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Nuclear Heritage Society for the Preservation of Canada's

Editorial

Straining at Gnats, but Swallowing Camels?

Nuclear waste — what to do with it, when to do it and where to do it, is one of the standard sets of questions to be raised whenever nuclear energy is discussed in the public forum. The assertions and responses by those involved in the debate have become as predictable as sunrise and sunset. One argument leads to the inevitable conclusion that the radioactive by-products of nuclear reactors represent a radiological sword of Damocles; the other that in comparison with the chemical cornucopia of toxins introduced to the environment by modern industrialized society, radioactive wastes form one of the easier group of potentially harmful substances to handle, and that radioactive waste disposal poses questions that are social and political rather than technical or scientific.

At the moment Atomic Energy of Canada Ltd. is reportedly spending more than ten million dollars a year in its radioactive waste management research work but no final disposal site for fuel waste yet exists. Small wonder that at times the nuclear industry's claims about the amenability of the nuclear waste management problem are sometimes greeted with a certain amount of scepticism.

There are two possibilities: either nuclear wastes *do* present an unprecedented long-term hazard to humans and the environment and require extraordinary measures, or they do not, when considered in the context of more familiar toxic materials. If the latter case is true, then surely a disporportionate amount of the country's resources are being applied to the problem. It may be that society has decided that it's more desirable to use resources to further reduce the size of a gnat than try to slim down a camel. Society certainly has the right to make that decision. But if it is the case that radioactive wastes *do* represent an environmental gnat compared to the camel of other pollutants and poisons, then those scientists working in the area have a duty to make this fact very clear to society. Every homeowner has the right to spend thousands of dollars erecting lightning conductors — but that homeowner should be aware of the fact that a much smaller amount spent on smoke detectors is a better safety investment.

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Perspective

Ontario Hydro Marketing Strategies

General points by Dane MacCarthy, Vice-President, Marketing of Ontario Hydro made to the Toronto Branch of the Canadian Nuclear Society during his presentation on April 12 at University of Toronto. Ontario Hydro has recently embarked on a marketing campaign, expected to include its well-developed nuclear program.

Ontario Hydro is facing a revenue gap, even with its cost-cutting measures. This is no different from what many industries are facing.

These challenges present an opportunity for marketing efforts to help fill the revenue gap.

We're also targetting for electricity rate increases below double digits, or at least in line with the rate of inflation. This still leaves us with a gap.

Market share

Hydro currently has about 16% of the provincial energy market. We feel we have to move it to about 20%. That's an increase in our load growth of about one per cent over and above what we currently have. Current projection is 2.1%/year. Our target is 3.1%. We may do even better than that.

A Shift in Focus

I don't really see this philosophy as a major shift. *But there IS a shift in focus.*

We've been accused of going back to the "Live Better Electrically" days. What's wrong with that? It's a good way to live. Live Better Electrically ended in 1964. It was right for its time.

Conservation was also right for the time.

It's also time now to continue to promote WISE and WIDER use. We're not saying pursue energy inefficiency, or leave the lights on when you don't need them.

Getting Closer to the Customer

The fundamental thing is getting closer to the customer. The customer is not interested in our problems, but his own.

The Market Sectors

We're analyzing each market sector, the

potential within that sector, the ease of access into the sectors, the extent of competition, etc.

We've broken down the sectors into:

- residential
- commercial
- industrial
- agricultural
- transportation

We'll be focusing on where we can move quickly and where we can get the best payoffs. We're also looking at what resource requirements are needed, since we're still in a restraint mode.

The Residential Market

The area we picked first. It's visible. It clearly says we're out in the marketplace.

e.g. furnace ad — high impact.
Plenum heater program being pursued now and into the fall.

Other Target Groups

- Industry...another application. We hope for a program in the fall.
- Government buildings...opportunities here, but more analysis needed. About 1800MW oil-heated load is here. It's time the government put into action some of the statements they've been making in terms of supporting BILD programs. We're making that point to the Ontario Premier.

There are many applications available. We need to pull all the electricity industry stakeholders together.

Incentives

We could explore the concept of customer-oriented rate packages for large industrial customers, and technical assistance for conversions of smaller industries.

Lateral Business Opportunities

The benefits are that we can utilize our existing human resources and earn revenue via:

- The Bruce Energy Centre
- Many potential electric applications in industry
- Irradiated nuclear fuel management
- Environmental assessments
- Our management systems...simulators in the nuclear area, security systems, etc.
- Tritium supply and technology
- Atmospheric control
- Export of nuclear off-peak electricity is an attractive possibility, but our primary focus remains the domestic market.

Dane MacCarthy

Nuclear Electricity

Herbert J.C. Kouts, a former Director of the US Nuclear Regulatory Commission's Office of Nuclear Regulatory Research, is Chairman of the Department of Nuclear Energy at Brookhaven National Laboratory. His following essay, "Nuclear Electricity" appeared in the April 29 edition of The New York Times.

To anyone professionally knowledgeable about the risks and promises of nuclear energy, including America's friends abroad who are sensibly forging ahead in using it to generate electricity, the recent supreme Court decision provides further evidence of the ridiculous levels to which opposition to nuclear power in this country has sunk.

