



Editorial

A Dangerous Thing?

Providing information to the public on sensitive technical issues is a complex and daunting business that is often underestimated or taken for granted. It involves a good deal of trust and credibility, a clear understanding on the part of the information broker of the ways in which a number of information handling media operate, a delicate judgement of people and situations and a willingness to relate unfavourable information when the need to do so arises. Sadly, it is too easy for the entire function to become a cynical exercise in public relations, using the most pejorative sense of the term.

However, when the operation walks abroad in the guise of public education, trouble is not far away.

"Public education" is a term that everybody understands until they examine it closely. Such an examination may show a "public education" program to be based on an implicit assumption which could be stated as follows: present the right information in the right way and the public will decide in your favour. Unfortunately, awkward questions arise. Which public is being addressed (there are several possible publics)? To what level do they need to be "educated"? Which medium should be used? What is the right information and what is the right way to present it? Embarking on a program without having answers to questions such as these is at best to pursue a poorly defined objective and at worst to attempt a form of social engineering.

This brings us conveniently to scientists and engineers. Because they are the people in the nuclear industry who understand the CANDU system and how it works, and because surveys have shown time and time again the natural authority and credibility accorded to scientists and engineers by most segments of the public, they are susceptible to being drafted into "public education" ventures, either as authors to prepare the message or as agents to disseminate the product. In the course of acting as distributor/interpreter, anyone who wanders outside their area of proper expertise and into the minefield of "public education," in pursuit of a poorly defined or even an undefined objective and using faulty tools, is trading fast and loose on their legitimately acquired and rightly

respected authority. They may be betraying the trust which their authority carries with it and offering themselves up for slaughter in the process.

This doesn't mean that we should all retire from the field and cower impotently in the face of public opinion. It does mean, however, that in any attempts to influence that opinion by making information available to it, motives have to be recognized and acknowledged, objectives have to be well defined and the means used to reach them have to be soundly based and supportable. More importantly, it means that an industry known for working to high standards and tight tolerances should apply the same precision of thought and respect for fact and detail to all its projects. None of us would expect to get away with using poor definitions, vague statements and questionable logic in our own field. There is no reason to expect that we could get away with it in any other field either.

The House That Isaac Built

Three hundred years ago, Isaac Newton published his *Philosophiæ Naturalis Principia Mathematica*.

It would be hard to exaggerate the importance of this work. The *Principia* consolidated the advances made by Galileo, Kepler, Descartes, Hooke and others and provided a powerful impetus for the seventeenth century scientific revolution. Ideas generated in the wake of the *Principia* were to figure prominently in the

Age of Reason which soon followed. Perhaps most significantly, by establishing a mathematical framework for physics and by putting in place a set of universally applicable laws of motion and gravitation, Newton handed down the ability to understand why things are as they are and behave as they do. From this knowledge there eventually flowed a greatly augmented ability to harness natural forces and put them to work.

This capability for control and the confidence that arose from it grew with the passage of time. Concurrently, but most importantly over the last hundred years or so, the awareness of the philosophical stance underlying this situation appeared to fade. Today, the position has become extreme. Our technical ability to plan modifications to our environment, and then to set a course for putting these plans into action is enormous. Consider just how enormous.

At least two comprehensive plans exist, backed by a lot of expensive hardware to carry them out, which probably enable the human race to obliterate itself along with all other higher forms of life. This is the ultimate in mastery and control: the systematic elimination of everything. At less apocalyptic levels, our ability to modify our environment and to take control of and channel natural processes is hardly less impressive.

A single modern power station can produce 1000 MWe or more; this is a commonplace today. In terms of mechanical effort, this power can be equated roughly with the working capability of about four million strong

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healthy slaves, who always remain in peak condition, never have to sleep, and each of whom can be fed, housed and made to work indefinitely for about one cent per hour.

A single supertanker today has a gross loaded displacement of 500,000 tonnes. The carrying capacity of a single ship such as this dwarfs the total burden of some of the world's most powerful navies in times past; it is greater than the gross tonnage of all the ships that faced each other when the Spanish dispatched the Armada in 1588.

A single aeroplane today can transport 80 tonnes of freight a thousand miles in two hours. A century ago the same feat would have required over 20 hours by the fastest route; two centuries ago it would have taken weeks or months.

Such is our rather Laputian capability. What has faded, been forgotten, and latterly perhaps not even realized, is that the framework which Newton put in place was, at the time, primarily a means of understanding the physical world about him. More than that it was the mathematical basis of an emerging world view, a unifying natural philosophy. It has gradually lost this designation and has now become largely a fragmented gang of slaves to mechanical human activities, activities which become more and more like Bertrand Russell's description as the rearrangement of matter at or near the earth's surface.

Three hundred years on, the paradox emerges. The great strength, and weakness, of the system which Newton set on its feet is its tremendous success in describing the material world. It has led to an understanding of nature which is complete enough to allow prediction and control of an increasing number of natural processes, and the development of "technologies" to do just that. Partly as a result of these successes, there is a strongly held assumption that the scope for applying these technologies has no practical limits and that any constraints imposed by nature or any unforeseen consequences brought about by our technological forays are themselves susceptible to technical fixes. The natural philosophy is still there, and stronger than ever, but the study and contemplation of it as such is now generally bypassed, it seems, in favour of its exclusive use as just another tool.

In a world run according to the findings and dictates of economists and engineers, and in which we develop and apply technology on the scale and with the intensity that we do, our situation is viewed by some with disquiet. They are disquieted when they consider that the tools used to erect all this superstructure, constituting our built physical environment, are also a magnificent but largely unappreciated intellectual construct which is now, as a matter of routine, ignored as irrelevant or bypassed unknowingly. Perhaps it should be disquieting for everybody, not least for economists and engineers, to realize that the material power conferred by those sterile and insipid formulae, and the ways in which that power is used, are not tempered by any deep understanding of their history, of how the knowledge they encapsulate was won nor of the potential they

offer for allowing one to view with wider vision, to ponder that sublime, subtle and strange world "out there." Such a historical and cultural perspective would at least help to balance the heavy technical bias which distinguishes the modern outlook. Reconsidering all this from time to time, reconsidering the path that has led us here from Newton's day, the reasons why that path was chosen at different points along the way, and where it is leading us in the future should be everyone's pastime.

Perspective

Fallout from Chernobyl

A paper, based on his recent book of the same title, by journalist L. Ray Silver. Presented at the annual seminar of Ontario Hydro's Nuclear Studies and Safety Dept., held in Orangeville, Ontario on June 30, 1987.

It is about 720 years since Franciscan monk Roger Bacon urged the brethren to take a scientific approach. "Observe, try, record, speculate *logically*, try out your speculation to confirm or correct it, communicate to other researchers," he told them. On the rational side of alchemy, he debunked the charlatans, ridiculed their metaphysics and saw their smoke as nothing more than charcoal, sulphur and salt-petre. Then the black magic brigade ganged up on him. For a dozen years Roger Bacon got a bad press and his books were banned. Pseudo-science flourished once more.

About 360 years after that, Francis Bacon – no kin to Roger – spelled out the rules of the science game in *New Atlantis*. The movers and shakers of Europe got his message. Within 40 years France's Academy of Science, Britain's Royal Society and Italy's Natural Science Academy were founded, scientists everywhere were communicating through the Royal Society's journal and Robert Boyle and Isaac Newton established the physical sciences on which the Industrial Revolution was based. Another 360 years since Francis Bacon's heyday, the metaphysicians are back in the temple, the alchemists' alembics are smoking, soothsayers flourish, witchcraft thrives and *your jobs are on the line*.

Tracing the Threads

Let me remind you of your genesis. When Chernobyl steam plant no. 4 blew its radioactive innards sky-high on April 26, 1986, nuclear science in Canada was more than 80 years old. For over half of that time Canadians have operated a world-class nuclear industry. The Canadian connection was forged in those nine years at the century's turn when the world of science ran on an axis that ran through Ernest Rutherford's nuclear lab at McGill University. In the 1930s it was Rutherford who inspired Pyotr Kapitz and Igor Kurchatov to establish nuclear technology in the USSR.

A generation after that when CANDU co-

designers Gordon L. Brooks of Atomic Energy of Canada Limited and William G. Morison of Ontario Hydro were looking for the right metal to clad reactor fuel and pressure tubes they leaned on Soviet experience with a zirconium-niobium alloy. Lunching with Soviet counterparts at an International Atomic Energy Agency (IAEA) meeting in Vienna last August, Brooks and Morison renewed discussions about the durable alloy. Then the talk turned to CANDU shutdown rods.

In the wake of a similar but less serious accident than Chernobyl – a 10 per cent meltdown of the NRX research reactor at Chalk River in December 1952 – the Canadians developed a very fast shutdown system. In an emergency it would thrust 28 spring-loaded rods the full depth of the reactor core to absorb atom-splitting neutrons. How quickly would it act? The CANDU nuclear reaction would be 90 per cent arrested within two seconds of the time that the operator pressed the "scram" button, Brooks said. The Chernobyl reactor relied on 30 shutdown rods which would be 80 per cent effective within 10 seconds. But in four seconds after they were activated that fateful night last year, the runaway reactor generated a hundred times its rated heat capacity. The resultant steam and hydrogen explosions lifted the vault top, rupturing every fuel channel. Incandescent chunks of graphite and lethally radioactive fuel fragments flew from the broken furnace. It was as if 428 million horses had kicked the plant apart. Canadian nuclear technology would

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La SNC procure aux Canadiens intéressés à l'énergie nucléaire un forum où ils peuvent participer à des discussions de nature technique. Pour tous renseignements concernant les inscriptions, veuillez bien entrer en contact avec le bureau de la SNC, les membres du Conseil ou les responsables locaux. La cotisation annuelle est de \$40.00, \$20.00 pour les retraités, et \$5.00 pour les étudiants.

