraviolet light, but even, to a much lesser degree, from substances like water or oxygen. Among the more surprising discoveries for scientists was the discovery of four distinct repair mechanisms for one specific type of damage. "The existence of multiple proteins with similar activities is a recurring theme in human DNA repair," the report says.

Discovering how DNA repair genes are overactive in tumors could lead to tailored techniques that inhibit genes, allowing physicians to kill the otherwise-resistant cancer cells with drugs or radiation. The researchers add that research into DNA repair genes could help counteract aging. The report is in the journal *Science*.