Having failed in their argument that nuclear power threatens public safety opponents have developed a new way to block nuclear power development. They contend that the cost of waste disposal is a significant economic consideration over which states have jurisdiction. The Court agreed, unanimously upholding a 1976 California ruling imposing a moratorium on all new projects until the Federal Government finds a way to dispose of radioactive wastes permanently.

The Court may be correct in saying that the legislation apportioning powers to regulate nuclear projects — the Atomic Energy Act of 1954 — allows the Government to regulate only the safety aspects of nuclear power, reserving to the states economic authority over plants. But Congress must see its intent perverted when a state can successfully argue that nuclear-waste disposal is a significant economic rather than public-safety consideration.

The fact is that waste-disposal costs have always been included in the design of energy systems, including nuclear systems. Nothing has happened to change that. Studies show that the disposal of ash from coal-burning plants is expensive but that disposal of nuclear waste is not.

A large nuclear plant — one that produces 1,000 megawatts of electricity — consumes only 30 tons of uranium annually and, after reprocessing, produces much less in waste products. Disposal of this comparatively small amount of waste would draw on technology that has been endorsed by a National Academy of Sciences study. It need cost no more than one mill per kilowatt hour. For a similar sized coal-fired plant burning two million tons a year, about 200,000 tons of ash have to be disposed of annually, as well as a comparable amount of limestone, needed for removing sulphur. Disposing of ash and limestone contributes heavily to the cost of coal-fired generation of electricity.

So those arguing that it costs too much to dispose of nuclear wastes are simply using the economic argument as a legalistic subterfuge when scare tactics fail. Can we afford the Catch-22 into which they are punching our country? They run up the cost of nuclear power by obstructing the licensing process; then they demand moratoriums on construction of new plants because they have run up the cost. This victimizes the public.

It is high time that the nation realized that nuclear power, unencumbered by the delaying tactics of opponents, is the cheapest, most reliable, safest source of energy technologically available. France, Japan and the Soviet Union know it and are rapidly increasing their reliance on it. Italy's Minister of Industry said the other day that oil would have to drop from the Organization of Petroleum Exporting Countries' reduced price of $29 a barrel to $10 to beat the economies that this country realizes from nuclear power.

The Long Island Lighting Company must import more than 95 percent of its oil to generate electricity. Delays caused by activists and confusion in regulation have helped send the cost of Lilco's almost completed Shoreham Nuclear Power Station to $3.2 billion. It should not have cost that much — and the end is not yet in sight.

If sensible regulation of commercial nuclear energy is to be made impossible by fears based on the scientifically unsupportable claims of the antinuclear forces, we must address this problem. Once it is solved, we can start providing the additional electrical capacity needed for economic recovery.

However, Americans must be convinced, as citizens of other countries have been, that while nothing in life is totally without risk, for 26 years commercial nuclear power has proved itself to be closer to being risk-free than almost all other human endeavors. Moreover, reactors are designed so that an accident requiring evacuation is less likely than the need for evacuation before a tidal wave or the melting of polar ice caps. Three Mile Island, a rarity, necessitated no evacuation and hurt no one, just the pocketbook.

It is well established that the more people know about science and engineering, the more they favour nuclear power. With very few exceptions, those who know most about nuclear power are its most enthusiastic supporters. Those who know least are most likely to fear it. The point is that the nation can no longer afford to leave their nuclear-power education to misguided ideologues.

Herbert J.C. Kouts

FYI

First CANDU 600s Reach Full Power (Staff)

In the final week of March, the Canadian reactors in South Korea, New Brunswick and Quebec reached full power, the first CANDU 600s to do so.

The Wolsung reactor went to full power March 26 and at Point Lepreau, the CANDU reached 100 per cent on March 27.

Gentilly 2 reached 100 per cent on March 31, and in Argentina, the Cordoba unit went critical on March 13.

Pickering Unit 5 Reaches Full Power (Staff)

Unit 5, the first unit of the "B" station of Ontario Hydro's Pickering Nuclear Generating Station reached full power March 24. The reactor should be formally declared in-service by late May or early June. The remaining three reactors are scheduled to be in-service in 1984 (Units 6 and 7) and 1985 (Unit 8).

Canada and Japan Reach Reprocessing Agreement (EA)

The Honourable Allan J. MacEachen, Deputy Prime Minister and Secretary of State for External Affairs, signed an Agreement in the form of an Exchange of Notes concerning the reprocessing by Japan of Canadian-origin spent nuclear fuel on April 14. Signing on behalf of Japan was the Japanese Ambassador, His Excellency Kiyohisa Mikanagi.

Canada and Japan have a nuclear relationship of long standing. The existing Agreement for Co-operation in the Peaceful Uses of Atomic Energy dates back to 1959. A Protocol amending this agreement came into force in September 1980. The agreement signed determines how Article III of the amended agreement which, *inter alia*, provides controls over reprocessing of spent nuclear fuel and over the retransfer of spent fuel for the purpose of reprocessing, will be implemented by the two parties on a long-term basis.

By obtaining an approval in advance for reprocessing to be carried out, Japan will be able to plan its nuclear fuel cycle activities with more certainty. The agreement thus enhances energy security. Japan is Canada's largest uranium customer and this agreement will make Canadian uranium yet more attractive to Japanese utilities because of its contribution to Japan's energy security.