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have prevented that. But when the Soviets tried to buy that safety technology from Ontario Hydro last fall the Mulroney government prevented it.

Your engineering and technology were founded on the three centuries of scientific research that evolved to the Atomic Bomb. There, I have uttered the ultimate obscenity, the taboo words more loathsome than sodomy these days. But it is the Bomb, that obscene twin of nuclear energy, on which latter-day witchcraft and the new alchemists thrive. When that awesome cloud rose over Hiroshima some 40 years ago, black magic was reborn and your peacetime nuclear craft was cursed at birth. Hiroshima – the word triggers a violent thundercloud roaring upward till stratospheric winds rounded its top to mushroom shape. In awe, fear, guilt and incomprehension we buried that image in our collective psyche. A generation later opportunists ploughed those repressed depths of the public mind to reap a rich crop of mass paranoia. “Radioactive contamination” became trigger words. Then it was enough to cry “radiation” or the curse-word “nuclear” to tap dark corners of the mind where demons lurk.

In the early 1980s environmental zealots, entertainment-hungry news media and opportunistic politicians reduced a pleasant Toronto suburban street – McClure Crescent – to an abstract image through just such psychic mechanism. The McClure neighbourhood, they said, was “radioactively contaminated.” Nuclear era sleuths were pictured earnestly bent to catch every beep of their geiger counters. The little golden TV folk glanced nervously over their shoulders while interviewing residents. The McClure families were generalized as “radiation victims.” That untouchable classification dropped them from the conscious concern of their elected representatives, neighbours, even friends. “What? Bring our kids over to play in your backyard? Are you crazy?” they were asked. Like victims in George Orwell’s super-state the McClure residents became non-persons, depersonalized beings in a proscribed area. Today you people in Canadian nuclear labs and power stations, uranium mills and reprocessing plants, face the same treatment. You are being spooked by the ghosts of Hiroshima. Your livelihoods are dependent on a high-tech, peacetime industry born in those first post-war-time years before the dust had settled. As in Francis Bacon’s day, reason prevailed and sorcery waned. Public acceptability was built on the proven performance of the world-class CANDU reactor and its spin-off isotopes. Need I remind this audience that nearly half a million people in 80 countries annually receive treatment on cobalt-60 beam-therapy machines of Canadian design and manufacture, that these units have extended cancer patients’ lives by 13 million person years. But despite such statistics Three Mile Island shook public confidence. Chernobyl almost shattered it.

Witchcraft

On April 29, 1979 a *Toronto Star* headline screamed: “New Perils Hit Nuclear Plant” and on page three Ontario Hydro was accused of minimizing nuclear danger. But if you endured

to the fourth paragraph of the *Star*’s lead editorial that day you learned that “there is a big difference between what is happening in the US nuclear power industry and what is happening in Ontario. An accident here would not produce the (same) disastrous chain of events. . . CANDU reactors are generally acknowledged to be the safest and most reliable in the world.” On the other hand movie-goers leaving the theatre showing ‘The China Syndrome’ that night were handed leaflets by the anti-nuke Energy Probe organization. “It’s no longer a movie. It just happened in Pennsylvania and it could happen here. . . The chances of a catastrophic accident at the Pickering nuclear plant near Toronto are comparable to the risks at US plants,” said the doomsayers.

Seven years and one day after that, as the dust settled at Chernobyl, *Toronto Star* readers were told: “It can’t happen here says Ontario Hydro. No, it *probably* can’t happen here says anti-nuclear group Energy Probe. . . (but) there remains a fundamental possibility of its happening, Energy Probe spokesman Norman Rubin said.” With a vested interest in nuclear disaster – real or imaginary – Energy Probe employs a sophisticated mix of public relations expertise and demonology to harvest a rich crop of paranoia. The fruits of public fear – the payoff – is threefold. Frightened people, hoping to buy off fate, make donations. The government buys off a noisy nuisance group with renewed funding. Other vested interests which find nuclear power competitive make substantial contributions. In 1982, 16 Canadian oil and gas companies contributed to Energy Probe’s \$273,000 annual budget.

The witchcraft, voodoo and sorcery to exorcise the high-tech devils from the environment is heavy on anthropomorphism. For five years from June 1978 concern for the three-inch snail-darter fish stopped Tennessee Valley Authority from completing a \$100 million power dam. In August 1981, Ontario’s resources minister Alan Pope spent half a day celebrating an eel ladder to let wrigglers squirm over a power dam enroute to Lake Ontario from the Sargasso Sea. On June 11, 1987 a Toronto member of the American Farm Animal Reform Movement disrupted a livestock industry conference. “Why do we allow animals to exist in conditions equal to those in Nazi death camps?” she demanded. Last month (May) – seven years after TMI – Pennsylvania health authorities reiterated that repeated studies had found “no significant increase” in cancer within 32 kilometres of the nuclear station. Nonetheless another \$300,000 study was ordered. Why? Well, local dairy farmer Jane Lee and farmwife Marjorie Aamodt had been doing their own epidemiological study by recording family tales of cancer cases in the Pennsylvania boondocks. Another resident, Mary Osborn had been out collecting bizarre maple leaves and dandelions, some nearly a metre in length. They were caused by radiation around the TMI plant, she said.

Fowl Implications

And on Chernobyl’s first anniversary the *National Enquirer* reported that Soviet scientists had captured a six-foot, 250-pound

chicken. A British reporter who covers the Soviet scene from England told the American publication the chicken had been abandoned when a farmer fled Chernobyl area. Two months earlier a woman with the improbable name of Irene Cock picketed the Toronto office of Atomic Energy of Canada Limited dressed as a lady chicken. She thinks AECL’s food irradiation technology is “a farce.” So does another Torontonian, Anne Hansen, who says “The reason the nuclear industry is (promoting) irradiated foods is to extend its own shelf life. Our suicidal enslavement to nuclear technology is unsavoury.”

In fact, AECL has researched, developed and perfected the sterilization of foods and drugs by cobalt-60 gamma rays to a world-wide business over the past 33 years. Now they are the target of the Vancouver-based Canadian Coalition to Stop Food Irradiation, among others. The vested interest behind such anti-nuclear claque is hard to pinpoint. They invariably hide behind post-office box addresses and electronically-answered phones. The word “Coalition” usually signals NDP support. In Ontario, at least, the New Democrats and Energy Probe have collaborated to sponsor several anti-nuke coalitions in recent years.

In Ottawa last month Vancouver MP Mary Collins tabled the report of her parliamentary committee on food irradiation. Admitting that “Salmonella may have contributed to 750 deaths in Canada in 1985, (that) salmonella contamination is a major source of food poisoning and significant health concern in Canada and elsewhere, (that) poultry is a prime candidate for irradiation, (and that) irradiating packaged poultry can eliminate salmonella,” she and her committee nevertheless insist that AECL’s cobalt-60 gamma radiation “will not deal with salmonella in a holistic context.” The Collins committee thinks there may be more cost-effective – and less scary – ways to deal with 750 salmonella poisoning deaths each year. Mary Collins is a Conservative, a member of the same Mulroney government as Marcel Masse. Energy minister Masse is in the process of dismantling AECL’s irradiation subsidiary and handing over the pieces to the private Institute Armand-Frappier in Québec.

Activist Arguments

For some years I have been questioning environmentalist activists such as Ralph Nader, Adele Hurley, Energy Probe and the NDP spokesfolk as to why they don’t endorse the most conspicuous and effective reducing agent for acid rain – nuclear power. They invariably look at me blankly and mutter about nuclear waste. Do they not know, nor care, nor admit that Ontario Hydro’s new nuclear stations brought into service in the past two years alone have cut the utility’s acid gas emissions by 190,000 metric tons, that is by 37 per cent. In Saint John, NB in June 1987 environmentalists were advising the populace to say “No to Lepreau 2.” Their vested interest was not apparent, but even to an Upper Canadian observer, the anti-nukes’ politics were plain enough. “Premier Richard Hatfield and AECL are intent on getting federal financial

guarantees to build Lepreau 2," they say. "The premier's motive is clear: a promise of lots of short-term jobs in Saint John in an election year. AECL's motives are much more insidious." According to the anonymous pamphleteers it is all a plot to set up this CANDU-300 at Point Lepreau to induce third-world countries to buy them to brew up plutonium for nuclear bombs. "This province is being used as a pawn in a dangerous and expensive nuclear game being played out in Ontario and in foreign countries," says this anti-nuclear and environmentalist coalition.

"There are no benefits for New Brunswickers from Lepreau-2, only smoke and mirrors," said these latter-day verbal alchemists. "Simply put, one job at Lepreau-2 puts from 7 to 16 other people out of work." Because this claim defied logic I checked it out with Atomic Energy of Canada Limited engineers among others. Such a plant would require some 4,800 person-years of on-site construction work, i.e. about four years work for 1,200 New Brunswick tradesmen. No one in the labour unions, no one in the New Brunswick government, nor in Ottawa could explain how those potential 1,200 construction workers would put a single other person out of work.

"Lepreau-2," said the doomsayers, "will increase the risk of catastrophic nuclear accidents in this province: contribute to frightening radioactive impact of ongoing leaks and the stockpiling of deadly wastes. It will starve hundreds, perhaps thousands of badly needed jobs and thwart any efforts towards an economical, efficient and responsible energy future in this province." In Saint John I suggested that fellow journalists query the experts on the validity of those anti-nuke claims. I have been querying many of these internationally-recognized professionals about just such absurdities for 35 years now. Nothing they have ever told me would justify such Henny-Penny sky-is-falling predictions, conclusions or speculations.