Canada has signed similar agreements with Sweden and Euratom.

Underground Research Lab Underway (AECL)

Blasting for the shaft at AECL's Underground Research Laboratory near Lac du Bonnet, Manitoba in March marks the beginning of construction of the $20 million facility designed as part of the assessment of Canada's concept for deep disposal of nuclear fuel wastes in stable rock formations. Operational date is expected to be 1986.

Although similar facilities exist in other countries, the URL is the first in the world to be built below the water table in previously undisturbed granite. By building the URL, experimenters can take a first-hand look at how groundwater and rock would behave under actual disposal conditions and plan accordingly.

The experimental program for the URL has already begun, with a thorough assessment of the site before the leased area was disturbed by construction.

During excavation, instruments installed in deep boreholes that ring the URL site will measure changes in groundwater. Later, from the shaft and the underground test rooms, boreholes will be drilled into the surrounding rock to determine how the rock responds to excavation, and what changes occur in groundwater chemistry and groundwater flow.

Shaft and tunnel-wall conditions will also be studied to determine how to seal cracks. Shaft seals will be constructed and tested and the ability of a shaft seal to minimize water seepage will be assessed.

Tests will also be conducted to determine how underground water seeps through crack networks around an excavated structure and how blind cracks in the rock mass would trap radionuclides and act as a deterrent to the passage of radioactive particles.

Atikokan Chosen for Hydrogeology Study (AECL)

Atomic Energy of Canada Limited has decided to locate a 10-year ten million dollar regional hydrogeological flow system research project at Atikokan, in Northwestern Ontario.

The study will investigate the natural seepage of groundwater through a large area of plutonic rock in the Canadian Shield. Results will be used to help assess the long term safety of a nuclear waste disposal vault, which is expected to be built in this kind of rock in the Ontario portion of the Canadian Shield sometime in the next century.

Advantages of the Atikokan site are that considerable knowledge of the geology of the area has been developed already, and the existence of a disused 320-metre deep open pit iron mine. By monitoring the level of the water in the pit, researchers will be able, in the space of only a few years, to conduct experiments that would take 35 years at another location.

Nuclear Power Shows Steady Increase (OECD)

Nuclear electricity generation in the OECD area increased in 1982 by 8.3% to 734 terawatt-hours (TWh) according to figures released in April by the OECD Nuclear Energy Agency.

The NEA figures, which are based on projections for electricity generation and nuclear power to the year 2000 show that despite problems in various countries and cancellations of reactors the contribution from nuclear power is steadily growing.

At the end of 1982 there were 229 operable nuclear power reactors in the OECD area with a total installed electrical capacity of 147 Gigawatt (GWe), an increase of 15 reactors over the 1981 figure. In addition, 149 reactors with a capacity of 151 GWe were under construction and 27 reactors representing 28 GWe were on order.

There were 20 reactor cancellations in the OECD area in 1982, 18 in the United States and 2 in Italy.

The substantial role that nuclear energy has come to play in electricity generation is illustrated by the figures in the following table, which shows that at the end of 1982 five OECD countries were producing more than 25% of electricity from nuclear power plants. Finland led the figures with more than 40%, closely followed by France (38.7%), Sweden (38.6%), Belgium (30.2%) and Switzerland (28.2%).

The nuclear share of electricity generation in the OECD area as a whole rose in 1982 to 14.8% compared with the 1981 figure of 13.5%. On the basis of estimates provided by Member countries in March 1983 the nuclear share of electricity generation in the OECD area will rise to 24% in 1990 and increase to 29% by the year 2000.

A comparison of fuel cycle supply and demand shows that with the present general over supply of uranium and fuel cycle services there are not likely to be any short term difficulties to constrain the growth of nuclear power.

From 1990 onwards the annual OECD requirements for uranium will amount to about 52,000 tonnes. Some 47,000 tonnes of this demand will be met by production from within the OECD area. The balance will continue to be supplied by imports, mainly from African countries.

The Nuclear Power Situation in OECD countries at 31st December 1982

Countries	Nuclear Capacity (GWe) (operable plants)	Nuclear share of Total Electricity (%)
Belgium	3.5	30.2
Canada	7.0	9.7
Finland	2.2	40.3
France	23.8	38.7
F.R. Germany	9.9	17.4
Italy	1.3	3.8
Japan	17.3	20.3
Netherlands	0.5	6.8
Spain	2.0	12.0
Sweden	7.3	38.6
Switzerland	1.9	28.2
U.K.	6.1	16.4
U.S.A.	63.9	12.6

Feasibility Study for Point Lepreau II (AECL)

Under a Memorandum of Understanding signed between Atomic Energy of Canada Limited and the New Brunswick Electric Power Commission, resources of both organizations will be combined to a joint undertaking to work towards the early realization of the Point Lepreau II nuclear power station.

The joint undertaking, to be known as Maritime Nuclear, will be based in Fredericton and will examine the feasibility of the marketing of electrical power to be generated from, the financing of, and the construction of Lepreau II.

The affairs of Maritime Nuclear will be

jointly controlled by an Executive Management Committee led by the Chief Executive Officer of AECL and the General Manager of New Brunswick Power and will be subject to the guidance of a policy committee comprising provincial and federal nominees. The staff, drawn from AECL and NB Power, will begin immediately to assemble the engineering and other skills necessary to carry out a feasibility proposal for the realization of a second reactor at Point Lepreau.

NPD Proves CANDU Concept (Nucleonics Week)

Designed to prove the feasibility of the CANDU reactor concept, the 20MW Nuclear Power Demonstration reactor in Ontario must be kept in operation as a testing and training facility, says Ontario Hydro. Hydro was justifying the annual $9 million operating cost before the Ontario Energy Board, and said materials testing alone justifies NPD now — after 20 years, this longest-running CANDU has an important bellwether role at low cost in the Ontario Hydro program, which will be capitalized at some $25 billion when Darlington is completed.

Maritime Heavy Water Plants Stay Open (Staff)

The federal government has decided to keep the two Nova Scotia heavy water plants open for now.

The Minister of Energy, Mines and Resources, Jean Chretien, told the House of Commons recently, "We have decided for the time being that we can keep these two plants in operation." The decision was reached due to AECL's investigation with the New Brunswick Electric Power Commission into a possible Point Lepreau 2 reactor and due to prospects for other export sales. He continued "We might be able to keep those plants in operation for a longer period of time. The government is doing its utmost to ensure that we save these jobs, but of course it is all within the normal possibilities of selling that heavy water."

Nuclear Sales Easier for AECL (Canadian Energy News)

New rules have received Cabinet approval giving Atomic Energy of Canada Ltd. the freedom to sign conventional low-value contracts without consultation with the government. Before this change, and since 1977, even a $50,000 or $100,000 consulting contract required government approval.

The new rules call for the Minister of Energy, Mines and Resources to consult with the federal Justice Department on all contracts of over $100 million. If there is any difference in the advice he receives from Justice and AECL's legal advice, the contract in question is to be referred for a final ruling to the Treasury Board.

Tritium Removal Systems Amalgamated (Ontario Hydro)

Ontario Hydro plans to amalgamate its two tritium removal systems planned for Pickering and Darlington nuclear generating stations.

The new system, to be built by Sulzer Canada Inc., will be located on the Darlington site, and integrated into the station, now under construction. The tritium removal system will help keep radioactive emissions low, and once recovered, tritium can be used in the manufacture of calculator displays, signs, smoke detectors and as a potential fuel for fusion reactors.

The system will not be in operation until 1986 or 1987.

Fusion Fuel Projects Get Go-Ahead (Nucleonics Week)

In its fiscal year just ended, a Canadian Fusion Fuel Technology Project CFFTP secretariat at Clarkson, Ontario was formed and 17 preliminary contracts worth about $1 million completed. Largest of these was a $150,000 study undertaken by Atomic Energy of Canada Ltd. at Chalk River to assess how tritium might be handled in extraction from a lithium blanket for fusion fuel production. The most significant project this past year was establishment of a five-man task force that went to Princeton to assess the long-term remote-controlled equipment demands of the U.S. TFTR program. The task force represented DSMA-Atcon Ltd. and Spar Aerospace Ltd. of Toronto and CAE industries of Montreal, the three firms that designed and built the space shuttle arm; Canadian General Electric of Peterborough, Ontario, which builds CANDU on-power fueling machines; and Ontario Hydro. It was headed by Varis Smeltnicks, a DSMA-Atcon electrical engineer who has been associated with CANDU fueling machine development since the 1960s.

The Canadian fusion program included in its first year awards a $47,000 contract to Scintrex Co. Ltd. of Toronto to continue development of tritium monitoring equipment designed at AECL's Chalk River Laboratories some years ago. A $30,000 award to McMaster University, Hamilton, financed research into how tritium adheres to metallic surfaces. The study is concerned with decontamination of fusion technology equipment. Ontario Hydro engineers at the utility's central safety laboratory at Pickering are completing a $70,000 research project to develop a new monitoring concept that will discriminate between pure tritium gas and tritium oxide.

AECB increases R&D Budget (Nucleonics Week)

The Atomic Energy Control Board has almost doubled its research and development budget to $1.9 million for the year beginning April 1st.

Most of the $575,000 allocated to radiation health effects will focus on uranium miners and the board has budgeted $350,000 for safety evaluations, notably on CANDU core behavior under dual-failure conditions, the likely consequences of pressure tube breaks, the development of better risk analysis techniques, and a small ($25,000) study on the socio-economic impact of AECB regulations. The government approved $150,000 special funds in the AECB R&D budget to assist the International Atomic Energy Agency in developing instruments and methods to safeguard the CANDU reactors. Another $50,000 will be spent on development of better security for Canadian nuclear materials and facilities.

AECB says it is hiring a human factors specialist who will direct a task analysis of reactor operators to determine their likely behavior during abnormal events and the effect of their training on response to emergencies.

A separate $150,000 program for pathway analysis will study plant and animal uptake of radioactive materials and apply state-of-the-art hydrogeology and geochemistry to Canada's deep disposal of nuclear waste program.