Refute It Thus

I suggest that each and every one of you make it your business to refute each and every such false accusation each and every time you encounter it. Whether it comes from a friend, a neighbour, a member of your family, a chance acquaintance or someone you meet in the supermarket line-up, counter such incantations with hard numbers, proven facts, sharp and clear refutations. It is your jobs that the sorcerers seek to transmute to dross with their mystical potions, smoke and mirrors. It is your jobs that are on the line when politicians hear frightened kids chanting slogans to ward off nuclear evils. It is your jobs and those of tens of thousands of other Canadians in high-tech fields of endeavour that are at risk.

At the bottom of a 17th century painting to illustrate medieval alchemy, the Dutch artist Pieter Brueghel inscribed a rhyme. It roughly translated to this:

The alchemist wastes time and leisure and in the end starves in a workhouse.

The new alchemists, those latter-day Luddites, the anti-nukes, might ponder that warning.

L. Ray Silver

FYI

Uranium Notes (R.T. Whillans)

On July 20, a United States Court of Appeals ruled to uphold a June 1986 District Court order placing a 100% restriction on the enrichment by the U.S. Department of Energy of foreign uranium intended for domestic use. Essentially, this ruling bans the importation of all uranium for end use in the U.S., effective immediately.

Canada could well be the foreign supplier most adversely affected by this restriction, as one-third of Canadian uranium production is destined for export to U.S. power utilities. Sales are currently valued at some \$300 million annually.

During the period 1967 to 1984, the international uranium market was severely disrupted when the United States first sought protection under Section 161 (V) of its Atomic Energy Act. Canadian producers have expressed their concern that the world's largest market for uranium might once again be protected by a unilateral non-tariff barrier; this is particularly distressing as the world uranium market has just reached equilibrium.

As Canada is a reliable, fair and very competitive supplier of uranium to many countries, the Government of Canada has sent a Diplomatic Note to the U.S. State Department urging the U.S. to appeal this court ruling. The Note points out that "should it remain in force, [the decision] will severely disrupt Canadian exports of uranium to the United States, will have harmful implications for the international uranium market, and will give rise to major trade irritants between the U.S. and its current suppliers of uranium. In addition, restricting the United States market to only domestic uranium would be completely at odds with current efforts to negotiate a free-trade agreement between our two countries, contrary to declarations against protectionism made at Punta del Este, and clearly inconsistent with the United States' GATT obligations."

Pickering-1 Goes Critical after Complete Retubing (Staff)

On July 16th, the successful completion of a three-year pressure tube replacement project was realized when Ontario Hydro's Pickering-1 reactor went critical after a shutdown of almost four years. This is the first time a retubing project of this scope has been performed and demonstrates a means of extending the life of CANDU reactors by replacing a key component from the primary circuit of the reactor core. The reactor first went critical in 1971.

The project originated with the pressure tube rupture at the twin Pickering-2 reactor on August 1, 1983, after about half the expected

life of the pressure tube. The accident was due to hydride blisters which had formed in the Zircaloy-2 pressure tubes due to a complex combination of sagging of the pressure tubes due to creep and misplaced spacers, which allowed contact with the calandria tube, and deuterium absorption.

Only Pickering 1 and 2 had this type of zirconium-tin alloy pressure tube and the retubing of these reactors with stronger zirconium-niobium pressure tubes, which all later CANDU reactors have, began in March 1984. The new tubes are expected to resist the conditions which led to pressure tube failure and to have a life of about 25 years. The calandria tubes were not replaced.

The retubing required the creation of a wealth of new devices and techniques to allow a low-cost and safe retubing operation.

Retubing of Pickering-2 is nearing completion and full-power operation of both units is expected before winter.

Challenge to Nuclear Liability Act Dismissed (Staff)

In September, an Ontario Supreme Court Judge dismissed a challenge to the federal Nuclear Liability Act before it went to trial, after hearing arguments on behalf of Ontario Hydro, the New Brunswick Electric Power Commission and the federal government. The two Canadian electrical utilities own CANDU nuclear power plants and were allowed to intervene on behalf of the federal government. In urging the dismissal of the challenge, lawyers argued that the challenge should not be allowed until an accident occurred and someone suffered as a result of the limits established by the Nuclear Liability Act. The judge accepted these arguments and found that the applicants lacked the required status to make their application.

The applicants contended that there was a real likelihood of a Chernobyl-type nuclear accident in Ontario, with a liability far exceeding \$75 million, and that the low liability limit reduced the incentive to design, construct and operate nuclear reactors safely. They argued the federal law was an invasion of provincial responsibilities as well as an infringement of rights under the Charter of Rights and Freedoms of 1982.

The constitutional challenge was brought by the Toronto-based anti-nuclear group Energy Probe and 12 other plaintiffs, including the City of Toronto, earlier this year. The decision will be appealed.

Ottawa to Approve Food Irradiation on Case-by-Case Basis (Government of Canada)

In September, Health and Welfare Minister Jake Epp and Consumer and Corporate Affairs Minister Harvie Andre announced the tabling of the government response to "Food Irradiation," a report of the Standing Committee on Consumer and Corporate Affairs.

Mr. Epp said, "After studying the Standing

Committee's recommendations and considering current scientific knowledge about this process, the federal government has outlined its position on food irradiation and labelling which reflects our commitment to ensuring the safe application of this technology and to providing consumers with the choice of irradiated or non-irradiated foods."

Mr. Andre, in endorsing the Standing Committee's recommendations on labelling, said, "My department is continuing its work on new regulations to ensure the clear identification of irradiated foods."

Mr. Epp noted that several recommendations from the report are consistent with current and planned government actions related to food irradiation. However, he acknowledged that there are some recommendations the government does not accept in light of research done in Canada and elsewhere over the last 30 years. Such research establishes that the proper application of food irradiation is effective and does not pose a hazard to health.

Both Ministers indicated the government is proceeding to amend the Food and Drug Regulations pertaining to food irradiation to strengthen premarket review requirements and compliance measures.

NPD To Be Shut Permanently (Ontario Hydro)

Ontario Hydro and Atomic Energy of Canada Limited will recommend to their Boards of Directors that the Nuclear Power Demonstration plant in Rolphton, 200 kilometres northwest of Ottawa, Ontario remain shut down permanently.

The small demonstration reactor was shut down in May for regular annual maintenance and to examine a pressure tube. Tests on the pressure tube showed increased deterioration since the last test, indicating that it and likely other tubes in the reactor were nearing the end of their service lives. The pressure tubes in the NPD reactor are made of Zircaloy-2, while all the commercial-sized CANDU reactors in Canada have zirconium-niobium pressure tubes.

"Given NPD's small output, its age, and the fact that it has fulfilled its role as a demonstration power reactor, Hydro and AECL concluded that replacing the pressure tubes would not be economical," said Arvo Niitenberg, Executive Vice-President of Operations for Hydro.

NPD was the first reactor to successfully demonstrate the concept of on-power refuelling, one of the unique features of the CANDU.

SLOWPOKE Heating Reactor Starts Up (Staff)

The 2 megawatt SLOWPOKE Demonstration Reactor (SDR) went critical on July 15th at Atomic Energy of Canada Ltd.'s Whiteshell Nuclear Research Establishment and will now undergo low-power testing before heating local buildings. The start-up of the reactor, designed to supply hot water, demonstrates the reactor

district heating concept which is being marketed by AECL Research Co. in Canada and abroad.

The reactor uses 5% low-enriched uranium fuel and light water as coolant and is about 100 times more powerful than the SLOWPOKE research reactor. The commercial version of the demonstration SLOWPOKE, known as the SLOWPOKE Energy System (SES) will produce 10MW (thermal). AECL is the first company in the world to demonstrate the use of small reactors to heat buildings.

The startup came while Bill 28, the High Level Radioactive Waste Act, was among the pieces of legislation considered by the Manitoba legislature before it recessed for the summer. Despite a strong presentation of the concerns of Atomic Energy of Canada Ltd., the legislation was enacted without amendment.

The law prohibits Manitoba facilities (including those of AECL) from storing used nuclear fuel produced outside Manitoba, or its interim storage for more than seven days.

Prohibiting the storage of high-level waste from outside the province for more than seven days may jeopardize future commercial opportunities for the province. If WNRE is not able to store fuel assemblies from SLOWPOKE Energy Systems marketed outside the province, duplicate storage facilities will have to be built elsewhere at additional cost.

Reactor Ageing Draws Attention of Experts (IAEA Newsbriefs)

At a recent international symposium in Vienna, more than 150 experts from 30 countries discussed technical and safety factors influencing decisions on the future of nuclear power plants that are approaching the end of their planned operational lives. By 1990, more than 50 nuclear power plants around the world will have been producing electricity for 25 years or longer. Most nuclear power plants have planned operational lifetimes of between 20 and 40 years.

As plants advance in age, decisions must be taken whether to retire them from service or to extend their lifetimes - choices that are plant specific and heavily influenced by safety and economic factors. At the symposium, experts focused on safety aspects of ageing, including age-related processes that may affect operational safety unless preventive measures are taken, and approaches to assess the capability of older plant components to perform their safety functions in normal and accident conditions. Based on the symposium and related meetings convened over the past 3 years, the IAEA will be preparing a comprehensive report on this subject to provide further guidance to its Member States.

The (June/July) IAEA symposium was the second this year on the general subject of plant ageing. In February 1987, a symposium on plant life extension was jointly organized by the IAEA and Nuclear Energy Agency of the Organization for Co-operation and Development (NEA/OECD). Among other topics, the meeting reviewed practical and economic aspects of plant refurbishment.

ONSR Completes Receiving Submissions (Staff)

The Ontario Nuclear Safety Review, consisting of an independent nine-member advisory panel headed by Dr. Kenneth Hare of the University of Toronto and assisted by over 20 consultants and a small support staff, is completing the receiving and examination of submissions on the safety of Ontario Hydro's nuclear generating stations.

Major submissions are by Ontario Hydro, Atomic Energy of Canada Ltd. and the Ontario Ministry of Energy.