Chalk River offers Heat Transfer Expertise (AECL)

A new service based at Chalk River Nuclear Laboratories went into operation April 1 to offer a heat transfer and fluid flow service (HTSF) to North American industry from three internationally renowned laboratories.

The service extends to this continent the benefits of research on heat transfer and fluid flow carried out at the Harwell Laboratory of the United Kingdom Atomic Energy Authority and the National Engineering Laboratory, also based in the U.K., as well as the laboratories of Atomic Energy of Canada Limited Research Company.

During many years' research in support of the nuclear program and some 20 years' experience with design and operation of nuclear power plants, Chalk River has learned much about the technology of heat transfer and pressure drop in boilers and pipeline systems, tube corrosion, vibration, fretting and wear, measurement of heat exchanger performance, and leak detection. Much of this information and experience is equally applicable to non-nuclear industries. HTFS will build from the basic knowledge to offer technology to a wide industrial base.

HTFS provides its members with computer programs, design reports, handbooks, information bulletins, a literature search service, seminars and technical meetings. HTFS methods cover such equipment as shell and tube exchangers, air-cooled exchangers, cryogenic equipment, furnaces, refrigerators and air conditioning equipment.

HTFS chose Chalk River Nuclear Laboratories to help it penetrate the North American market for three reasons — the international reputation Chalk River has earned in 40 years' service; the willingness of the Canadian government's Department of Energy, Mines and Resources to help fund the research; and Chalk River's established credibility in technology associated with

heat exchange equipment design and operation.

AECL's Accelerator Breeder Program Outlined (Energy Analects)

The anticipated world shortage of fissile fuel for nuclear power stations has prompted Atomic Energy of Canada Ltd. to begin a program of accelerator breeder (AB) system development.

The first stage, ZEBRA (Zero Energy Breeder Accelerator), will test aspects of a full current beam for an AB, and is slated to be operational in 1990 at a cost of $35 million. The second stage, EMTF (Electronuclear Materials Test Facility), would be completed shortly after the year 2000 for $75 million and will be used for a number of purposes, including fuel materials testing. About ten years later, the third stage, a $500 million pilot AB facility operating at a low power level, will be finished. Finally, near the year 2025, the fourth stage, a completely operational AB generator producing 110MW, costing roughly $1,500 million, will be finished.

Approval for the first stage, which will likely be located at a new laboratory in the province of Quebec, is expected this year. The remaining stages would be built at an existing nuclear park in order to reduce risks and costs involved with the shipping of radioactive material.

Whiteshell Celebrates 20th Anniversary (AECL)

Whiteshell Nuclear Research Establishment is celebrating its 20th anniversary this year, having begun in July 1963 when Atomic Energy of Canada Ltd. formally took over operation of WNRE from building contractors.

Its origin was six years earlier, when a memorandum written to then AECL President Lorne Gray by J.S. Foster and Harold Smith recommended that the company develop the organic coolant nuclear reactor concept to provide "a second string to our bow." The suggestion was made following a visit to the Organic Moderated Reactor Experiment at Idaho Falls, USA. According to J.S. Foster, the decision to proceed with WNRE was taken about that time and from the beginning it was envisaged that the test reactor, which would be the main initial facility, should be an organic-cooled, heavy water moderated unit.

In 1960, the Whiteshell division was formed at Chalk River Nuclear Laboratories to organize recruiting of staff for WNRE, establish a research program and write design specifications for WR-1. In June of that year an agreement between AECL and the Manitoba Government was concluded covering construction and operation of both WNRE and the new community to be established in Pinawa.

A major milestone was reached in January 1962 when the contract to build WR-1 was awarded to Canadian General Electric.

In May of 1963 the 65-foot deep excavation for the reactor building was completed and the first concrete was poured in June.

In July the Whiteshell laboratories were officially turned over to AECL without ceremony.

New Report on Training for Radiation Workers (NCRP)

The publication of a new report dealing with the training aspects of radiation safety programs was announced April 1 by the National Council on Radiation Protection and Measurement (NCRP). NCRP Report No. 71, "Operational Radiation Safety — Training" seeks to provide guidance for the development of training for individuals who are exposed to radiation in the course of their work. The guidance provided covers the basic elements of needed training and thus should be useful to the entire range of radiation users, from small single source operations to relatively complex ones. The report emphasizes management's responsibility in training employees and presents criteria for identifying training requirements for a variety of personnel such as, regularly exposed workers, occasionally exposed workers, management and supervisory personnel, contractor personnel, visitors and emergency personnel. Criteria for training requirements for special cases such as workers who are required to enter unusually high radiation fields are also included. Training aids are discussed and guidance on the audit of training programs is given. Suggested minimum topics for radiation safety training, examples of training methods, specific needs for adult training programs, and sources for current listings of publications on human resources development and training are also included. The new report is the second in a series of reports devoted to operational radiation safety matters. The first in the series, NCRP Report No. 59, "Operational Radiation Safety Programs", provided the philosophy, basic principles and requirements for an operational radiation safety program. Copies of the report can be obtained from: **NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, Maryland 20814.**

Report Examines US Nuclear Industry Viability

(Nuclear Engineering International)

The manufacturing backlog is essentially gone in the American nuclear supply industry, and what little remains will be completed in late 1983 or early 1984. There has already been a major shrinkage in manufacturing capacity at the NSSS supply level to about one-half that of the mid-1970s — these are some of the findings of a report on the viability of the American nuclear supply industry carried out by S.M. Stoller Corp. for the Argonne National Laboratory: "Nuclear Supply Infrastructure Viability Study" (November 1982).

The domestic supply capacity will continue to decline from an estimated present level of eight to 12 units per year to a level of four to six units per year within the next three to five years. Diversification of facilities to other market areas (and products) is occurring and will continue, Stoller says.

The projected foreign order load is insufficient to sustain the present capacity even for the three NSSS vendors actively competing in the export market. That order load is expected to represent about one to two units per year for American vendors.

The major prerequisite for a resurgence of the American nuclear supply industry is growth in electricity demand.

If the electricity demand growth is healthy and sustained, and if the other prerequisites are met, Stoller expects that there will only be a market sufficient to support at best two NSSS vendors until well into the 1990s.

One factor which could have a profound impact on the resumption of the nuclear supply industry is the large inventory of equipment and material produced for nuclear plants which have been cancelled.

CNS News

Blix to Address Pacific Basin Conference

Hans Blix, the Director General of the International Atomic Energy Agency will address the 4th Pacific Basin Nuclear Conference this September in Vancouver. Blix will speak on the subject of international cooperation in nuclear energy and joins a wide-ranging program examining the status, future plans and significance of nuclear developments for Pacific Basin countries. The conference is hosted by the Canadian Nuclear Association and co-sponsored by the Canadian Nuclear Society, the American Nuclear Society and other Pacific Basin nuclear societies and forums.

Dan Meneley to Represent CNS on International Committee

CNS Council has appointed Dr. Dan Meneley to represent the CNS on a committee of eleven national nuclear society representatives to examine the need for and the role to be played by an International Institute on Nuclear Safety. Under the chairmanship of Professor Dr. Claude Zangger of the Swiss Office of Energy, the Committee, which will present its conclusions at the 4th Pacific Basin Nuclear Conference in Vancouver, September 1983, results from the initiative of American Nuclear Society President, Manning Muntzing.

As CNS representative, Dr. Meneley is anxious to receive any comments or suggestions from CNS members on IINS: need, professional goals, scope of work, representation or any other aspect of this activity. Comments should be sent to:

Dr. D.A. Meneley
Manager, Nuclear Group
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Comprehensive CNS Annual Conference Program Set

The CNS 4th Annual Conference, to be held June 15 in Montreal promises a comprehensive review of nuclear technology, research and new applications. Scheduled are five parallel sessions with 24 papers in the morning and six parallel sessions with 30 papers in the afternoon. The sessions will emphasize new technology and services, such as the Spar space arm applied to reactor maintenance and the Canadian accelerator breeder program. Former US DOE official W.K. Davis will speak on future prospects in the keynote address and J. Macefield will speak on world food irradiation. The panel session will deal with nuclear waste sterilization. Jan-G Charuk of AECL is CNS Conference Chairman and Gaston Bolduc of Hydro-Quebec is Chairman of the CNS Conference Program Committee. A special invitation to all technological innovators is extended — the CNS needs you!

Programme détaillé du Congrès annuel de la SNC établit

Le quatrième Congrès annuel de la SNC, qui aura lieu le 15 juin à Montréal présente une revue détaillée de la technologie, de la recherche et des nouvelles applications nucléaires. Cinq sessions parallèles avec 24 exposés sont prévus pour la matinée et six. sessions paralèlles avec 30 exposés sont prévus pour l'après-midi. L'accent sera placé sur les nouvelles technologies nucléaires, comme le télémanipulateur spacial de Spar, utilisé pour l'entretien des réacteurs et le programme canadien d'accélérateur-convertisseur. W.K. Davis, ancien sous-secrétaire à l'Energie des É.-U., parlera de l'avenir de l'industrie nucléaire lors de son exposé d'ouverture. Au dejeuner, J. Macefield entretiendra l'auditoire sur la préservation des aliments par l'irradiation. Enfin, la séance plenière traitera de la stérilisation des déchets. Jan G. Charuk, de l'AECL, est le président du Congrès et Gaston Bolduc, d'Hydro-Québec, est le président du Comité du programme. Une invitation spéciale est lancée à tous les innovateurs technologiques - c'est un rendez-vous à ne pas manquer.

CNS Technical Division Conference Planning

We thought you would be interested in some of the longer term conference planning which is going on at this time in our four Technical Divisions. It is our hope, in telling you of our advanced planning that you will decide to hold that technical paper (you have been intending to prepare for so long) until you can present it in one of our forthcoming symposia or, of course, in the proposed journal.

The Conference program for 1983 is already complete and, apart from a few stragglers, all summaries should already be in for the Annual Meeting on June 15, in Montreal's Queen Elizabeth Hotel; and the Numerical Methods Conference from September 6-9, in Montreal's Sheraton Centre. Additionally, we are organizing a course on the ASME Code, Section III from October 4-5, in Toronto's Chelsea Inn.