Letters to the Editor

Dear Sir,

This letter is in response to your editorial in the May/June issue of the *Bulletin*. Perhaps I misunderstood the main thrust of your article, but it appears to me that you argue *against* "risk assessment using observed data". Such a move would be directly counter to the AECB Siting Guide, which is based on measurable safety performance targets. Without measurements in the field we would not know the level of safety actually being achieved in operating stations. Design targets are required, no doubt, but their achievement during operation is the central requirement for safety.

Several methods already exist for measuring safety achievement. Some of these are referenced in my paper given at the May 1986 Waterloo Symposium on Risk and Benefit Impact of Energy Alternatives. Station quarterly reports are a continuing record of measured safety levels. One can easily reach the conclusion that CANDU plants have performed at a risk level at least an order of magnitude below the prescribed limits of the Siting Guide.

The paper by Ott and Marchaterre in *Nuclear Technology*, February 1981, shows clearly the world-wide decreasing-rate trend of severe reactor accidents. This trend continues, even including the "outlier" event at Chernobyl-4. Basu and Sharma applied this methodology to a couple of failure types in Pickering A, as reported in the 12th Inter-RAM conference for the electrical power industry in April 1985. Not all news is good news; this is a fact of any safety-related activity.

For the sake both of assuring economic protection and of gaining increased public support, I sincerely hope that CANDU owners continue to employ "risk assessment using observed data". There is no need for hesitancy on safety issues; we have an excellent story to tell. Uncertainty can only be reduced by measurement, and not by hiding behind a false wall of industry solidarity.

D.A. Meneley
Chairman and Professor of
Nuclear Engineering, UNB

CNS News

President's Message

It is a pleasure and an honour to have been elected President of the Canadian Nuclear Society.

The CNS is a society that is strong organizationally and most important technically and as such is recognized both nationally and around the world. In the coming year, your Council and I hope to build on these strengths and on the efforts of all the past presidents and Councils to further strengthen the Society.

The strength and vitality of an organization is its membership. The first priority this year will be to increase the number of members in our Society and to get the entire membership active and involved. In addition to actively pursuing membership from within our two major organizations, Ontario Hydro and Atomic Energy of Canada Limited, we will target members from the uranium mining and processing industries and component manufacturers. We will also work towards a resolution of our difficulties with respect to the restriction in membership by Atomic Energy Control Board staff.

We are committed to developing strength in numbers. To what end?

As so aptly brought home at our Annual Conference in Saint John, the significant challenge facing our industry and therefore ourselves, working in and for this industry is the limited degree of public and therefore political support for science and technology in general and energy and nuclear issues specifically.

While our technology and industry enjoys considerable public support in New Brunswick and Ontario, we must as a priority do more to gain support in other parts of Canada for our highly acclaimed nuclear power technology. As individuals and as a society, we will adopt a more proactive role with respect to the issues. Public and political awareness of past and anticipated achievements and the expected consequences of not supporting technological development and change has to be increased. To achieve this end, one program we will be implementing this year will involve establishing face-to-face dialogue on nuclear related matters with school teachers targetting those teaching courses in Social Studies. Other programs will also be developed during the year. For our public awareness program to be successful, that is, for us to have influence with those in influence, we come full circle to the first priority, namely membership. With a strong membership base, our Society will have the influence necessary to impact on the advancement of the Canadian nuclear power program and related science and technology. In the past year, we have successfully extended the number of branches we have. Now is the time to nurture and strengthen them. Programming at the branch level combined with an active conference schedule as a priority, will

allow our Society to have a strong and substantive program in all regions of the country. Finally, teething programs with the *Nuclear Journal of Canada* are being sorted out. Current subscriptions stand at 762 of which 540 are member subscriptions, 87 are institutional subscriptions. An additional 135 are in process (AECL and Ontario Hydro). This is substantially below the 450 institutional subscriptions anticipated in the business plan developed when the decision to go ahead with the Journal was taken in March of 1986.

The shortfall in revenue combined with the increase in expenses over the "Worst Case" scenario developed in the business plan has resulted in a projected Journal deficit of about \$65,000 - twice that anticipated.

These two factors:

- reduced circulation; and
- increased costs

have prompted Council to direct the Journal Management Board to reduce publishing costs by 25%, increase the Journal's circulation to a minimum of 450 in excess of members' subscriptions and increase revenues by other means. To allow for a complete assessment of options, including the choice of the publishing house, notice was served to University of Toronto Press of cancellation of the publishing agreement. Cancellation of the agreement will be effective December 31, 1987 with the issuance of Volume 1, Number 4. *This does not mean that we have cancelled the Journal.*

Discussions with U of T Press and other publishing houses have begun. Production, marketing and financial plans for 1988 are being prepared. Papers for Volume 2 are being reviewed.

We intend to continue to publish the *Nuclear Journal of Canada* as long as we have the ongoing commitment of our members, the subscribers and the financial resources to continue.

Irwin Itzkovitch

CNS President's 1986/87 Report

The CNS had a busy and exciting year. A year during which we published the first two issues of a world class technical journal, the *Nuclear Journal of Canada*, established three new member chapters, increased the membership by 20%, held four successful international conferences and increased the society's assets by 50%. We also made progress in cementing our relationships with many national and international organizations. Your Council designed a program to inform the public about nuclear issues by you, the technical experts in the field. This will be achieved by providing CNS members to speak on their areas of expertise to interested groups. We plan to focus on teachers and school audiences in the early phases.

Council members are speaking out on the issues of importance to CNS members and the nuclear industry in Canada. I urge each one of you to do the same in your area of expertise whenever you get a chance. In fact, get out there and make your "chances."

It is clear from the list of accomplishments in 1986/87, that your Council and all who served on the committees, worked very hard to make this term a great success. I extend my sincere appreciation to them for their loyalty, efforts, innovation and dedication.

Special thanks to the CNS office staff who are the stabilizing factor in the Society, considering the annual change in Council membership. Their help and advice allowed Council to deal with the demands placed on us.

Our relationship with the Canadian Nuclear Association was clarified this year. I hope that this firmly based partnership will continue in the future for the good of both organizations and the nuclear industry in general.

I congratulate Irwin Itzkovitch and his new Council on their election to office. I believe the membership has put in place elected officials who will serve them well. I wish to offer the new Council my time, energy and expertise to use as they see fit in the future.

I have enjoyed my term as President and hope you are in agreement with the initiatives and programs. A final word as your outgoing President. I believe that we have an excellent energy system called the CANDU, the system that has proven to be the *top performer* in the world. We have a nuclear industry that is serving the people of Canada in the areas of power production (at very low cost), aiding medical science and providing irradiation technologies to the world. Finally, the industry today provides direct employment to 31,000 Canadians. We should be proud of these facts and make sure they get wide publicity. The Canadian Nuclear Society, although a technical society promoting excellence in our field, can and should stand up and be counted at every opportunity. Please join your Council in speaking out, participating in all activities and contributing to your Journal.

Nabila Yousef

Dr. Irwin Itzkovitch New CNS President

Irwin Itzkovitch was elected President of the Canadian Nuclear Society at its annual meeting in Saint John in June. He is currently Manager, Business Development, Eldorado Resources Limited, a position he has held for almost two years.

After receiving his B.Sc. from Sir George Williams University, a M.Sc. from the University of Waterloo and a Ph.D. from Queen's University, all in chemistry, Irwin joined INCO Limited as a Senior Research Scientist. In 1974, he moved to Ontario Research Foundation as Head of Hydrometallurgy and joined Eldorado Resources Limited in 1979 as Assistant Manager, Research and Development Division, becoming Manager of the Division in 1981.

Since joining the CNS, a year after its formation, Irwin has been very active on Council and in the Technical Divisions.



CNS Council 1987-88

Bottom row, left to right: G. Phillips (Secretary), K. Talbot (Vice-president), I. Itzkovitch (President), N. Yousef (Immediate Past President), P.D. Stevens-Guille. Top row, left to right: A. Pasanen, T. Drolet, A.D. Lane, T. Carter, R. Sligl, H. Bonin, J. Weller. Not present: R. Abel, T. Lassau, D. Mosey, E. Price, D. Primeau, E. Rosinger, N. Spinks, H. Tamm.

CNS Phone and Fax Established

The Canadian Nuclear Society has obtained its own telephone at the CNA/CNS office in Toronto: (416) 977-7620.

The office also now has a telecopier (fax) machine, which can be used to send messages to CNA or CNS: (416) 979-8356.

CNS Branch Programs

Golden Horseshoe Branch

A new branch of the CNS, centred in the Hamilton area, was recently formed. The official branch name is the Golden Horseshoe Branch to reflect the area covered by the branch, namely:

- To the south – Niagara Falls
- To the east – Oakville
- To the west – London
- To the north – Guelph.

The boundaries are somewhat fuzzy and are not meant to exclude members in outlying regions, e.g. Toronto and other remote areas. The pro tem executive are:

Bill Garland, Chairman
Ron Young, Vice-Chairman
Mike Butler, Secretary-Treasurer.

The pro tem executive plan to meet over the summer to organize our first membership meeting in September at McMaster University. If you wish to be put on the branch mailing list, please contact me. Your suggestions are very welcome.