For the 1984 program we are hoping to arrange five technical conferences on the following topics:

- Radiation Protection — Spring in Banff — one day.
- Fuel Development Information Meeting — Spring location to be chosen — two days.
- Simulation Symposium — April — location to be chosen — two days.
- Containment Design — June 18-20 — at Toronto's Westin Hotel.
- Applications of Robotics and Remote Handling to the Nuclear Industry — September — Southern Ontario location.

It would be of great assistance to our planning for these meetings if you could drop a note to me at **Energy, Mines and Resources, 580 Booth Street, Ottawa, Ontario, K1A 0E4,** with your offer of help and intent to present a paper.

Joe Howieson

Responses to Questionnaire

Council included a questionnaire in with the subscription notices this year in an effort to better determine the wishes of the CNS membership. At this time, we have received a good response — 180 from our current membership of about 800. What you have told council is as follows:

1. 48% of you already attend branch programs.
   6% of you would help with local branches.
   40% of you will attend branch programs.
   5% of you will not attend branch programs.
   (most of the latter are in areas remote from existing branches.)
2. 45% of you are strongly in favour of a journal.
   40% of you have some interest in a journal.
   14% of you have no interest in a journal.
3. A significant number of you indicated interest in participating more fully in the executive activities of the society. Unfortunately, the questionnaires were not identified by name and only those whose comments were signed could be identified.

We receive many comments and suggestions on the proposed journal but the overall response seems to establish that there is a potential readership. It has already been established that there is a potential authorship and all that remains for council is to determine a good organization and an economic method of production.

In view of the above, we request that those who volunteered to help with the journal in particular leave their names and interests with: John Hewitt (416) 978-2976.

Joe Howieson

Nuclear Engineering Positions at the University of Toronto

The University of Toronto has reaffirmed its commitment to postgraduate and undergraduate training in nuclear engineering, utilizing the substantial resources which exist in established departments. Coordination is to be achieved through the University's new Centre for Nuclear Engineering. Enhanced support and collaboration has been pledged by industry. As an initial step in the development of the Centre, applications are invited for two tenure stream/tenured faculty positions, one to be held in the Department of Chemical Engineering and Applied Chemistry and the other to be held in the Department of Mechanical Engineering.

The appointment in the Department of Chemical Engineering and Applied Chemistry will be made at either the Associate or Full Professor rank. Candidates should have a doctoral degree, preferably in nuclear engineering, and have considerable experience in research or engineering development related to the application of nuclear energy. Preference will be given to candidates with previous academic experience and with expertise in one or more of the following areas: nuclear reactor analysis and control; advanced nuclear systems; nuclear shielding, safety and containment; nuclear calculational methods; and nuclear chemical engineering.

The appointment in the Department of Mechanical Engineering will be made at the Assistant or Associate Professor rank. The candidate should be a nuclear engineer with a doctoral degree in engineering, and have a background of study and research in nuclear power systems. Experience in teaching, in the engineering design of power systems, and in research and development projects in heat transfer, thermal hydraulics, two phase flow, or allied areas will be favourably considered.

Both departments are seeking research oriented nuclear engineers who will give leadership in nuclear power related undertakings.

The successful candidates will be expected to contribute to teaching and course development in the established Bachelor's, Master's and Doctoral degree programs in nuclear engineering, to develop graduate research programs in chosen areas, to supervise graduate students, and to give active support to the activities of the Centre for Nuclear Engineering.

The teaching and research facilities at Toronto include the SLOWPOKE nuclear reactor, a heavy water-uranium subcritical reactor, a fast neutron generator, a radiochemical laboratory, a broad range of modern nuclear instrumentation, facilities for heat transfer and fluid flow investigations, and extensive computational resources.

Candidates for either position should provide a curriculum vitae, the names of at least three referees, and a summary of teaching and research interests. Applications for the position in Chemical Engineering should be addressed to **Professor M.E. Charles, Chairman, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Ontario, M5S 1A4.** Applications for the position in Mechanical Engineering should be addressed to **Professor R.D. Venter, Chairman, Department of Mechanical Engineering, University of Toronto, Toronto, Ontario, M5S 1A4.**

In accordance with Canadian immigration requirements this advertisement is directed to Canadian citizens or permanent residents of Canada.

Conferences & Meetings

3rd International Conference on Emerging Nuclear Energy Systems

Co-sponsored by Finnish Nuclear Society, ENS, ANS and USSR Academy of Sciences, to be held **June 6 to 9, 1983** in Helsinki, Finland. For information contact: **Drs. Seppo Karttunen and Rainer Salomaa; Technical Research Centre of Finland; Nuclear Engineering Laboratory; P.O. Box 169; SF-00181 Helsinki 18; Finland.**

23rd Annual International Conference of the CNA and 4th Annual Conference of the CNS

Co-sponsored by CNS and CNA, to be held **June 12 to 15, 1983** in Montreal. For information contact CNS.