Bill Garland
Department of Engineering Physics
McMaster University
1280 Main Street West
Hamilton, Ontario L8S 4M1
(416) 525-9140 ext. 4925
(416) 637-1703 (home)

Toronto Branch Executive 1987-88

The Toronto Branch Executive for the 1987-88 season are as follows:

Chairman: Eva B. Marczak
Ontario Hydro, Pickering NGS Technical Unit
Pickering (839-1151, Ext 4655)

Vice-Chairman: Gord J. Sullivan
Ontario Hydro, Radioactivity Management and Environmental Protection Department
Toronto (592-7365)

Past-Chairman: John V. Marczak
Ontario Hydro, Radioactivity Management and Environmental Protection Department
Toronto (592-7622)

Treasurer: Ben Rouben
Atomic Energy of Canada Limited, Safety Engineering Department
Mississauga (823-9040, Ext 4550)

Secretary: Bill Maser
University of Toronto Engineering Student
Toronto (978-4328)

Public Affairs: Robert P. Steadman
Ontario Hydro, Radioactivity Management and Environmental Protection Department
Toronto (592-5196)

The Executive strongly encourages all members to participate in Branch activities. If you would like to join the executive or simply wish to discuss your ideas on how the branch should be run or what we should be doing, please do not hesitate to contact one of the above.

John Marczak

Interested in contributing to the CNS Bulletin?

To submit original articles, letters, FYI items, reviews, calls for papers, etc., contact:

- J. Nathwani, Editor, *CNS Bulletin*,
c/o Ontario Hydro, 700 University Ave.,
Toronto, Ontario, M5G 1X6.
(416) 592-6855.

Book Reviews

The Wisdom of Science: Its Relevance to Culture and Religion, by Robert Hanbury Brown, Cambridge University Press, Cambridge, 1986.

This book offers a description of "the ancient and invisible college of science," and was intended by its author to answer the basic question, "What use is science?" In formulating his answer, but "in a much deeper sense than the question itself implies," the author has produced an engagingly reflective, readable and eloquent little book.

The book falls naturally into three main parts. The first two chapters are an admirable potted history of science from the middle ages through to the twentieth century. In a hundred pages it is clearly too much to expect that all the details of the scientific developments over this vast period will be fully reflected. Rather, the approach the author has taken is to point out those trends which emerged as science came of age, particularly trends that are of importance or significance today. The transition from mediaeval bookishness and from the notion that knowledge or "truth" are bestowed by revelation, to the Baconian view that speculations have to be tested against observations in the real world; the appearance of the modern concept of "progress"; the organization of science into a community, then into a profession, then into a useful adjunct to industry; these themes are discussed against a procession of big names in science that march through the text as the chronology unfolds.

In the latter half of this first section, time slows down and much more discussion is devoted to developments during the period beginning approximately with Darwin. Of particular interest is the discussion of scientific advances in the realms of the very small and the very large, and the difficulties faced by reductionism in explaining some of the developments in these areas.

The second main section is entitled "The Cultural Dimension of Science" and constitutes the guts of the book. In this section, the author unfolds his most thought-provoking views on what people think of science and why, why science is important and how we should be trying to make better practical use of it, and the "cultural" function of science, its relation to values. If this were the only section of the book to be read and if all the reader got out of it was a renewed interest to ponder and consider the reasons given by the author for the importance of science, then the book would have more than served its purpose. It is also in this section that the author develops another of his themes, that "the most valuable 'use' of science is in the getting of wisdom."

In the final main section of the book, "The Religious Dimension of Science," the author attempts to demonstrate that science and religion do not need to be divorced, but he strains and doesn't quite succeed in the effort, in my

view. The ideas are thought-provoking, as they are elsewhere in the book, but somehow it seems that they fail to hit home in a fully satisfactory way. However, in this very subjective sphere, each has to judge for himself.

"If we were to ask those legendary oracles of society, the man and woman in the street, whether science is really worth bothering about, what would they say?" In answer to this question, which begins Chapter 3, the author posits that three hundred years ago they would probably not have heard of it. A hundred years ago they would have been enthusiastically supportive. Today they view it as a mixed blessing and can find as much to object to as they can to approve of. This is why, the author feels, it is so vital for scientists to understand more clearly the nature of science and to be able to explain it equally clearly to the public.

If this is true in general, with how much extra force does it apply in areas such as the nuclear industry, where the benefits are taken for granted or even denied existence, while the risks, both real and imagined, and the costs, both known and feared, are put under the microscope and discussed widely in every possible forum, from cool and rational to wailing and fearful? How important is it for people in such an industry to understand the foundations on which the whole venture is built, and be able to talk about them?

This little book might help. It isn't merely food for thought; it's a banquet.

Keith Weaver

How Safe? – Three Mile Island, Chernobyl and Beyond, by James Megaw. Published by Stoddart, 1987. ISBN 0-7737-2111-8

In the weeks immediately following the Chernobyl reactor accident, the plethora of speculation (garnished with a few facts), often contradictory assertions and delighted doomsaying did not well serve those who were anxious to understand what happened and what the implications might be. Noting this in his introduction, Professor Megaw points out that "there was a need for a dispassionate analysis not only of the accident itself and its effects, but also of the effects of radiation on people and a comparison of the social costs of the various methods of generating electricity." It is this need Megaw sets out to meet in his book which was written immediately following the accident and before the official Soviet report on the accident became available.

How Safe? covers the Chernobyl accident sequence and its radiological consequences within the USSR and throughout the world, deals generally with the nature of and the hazard presented by fission products, reviews the fundamental principles of the fission process and outlines the design features of the world's principal commercial reactor systems. In a chapter entitled "Accidents will happen" Megaw briefly reviews a number of serious nuclear accidents, ranging from the critical

assembly accident that killed Canadian physicist Louis Slotin in 1946 to the Three Mile Island accident in 1979, and adds a representative list of other less serious accidents and incidents. His concluding chapters deal with the world's energy use and needs, risk in energy production and the future prospects for nuclear energy in the post-Chernobyl era.

An initial and general comment must be that Professor Megaw is something of a rarity in that as an academic and a scientist he can yet write clearly and entertainingly, and be authoritative without being patronising. Indeed in these respects, Megaw's book is the best layperson's guide to nuclear energy to appear since *The Nuclear Book* (1980) which, interestingly enough, was by another academic scientist, David Peat. Megaw gives his reader credit for some basic commonsense and intelligence – qualities which it seems to this reviewer are too seldom recognised by the authors of nuclear industry sponsored publications. As well Megaw assumes that his reader may become intelligently interested in the topic and therefore provides a comprehensive bibliography – including such authors as Mancuso and Stewart. This indicates that Megaw also does his readers the courtesy of assuming that they may be capable of coming to an informed opinion through reviewing a representative sample of the available literature – a courtesy the nuclear industry would be well advised to emulate.

Minor casualties of a hasty publishing schedule

It is possible to infer from Professor Megaw's introduction that in preparation of the book he was constrained by a rather tight publisher's schedule – indeed he points out that the manuscript was already with the publisher when the official Soviet report on the Chernobyl accident was presented at Vienna, a fact which prompted him to insert a second, more detailed, chapter (Chapter 2) on the accident sequence and its consequences, while leaving the first chapter in place with its tentative suggestions of loss of coolant or loss of site electrical power (or both) as the initiating event – the two most favoured accident scenarios in the West before detailed information became available from the Soviets. No doubt the constraints of the publisher's timetable precluded any reference by Professor Megaw to the IAEA's INSAG report on the accident. This is a pity since, while no one would suggest that the INSAG report is the final word on the accident, it must be considered as one of the essential items in the growing catalogue of Chernobyl literature and its omission from Megaw's otherwise comprehensive (and extremely valuable) bibliography is disappointing.

Megaw's detailed treatment of the accident, in Chapter 2, is of admirable clarity but his table of operator actions, motivation and results (apparently adapted from that in the Soviet report) has some errors. For example, the result of running all eight of the reactor's main circulating pumps was decreased core void (and hence a loss of reactivity) and not "loss of cooling." It is probable that this table was

another casualty of a hurried production schedule. As well there is some confusion in details about the RBMK control rod design and the changes being implemented by the Soviets in control rod operation.

In his comments on the Soviet recovery actions through the first week of May, Professor Megaw is perhaps somewhat harsher than circumstances warrant, in particular his questioning of the dumping of about 5000 tonnes of material on the open reactor. He does not make clear the fact that sand was dumped primarily to act as a filter, rather than smother the fire, and that lead was used to both act as a heat sink (through the phase change) and a shielding medium. He does not mention the use of dolomite which was used to provide an inerting atmosphere from the CO₂ it releases when heated. It is certainly true that with the fire out and the top of the reactor sealed, temperatures inside the core rose and radioactive emissions temporarily increased (beginning 2 May) from the lower levels to which they had been brought and it was the injection of nitrogen on 6 May which essentially halted further emissions. However, sealing the top of the reactor did reduce the initial very large emissions. To characterize this action as a cure being worse than a disease does not, to this reviewer, seem entirely fair – indeed given the nature of the damage to the reactor and its building it is difficult to suggest an alternative course of action the Soviets could have followed with better results. In the same chapter we must also take issue with Megaw's comments on containment. First, it is a little misleading to suggest that "all modern commercial reactors in the world" are enclosed in containment shells – the British gas-cooled reactors do not use containment. Second it is wrong to imply that the existence of containment is a prerequisite for reactor safety. As the English Central Electricity Generating Board noted in early May of 1986, the safety of a particular reactor concept is not necessarily predicated upon the existence of a containment structure, or the use of a particular moderator, or any other single design specific but upon the consistent provision of what the particular concept demands – or to put it another way, there are more ways of killing a cat than drowning it in cream. Third, it seems dangerously speculative to suggest that a containment structure "might well, however, have prevented the release of any fission products at all at Chernobyl."

Realism and Commonsense

Chapters Three through Five of the book are perhaps the most valuable – and not just to the layperson. Chapter 3, "Self Help in a Nuclear Accident" in particular should be read, learned and inwardly digested by any person with any kind of responsibility for public information related to nuclear accident response. Megaw's account of the nature and health effects of radioactive materials is lucid and readable and his discussion of the movement of fission products through the environment (which happens to be one of his areas of speciality) is excellent and would be worthwhile reading for any nuclear engineer who might face the prospect

of interrogation by non-nuclear friends and neighbours. The section "What to do at home" is quite the most useful, forthright and genuinely reassuring discussion we have encountered – if nothing else, those involved in contingency planning should buy, beg, borrow or steal this from Professor Megaw for widespread public distribution. Megaw de-mystifies the topic, establishes radioactivity as one of a number of potentially hazardous phenomena and shows how simple and logical precautions can significantly reduce the hazard to the individual.

In his discussion of radioactivity and its effects (Chapter 4) Megaw is comprehensive, straightforward and objective. His discussion of the literature on the effects of low-level radiation exposures is particularly good, indicating as it does where some researchers' findings appear to be anomalous.

Essentially what Megaw is doing here is providing his readers with an overview of the **whole range** of literature on the topic rather than that selected to bolster a particular case, while at the same time he enters a fair enough *caveat* that certain conclusions do not appear to properly reflect the data from which they were drawn. He pays specific attention to the work of Stewart, Mancuso and Najarian in this respect. His observations on the effects of the Three Mile Island releases and the observed leukemia incidence in Seascale (Windscale) are detailed and admirably clear to the non-specialist – a commendable achievement in view of the complexity of the topic. On the topic of low dose radiation effects, Megaw is at pains to emphasize the level of uncertainty, concluding "There is no doubt that high doses of radiation are harmful but there is considerable doubt as to whether small doses have the effect predicted by linear extrapolation, or no effect or an effect somewhere between the two extremes." The radiological impact of the Chernobyl accident outside the USSR (Chapter 5) is discussed by Megaw in some detail, and he shows that the impact in Europe while measurable, would be difficult to categorize as "significant" except in the case of Swedish Lapland where caesium deposition on lichen has resulted in unacceptably high levels of this isotope in reindeer meat. To put the Chernobyl releases in context, Megaw compares the estimated caesium releases of 1.3 MCi to *circa* 4 MCi of iodine deposition in 1963 resulting from nuclear weapons testing.

Nuclear Energy Overview

The second half of *How Safe?* deals more generally with nuclear power, and is introduced by a chapter giving some theoretical and historical background – and to this reviewer anyway, the history is fascinating enough that it can always be re-read with pleasure and excitement. It would have been pleasant had the author, under the heading "The First Nuclear Reactor," included the Oklo natural reactor. It's worth reminding ourselves now and again that in the field of nuclear reactors, Nature anticipated humankind by a couple of billion years or so – and the shade of Enrico Fermi would certainly not begrudge Nature that

recognition.

A short chapter is devoted to a workmanlike summary of the principal commercial power reactor systems in service today, marred only by some critical comments on construction standards of RBMK reactors referenced to the publication *Ukraine Literature*.

Megaw's chapter on nuclear accidents ("Accidents Will Happen") is particularly interesting, though again schedule constraints appear to have resulted in the odd minor inaccuracy (for example in his description of the SL-1 accident where he overstates a control rod withdrawal distance by 60 percent). Because of Professor Megaw's personal experience at the Windscale site his description of the 1957 Windscale fire and its impact forms a very enlightening (and readable) supplement to the existing technical literature on that event. The Three Mile Island accident is also well handled, although Megaw's conclusion about operator training "... it is not just sufficient to train reactor operators once. Training must be continuous and comprehensive" may encourage the reader to mistakenly infer that the accident in large can be attributed to operators who forgot their training, rather than the institution which provided inappropriate and inadequate training. The chapter concludes with a representative list of "Other but Less Catastrophic Accidents" which includes the 1952 NRX accident, the Fermi 1 accident and the Browns Ferry fire. Here one might argue that the "causes" Megaw lists (sometimes in a single word) might be misleadingly simplistic, but it's important to remember that the author is not catering to a specialist audience. However, in view of the scrupulous care Megaw has taken to guide the reader through the available literature in other sections of the book, the lack of any references for such, admittedly "less catastrophic" but certainly important events as NRX, is disappointing.

In discussing world energy use, Megaw moves into territory which will be familiar to most readers. It is, perhaps, unfortunate that the author has followed a rather well-beaten path whose geographical exactitude is open to debate. It has been remarked that hearing a physicist expatiate on energy policy is rather like hearing a cow playing the violin, and it is important for the reader to recognise that a specialist in *any* area has, by definition, limits on his/her expertise. The appearance of a graph relating *per capita* energy consumption to *per capita* GNP – a graph which has been kicking around the place at least since the early 'seventies – should be enough to alert one to the fact we may be faced with either a "correlation" or a *non sequitur*. The positions of such countries as Sweden, Finland, Denmark, Norway and New Zealand on the graph should give rise to some healthy debate. Suffice it to say that Megaw's strongest point is that of the undesirability of burning coal (a point which anyone who grew up in London in the late 'forties or early 'fifties would find it difficult to dispute). As well, there is the implicit warning that while uranium is a comparatively useless material (good principally only for making bombs or generating electricity), fossil materials

(such as petrol or coal) not only have a wide range of vital applications, but also are irreplaceable as fuels in specific segments of the transportation sector.

Professor Megaw brings impressive credentials with him. Currently the Chairman of York University's Department of Physics, he is a former Head of Operational Nuclear Radiation Safety at AERE Harwell and has specialized in the airborne transportation and deposition of contaminants (particularly iodine) since 1957. In *How Safe?* Megaw has made a courageous attempt to identify and scrutinise the issues related to the use of fission energy in a manner that will be intellectually accessible to the non-specialist. The attempt is marred by minor detail errors which seem to be the result of an over hasty publication schedule. The non-specialist will be well served when the book is re-printed with these errors rectified. This aside, it must be emphasized that Megaw has brought to the nuclear energy debate reasonableness, technical expertise and plain commonsense – commodities which heretofore have been disappointingly absent.

David Mosey

Conference Reports

The Yellow Sou'wester Conference

The picturesque city of St. John, New Brunswick, was invaded by over 400 nuclear experts who attended the Eighth Annual Conference of the Canadian Nuclear Society along with the 27th Annual Conference of the Canadian Nuclear Association, between June 14 and 18. The program was very well organized and went smoothly. It started Sunday, June 14, with a Get Acquainted with Seafood Chowder. Unannounced on the official program was the moose call contest which was a smash hit. The most fascinating performances were the calls with a British accent, which provided an obvious answer to one of Nature's enigmas: why the moose population is so low in the U.K. Both CNA and CNS technical programs were informative, and choosing which of the parallel sessions to attend was always difficult, as the papers were all top-notch. The CNA papers focussed mostly on the present state of the Canadian nuclear industry and perspectives for the future, and several representatives from the U.S. and Europe informed the audience about the vitality of their respective nuclear programs and their specific problems, notably in the wake of the Chernobyl accident. The already well-established nuclear programs continue with fewer or greater delays, while countries with modest reliance on nuclear-generated electricity have deferred decisions on

expansion. In general, the effects on the nuclear programs of the Chernobyl accident are less than initially feared, although public acceptance has suffered significantly everywhere.

The CNS sessions included sixty-eight papers of high technical quality. They were grouped into 12 sessions entitled as follows: Plant Life Extension, Safety and the Environment, Reactor Physics, Thermalhydraulics (2 sessions), Risk Assessment – A CANDU Perspective, SLAR (Spacer Locating and Repositioning) – Development and Deployment, Operations (2 sessions), Safety R&D Post-Chernobyl, Fuel Channels – An Update, and Nuclear Technology Developments.

Papers dealt with the outstanding performance of the Point Lepreau Generating Station, innovative design and construction features of the new CANDU-300 (including a century-long design plant life, reduced construction delays through improved planning and modular buildings) and improvements to the CANDU-600 design. Ontario Hydro's Darlington Probabilistic Safety Evaluation Study was reported as the first application of fully integrated event-tree fault-tree risk analysis methods to a pre-operational CANDU reactor design. The authors related that nearly a hundred design changes resulted from this risk analysis. Improved performance was also reported for the Royal Military College's SLOWPOKE-2 research reactor at Kingston, which uses low-enriched uranium (LEU) fuel. The evenings were well spent with social activities, with a Racquet Ball/Squash Tournament, a Lobster Dinner and Maritime Fun Night and a tour of the Moosehead Brewery. The title of this conference report refers to the sou'westers which were given to the participants at the Fun Night and which served as the symbol of the conference. They certainly did a fine job in keeping the rain away as St. John enjoyed gorgeous weather at the time. Thursday, June 18 was spent on several tours of a technical or sightseeing nature, including visits to the Point Lepreau Generating Station, the Sussex County Potash mines, and St. Andrews and the Fundy Isles.

All the participants wished that a majority of the public was as much in favour of nuclear energy as Mrs. Elsie Wayne, mayor of St. John, who welcomed them in a colourful and exuberant fashion. This was somewhat tempered by the absence of the luncheon speakers. The New Brunswick Premier, the Hon. Richard Hatfield, was attending the conference of Eastern Canada's premiers and New England's governors in Halifax at the time, and he sent a positive letter expressing his pride in the performance of the Point Lepreau station and in the selection of CANDU as one of the 10 most outstanding engineering achievements of the century. Canada's Minister of Energy, Mines and Resources, the Hon. Marcel Masse, was not able to address the participants at the Tuesday luncheon.

Conference attendees were told by the CNS past and new presidents, Ms. Nabila Yousef and Dr. Irwin Itzkovitch respectively, as well as by CNA President Michael Harrison, of the major efforts now underway to improve the

public acceptance of nuclear energy in Canada. Each group is launching programs to present the facts to the public. A major step was taken by the conference with the inclusion of special sessions for some 120 New Brunswick high school teachers. One of the sessions dealt with several papers covering risks from nuclear power stations, spent fuel and waste management, nuclear medicine, and food irradiation, and discussed career opportunities and training in the nuclear industry. A panel session entitled "The Dialogue with the Public" emphasized the difficulties of educating the public on technical matters. The panelists represented universities, the mass media, and educators at college and high school levels.

The participation of panelists from the New Brunswick school system was well remarked. Messrs. Rino Castonquay and Paul Parker told the audience of the importance of informing the students properly about energy questions as the students are tomorrow's decision makers. However, they agree that their task is made very difficult by the confusion around the subject of nuclear power, as the technical language used by the experts is beyond their own training, and the information they receive from the many sources – the nuclear industry, the mass media, the anti-nuclear groups – differs considerably. This communications problem is therefore a challenge that the Canadian nuclear industry, the CNS and the CNA have decided to make into a high priority. A confirmation of this attitude came near the end of the conference when Nabila Yousef announced the creation of a fund to assist nuclear education in the Province of New Brunswick, to be administered by the New Brunswick branch of the CNS.* For the conference to have such outstanding success is not due to sheer luck, but rather to long hours of dedicated work by a team of people who indeed deserve mention: Frank MacLoon, Jan Burnham, Dan Meneley, John Sommerville, Bob Munro, Diane Waechter, Jim Weller, Roger Steed, Terry Thompson, Jeff Jones, Wendy Anderson-Gillespie, Janice Haig, John Paciga and Arlie Blizzard. Thank you all, and, as William Cornelius Van Horne said nearly 102 years ago: "The job has been done well in every way."

* The conference certainly made a strong impression in the Maritimes. Even three days after the conference ended, the French network of Radio-Canada was still commenting on it in a rather positive way. The comments broadcast struck a reassuring note, a nice change from the more familiar quasi-hysterical attitude towards nuclear energy.

Hugues W. Bonin

Le Congrès du Suroît Jaune

Quelques 400 experts du nucléaire ont récemment envahi la jolie ville de Saint-Jean, Nouveau-Brunswick, à l'occasion du 8^{ième} Congrès annuel de la Société Nucléaire Canadienne et du 27^{ième} Congrès annuel de l'Association Nucléaire Canadienne.

Le programme avait été très bien organisé et se déroula sans anicroche. Une réception d'accueil à la chaudière de fruits de mer débuta le

tout le dimanche 14 juin. Elle fut marquée par une compétition-surprise d'appels à l'original qui fit un malheur. Les appels les plus fascinants furent certes ceux avec accent britannique, dont le résultat fut sans aucun doute de fournir une réponse à l'une des énigmes de la Nature, à savoir pourquoi les îles britanniques étaient dépourvues de population d'originaux notables . . .

Les programmes techniques de la S.N.C. et de l'A.N.C. ont été enrichissants et choisir la session parallèle à suivre a été un dilemme constant, vu l'excellence des communications. Les sessions de l'A.N.C. ont surtout porté sur l'état actuel de l'industrie nucléaire canadienne et ses perspectives d'avenir, et plusieurs représentants des Etats-Unis et de l'Europe ont informé leurs auditoires sur la vitalité de leurs programmes nucléaires respectifs et leurs problèmes spécifiques, à la lumière de l'accident de Tchernobyl. Il semble que les programmes déjà bien établis se poursuivent avec plus ou moins de retards, alors que les pays n'utilisant que peu l'énergie nucléaire voient toute décision d'expansion remise à plus tard. En général, les effets du désastre de Tchernobyl sur les programmes électro-nucléaires sont moins prononcés qu'on l'avait d'abord craint; cependant, l'acceptation du nucléaire par le public a diminué partout de façon marquée.

Les sessions de la S.N.C. ont totalisé soixante-huit communications de haute qualité technique, regroupées en douze sessions portant les titres suivants: "Prolongement de la Vie des Centrales", "La Sécurité et l'Environnement", "La Physique du Réacteur", "Thermohydraulique" (2 sessions), "Evaluation des Risques – Une Perspective CANDU", "Localisation et Repositionnement des Espaceurs – Développement et Mise en Oeuvre", "Exploitation" (2 sessions), "Recherche et Développement en Sécurité – Post-Tchernobyl", "Canaux de Combustibles: Mise à Jour", et "Développements en Technologie Nucléaire".

Plusieurs communications ont porté sur la performance exceptionnelle de la centrale de Point Lepreau, sur l'innovation de la conception et des caractéristiques des méthodes de construction du nouveau CANDU-300 (notamment une durée de vie de la centrale de l'ordre du siècle et une réduction des temps de construction grâce à une planification améliorée et à l'utilisation d'édifices modulaires), et sur les nombreuses améliorations apportées à la conception des CANDU-600. On a aussi révélé aux participants la première application à la conception pré-opérationnelle d'un réacteur CANDU d'une analyse de risque basée sur une intégration totale de méthodes d'arbres d'événements et d'arbres de défaillances: ce fut l'Evaluation Probabilistique de la Sécurité de la Centrale de Darlington de l'Ontario Hydro. Les auditeurs ont pu prendre connaissance d'une centaine de modifications au concept de la centrale qui ont résulté de cette analyse de sécurité. On a aussi fait part à la conférence de la performance supérieure du réacteur de recherche SLOWPOKE-2 du Royal Military College de Kingston, qui utilise un combustible à l'uranium faiblement enrichi.

Plusieurs activités sociales intéressantes étaient

prévues pour les soirées, comme un tournoi de racquetball/squash, un dîner au homard suivi d'une soirée d'agrément "Maritimes" et une visite à la brasserie Moosehead. Le titre de cet article réfère aux suroîts distribués aux participants lors de la soirée "Maritimes", et qui servit de symbole à la Conférence. Ils ont certes servi à éloigner la pluie puisque la température à Saint-Jean fut superbe. Le jeudi 18 juin était consacré à plusieurs visites de nature technique ou simplement touristique, notamment à la centrale nucléaire de Point Lepreau, aux mines de potasse du comté de Sussex, à Saint Andrews et aux Îles de Fundy.

Tous les congressistes ont sans doute souhaité qu'une majorité du public soit en faveur du nucléaire de façon aussi enthousiaste que celle de Madame Elsie Wayne, mairesse de Saint-Jean, dont l'accueil qu'elle leur réserva fut coloré et exhubérant. La chaleur de cet accueil fit plus que compenser pour la déception causée par l'absence des conférenciers invités aux déjeuners. Obligé d'assister à la conférence des Premiers Ministres des Provinces de l'Est du Canada et des Gouverneurs de la Nouvelle-Angleterre, le Premier Ministre du Nouveau-Brunswick, le très Honorable Richard Hatfield fit parvenir aux congressistes une lettre exprimant sa fierté pour la performance de Point Lepreau et pour le choix de la filière CANDU comme l'une des dix réalisations majeures de l'ingénierie canadienne. Le ministre fédéral de l'Energie, des Mines et des Ressources, l'honorable Marcel Masse, fut lui aussi empêché d'être présent à Saint-Jean pour y prononcer une allocution.

S'adressant aux participants, la présidente sortante et le nouveau président de la Société Nucléaire Canadienne, Mme Nabila Yousef et M. Irwin Itzkovitch, de même que le nouveau président de l'Association Nucléaire Canadienne, M. Michael Harrison, ont esquissé les plans d'action d'un effort intensif de sensibilisation du public afin d'en accroître le support en faveur de l'énergie nucléaire. Chacun de ces groupes s'apprête à démarrer des programmes d'information pour mettre le public au courant des faits réels sur le nucléaire. Une étape importante fut accomplie par la Conférence elle-même alors que quelques 120 enseignants du secondaire du Nouveau-Brunswick ont pu assister à des sessions spéciales à leur intention. A l'une de ces sessions, on leur a présenté des communiqués sur les risques de l'énergie nucléaire, la gestion du combustible usé et des déchets radioactifs, la médecine nucléaire, l'irradiation des aliments et la formation des spécialistes dans l'industrie nucléaire. Une session panel intitulée "Le Dialogue avec le Public" a mis en relief les difficultés de transmettre de l'information technique spécialisée au public ordinaire. Les panelistes représentaient les milieux universitaires, industriels et journalistiques, ainsi que éducationnels au niveau secondaire et collégial.

La contribution des enseignants du Nouveau-Brunswick a été remarquable. Messieurs Rino Castonguay et Paul Parker ont insisté sur l'importance d'informer les étudiants correctement sur les questions énergétiques, puisqu'ils sont les preneurs de décisions de demain. Ce-

pendant, ils sont d'accord pour dire que leur tâche est compliquée par le fait que l'information sur l'énergie nucléaire leur apparaît confuse et présentée avec une terminologie technique au-delà de leur formation. Cette information leur provient de plusieurs sources: l'industrie nucléaire, les mass media et les groupes antinucléaires; il n'est pas surprenant qu'on y trouve des différences importantes.

Surmonter ce problème de communication apparaît donc comme un défi à l'industrie nucléaire canadienne, et tant la S.N.C. que l'A.N.C. ont décidé d'en faire leur cheval de bataille. Aussitôt dit, aussitôt fait, comme les congressistes s'en sont rendus compte, lorsque, vers la fin de la Conférence, Mme Nabila Yousef annonçait la création d'un fonds spécial pour promouvoir l'éducation sur le nucléaire au Nouveau-Brunswick. Ce fonds sera administré par la section du Nouveau-Brunswick de la S.N.C. Le succès de cette Conférence fut complet et fut tel que plusieurs jours après la clôture, la chaîne Atlantique de Radio-Canada en parlait encore, de façon beaucoup plus positive que d'habitude. Une telle réussite n'est pas le fruit du hasard, mais la suite de longues heures de travail acharné d'une équipe de personnes dévouées qui méritent certes d'avoir leurs noms écrits ici: Frank MacLoon, Jan Burnham, Dan Meneley, John Sommerville, Bob Munro, Diane Waechter, Jim Weller, Roger Steed, Terry Thompson, Jeff Jones, Wendy Anderson-Gillespie, Janice Haig, John Paciga et Arlie Blizzard. Mille mercis à tous et à toutes, et, comme William Cornelius Van Horne l'a dit il y a presque 102 ans: "Le travail a été bien effectué de toutes les façons".

Hugues W. Bonin

Conferences & Meetings

Symposium on the Transportation of Radioactive Materials

Sponsored by the Canadian Nuclear Association and CNS, to be held **October 29-30, 1987** in Toronto, Ontario. For information contact: **Canadian Nuclear Association, 111 Elizabeth St., 11th Floor, Toronto, Ontario, M5G 1P7, (416) 977-6152.**

Workshop on Electrochemical Metallizing (ECM)

Sponsored by University of Toronto, to be held **November 9, 1987** in Toronto. For information contact: **Ms. Anne-Marie Tynan, University of Toronto, Faculty of Applied Science & Engineering, 35 St. George St., Toronto, Ontario, M5S 1A4, (416) 978-3119.**

International Conference on CANDU Maintenance

Sponsored by CNS, cosponsored by CNA and ANS, to be held **November 22-24, 1987** in Toronto, Ontario. For information contact: **D.F. Meraw, Darlington N.G.S., P.O. Box 4000, Bowmanville, Ontario, L1C 3Z8, (416) 623-6606, ext. 4218.**

1987 International Waste Management Conference

Sponsored by ASME and IAEA, cosponsored by ANS, CNS et al., to be held **Nov. 30-Dec. 5, 1987** in Kowloon, Hong Kong. For information contact: **L.C. Oyen, Sargent & Lundy, 55 E. Monroe St., Chicago, Illinois 60603, or Tom Carter, (416) 592-6024.**

Radiation Protection in Nuclear Energy

Sponsored by IAEA, to be held **April 18-22, 1988** in Sydney, Australia. For information contact: **IAEA, P.O. Box 100, A-1400 Vienna, Austria.**

Safety of Next Generation Power Reactors

Sponsored by ANS; cosponsored by U.S. DOE, CNS et al., to be held **May 1-5, 1988** in Seattle, Washington. For information contact: **Alan E. Waltar, Westinghouse Hanford Co., P.O. Box 1970, Richland, Wash. 99352, (509) 376-5250.**

Third Topical Meeting on Tritium Technology in Fission, Fusion and Isotopic Applications

Sponsored by CNS, cosponsored by American Nuclear Society, to be held **May 1-6, 1988** in Toronto, Ontario. For information contact: **C.D. Burnham, CFFTP, 2700 Lakeshore Rd. W., Mississauga, Ontario, L5J 1K3, (416) 823-6364.**

4th Workshop on Analytical Chemistry Related to Canada's Nuclear Industry

To be held **May 15-18, 1988** in Kimberly, Ontario. Open to anyone interested in either the routine or innovative analytical aspects of the uranium industry, particularly present problems, present work and future plans and projects. There will be small, informal discussion groups and no proceedings. Participants should send affiliation, areas of interest and a brief abstract of the subject they wish to discuss by **February 1, 1988** to **K.R. Betty, Eldorado Resources Ltd., 255 Albert St., Suite 400, Ottawa, Ontario, K1P 6A9, (613) 238-5222.**

28th Annual International Conference of the CNA and 9th Annual Conference of the CNS

To be held **June 12-15, 1988** in Winnipeg, Manitoba. For information contact CNS office, (416) 977-6152.

14th International Symposium on Effects of Radiation on Materials

Sponsored by ASTM, to be held **June 27-29, 1988** in Andover, Massachusetts. For information contact: **ASTM, 1916 Race St., Philadelphia, PA 19103, (215) 299-5400.**

Symposium on Uranium and Electricity - The Complete Nuclear Fuel Cycle

Sponsored by CNS, to be held **September 18-20, 1988** in Saskatoon, Saskatchewan. For information contact CNS office, (416) 977-6152.

International Conference on Thermal Reactor Safety

Sponsored by SFEN, cosponsored by CNS et al., to be held **October 2-7, 1988** in Avignon, France. For information contact: **F. Cogne, Société Française d'Énergie Nucléaire (SFEN), 48, rue de la Procession, F-75724 Paris, CEDEX 15, France.**

3rd International Topical Meeting on Nuclear Power Plant Thermal Hydraulics and Operations

Sponsored by CNS, Korean Nuclear Society et al., to be held **Nov. 14-17, 1988** in Seoul, South Korea. For information contact: **Dr. Jong Hyun Kim, EPRI, 3412 Hillview Ave., P.O. Box 10412, Palo Alto, California 94303.**

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The Unfashionable Side

Threats of Agreement

It always happens, and this time had been no exception. My step became lighter, the sun shone more strongly, skirts on the subway seemed a little shorter and legs a little longer. In the past I had put it down to the superb cognac. Or possibly the Chateau d'Yquem. At one point I had even decided that it could be the oysters.

Gradually I was able to rule some of these out. The final clue came to me late one night in July on Mountain Street. I realized that it only happened when I had been to Montreal or Quebec! Even after that I kept searching for some gastronomic cause: could it be ris de veau? le trou normand? calmars du Midi? vache espagnole?

It was my own personal little *koan*, but not quite. It was more like keeping a book on who has freckles furthest down her neck, or opens her mouth widest while putting on eye make-up. Not the sort of problem one really ever wants to solve. Imagine my chagrin when it turned out to be a shrug.

It sounds odd, but that's what it was. Each time I went to La Belle Province I unconsciously remastered that great Laodicean art, the casual insouciance, the relaxed nonchalance. The Gallic shrug took control of my world view at these junctures for a few short weeks and made life so simple, so enjoyable.

It had already been some weeks since I had returned from The Hunting of the Clochards*, but the feeling still lingered, and when the telephone rang early one morning, I was busily shrugging myself into happy oblivion in my flat with the late summer sun streaming in over the breakfast debris. Once the phenomenon had been identified as the shrug, I could exaggerate it and double my enjoyment.

"Bauer," I sighed languidly into the instrument, my voice dripping with mock boredom as I shrugged viciously at a pile of toast crumbs. It was the president of the Canadian Nuclear Society. I shrugged a few more times, picturing him in my mind's eye in his suite in Ottawa, surrounded by shelves filled with CNS conference proceedings, "novels" by Robert Ludlum and the usual pile of telexes from Sussex Drive requesting information and strategic advice.

"George? It's Ivan Ipswich," he shrilled, his voice tense with your typical Anglo anxiety.

"We have problems with the Control Board," he warbled, in near panic.

This was really prime material, Shrug City. I almost went into spasm.

"George? Are you there?"

"I must be. You called me and I picked up the phone. What's new about having problems with the Control Board? That's what they're there for, isn't it?"

"That's just it," he cawed with avian anguish, his voice almost breaking. "They've started agreeing with what we say!"

This one couldn't be shrugged off. I broke into a cold sweat.

"Agreeing with you? Good God, Ivan, what are you saying to them? If this gets into the papers, we've had it."

I sensed what he would say even before he began to say it. "Nothing different from the usual. The reactors are safe. Everything is conservative. No new analysis is needed." I wasn't prepared for the next bit. "The only change they want made is to have the operators issued with mirrors."

"Mirrors? What for? To help them see through the smoke?"

"I don't know why," he screeched in exasperation. "But we had a meeting with them yesterday and cleared 34 action items in five minutes. That worries me."

"You know what this means, don't you?" I said, beginning to have an unpleasant sinking feeling. "It means that we will soon lose out status."

"What do you mean?" he croaked with trepidation.

"I mean we won't be experts any longer. Experts have to disagree; that's what they've always done. Once we start agreeing, that's it. Can you imagine the headlines in the Globe? 'Nukes Are Safe? Experts Agree!!!' Just think of the banner on Energy Grope's press release: 'Common Mode Failure! Regulators and Reactor Owners Found Locked in Embrace!' We wouldn't be able to walk down the street. An expert who couldn't find something to disagree about wouldn't be worth the paper his diploma..."

My window looked out onto Bay Street and I was sure I knew that woman's name. Sharon? Samantha? Sheryl? ... Bertha? It didn't matter, though, because as I watched her walking down the street I had the answer. Not only that, but I knew it was the right answer. My shrug was back.

"George? George? Are you there?" he yodelled in a tremulous voice.

"Honestly Ivan," I drawled infuriatingly, "you do get excited about the smallest things." He began to splutter and I knew he was close to tears. "I predict, Ivan, that within one hour The Big Z will call you. Don't leave your office." And I abruptly hung up.

Well, to make a long story short, it worked. Less than an hour and a half later, Ivan called me again, laughing and in immensely high spirits. "He did call me, and I can't remember him ever being so angry. What did you say to him?"

"Nothing much. Just that the stations were going to burn their licenses since they didn't need them anymore."

"Burn their ... ?"

"Why not? If there are no disagreements then there's no need to license anybody."

"I don't understand..." Ivan trilled weakly.

After a couple of delicious shrugs, I explained "It's simple. The Big Z has spent his whole life trying to make it as hard as possible for us to get those licenses. After all that effort, he couldn't just agree all at once to have somebody burn them. Once he started disagreeing it was easy to convince him that we were wrong about everything else too, and that it was hard to see how he could go on agreeing with us in good conscience. So relax, Ivan. Nothing has changed. It's just like the good old days."

There was a long silence, then he said, with enormous gravity, "What can I get you for this, George. You name it. We owe it to you."

Here there was a lot of shrugging. Heavy shrugging. Someone with real class would have said "Get lost Ivan," with great ennui and hung up. I couldn't.

"London," I said. "Sotheby's. Margaux, 1947. Two cases please."

* Documented in "A Bas les Clochards!", CNS Bulletin, vol. 8, no. 3, May/June, 1987.

George Bauer