7th International Symposium on Nuclear Quadrupole Resonance

To be held **July 11 to 14, 1983** in Kingston, Ontario. For information contact **R.J.C. Brown, Chemistry Department, Queen's University, Kingston, Ontario, K7L 3N6.**

6th International Symposium on Plasma Chemistry

Sponsored by the International Union of Pure and Applied Chemistry, to be held **July 24 to 28, 1983** in Montreal, Quebec. For information contact **Prof. Maher Boulos, Département de génie chimique, Faculté des sciences appliquées, Université de Sherbrooke, Sherbrooke, Quebec, J1K 2R1.**

Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy for Economic and Social Development

Sponsored by the United Nations, to be held **August 29 to September 9, 1983** in Geneva, Switzerland. For information contact **Secretary General, UN Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy**, United Nations, New York, NY 10017.

International Conference on Numerical Methods in Nuclear Engineering

Co-sponsored by Canadian Nuclear Society and American Nuclear Society, to be held **September 6 to 9, 1983** in Montreal, Quebec. For information contact **R.A. Bonalumi, Conference Chairman, Nuclear Studies and Safety Dept., H16-H17, Ontario Hydro, 700 University Ave., Toronto, Ontario, M5G 1X6.**

4th Pacific Basin Nuclear Conference

Co-sponsored by CNS, CNA et al., to be held **September 11 to 15, 1983** in Vancouver. For information contact CNS.

7th International Conference on Solid State Dosimetry

To be held **September 27 to 30, 1983** in Ottawa, Ontario. For information contact **D. Grogan, Health and Welfare Canada, Radiation Protection Bureau, Brookfield Road, Ottawa, Ontario, K1A 1C1.**

CNS Design and Materials Division Seminar

Subject: Overview of ASME III and its Relationship to Canadian Requirements.

Speakers: M.N. Bressler — Staff Specialist — Codes & Materials, Nuclear Engineering Branch, TVA.

H.D. Hanrath — Chief Inspector, Boiler & Pressure Vessels Branch, Ontario MCCR.

R. Humphries — Manager — Licensing, Design & Development Division, AECL-EC.

G.G. Legg — Manager — QA Systems, Design & Development Division, AECL-EC.

Date: October 4-5, 1983.

Location: Chelsea Inn, Toronto.

Cost: $180 ($165 for CNS Members) — includes full set of notes, lunches and coffee breaks.

Seminar Description: Mr. Bressler's presentation (1-1/2 days) will be an overview of the ASME Code Section III, discussing the structure and content of the various Articles and Subsections. He will also touch on the historical development of the Code and highlight the latest changes in requirements. The final 1/2 day will consider the Canadian perspective of the ASME Code, its relationship to Federal/Provincial requirements and to the CSA N285 series of standards.

For information contact **J.T. Martin, Mechanical Design Dept. H14, Ontario Hydro, 700 University Ave., Toronto, Ont., M5G 1X6, (416) 592-5132.**

Workshop on Analytical Chemistry Related to Canada's Nuclear Industry

Co-sponsored by Canadian Nuclear Society, Canadian Nuclear Association, AECL et al, to be held **October 24 to 26, 1983** on Hecla Island, Manitoba. For information contact **P. Campbell, Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, R0E 1L0.**

Reactor Safety Conference

The Internation Conference on Thermal Nuclear Reactor Safety will be held at Karlsruhe, West Germany, **September 10-13, 1984**. The current schedule for issue of the Call for Papers is **October 7, 1983**. A brief statement of intent to submit a paper will be required by **December 15, 1983**. Summaries (1,000 words) must be submitted by **February 15, 1984**. Camera-ready papers (10 page maximum) must be submitted by **September 10, 1984**. Proceedings will be issued by **January 31, 1985**.

The conference is hosted by the European Nuclear Society, with co-sponsorship by CNS, ANS, and other national nuclear societies. Judging from the tone of the 1982 conference in Chicago, increasing emphasis on operating experience and feedback to design is expected, with decreasing emphasis on far-out accident scenarios. Engineering experiments and analysis to justify lesser conservatism also will be emphasized. Risk-based design and operating standards will likely be popular.

Bill Penn (Manager, Nuclear Studies and Safety Department, Ontario Hydro) is the Canadian representative on the technical program committee and Dan Meneley (Group Manager, Nuclear, Ontario Hydro) has been nominated to the Steering Committee. Contact either if you have questions regarding this conference.

Dan Meneley

The Unfashionable Side

Outlook Sunny: ASLEEP Head

The outlook for solar energy research has never been sunnier, says Dr. Solomon Breeder, President of Gecko Solar Laboratories Inc., of California. And Dr. Breeder should know, what with Gecko Solar stock

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Le Bulletin SNC est l'organe d'information de la Société Nucléaire Canadienne.

CNS provides Canadians interested in nuclear energy with a forum for technical discussion. For membership information, contact the CNS office, a member of the Council, or local branch executive. Membership fee is $30.00 annually, ($5.00 to students).

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, contacter le bureau de la SNC, les membres du Conseil ou les responsables locaux. La cotisation annuelle ext de $30.00, ($5.00 pour les etudients).

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skyrocketting on the OTC market, until recently.

He is head of ASLEEP, the newly-formed Association of Solar Laboratories for Ephemeral Energy Production and has made similar forecasts ever since Gecko Solar was established to capitalize on the abundance of solar funding during the Carter administration.

Winner of many media awards, Breeder has also twice received the distinguished Aphasia University Medal for Conspicuous Research.

A prolific and popular writer on renewable energy and other subjects as well, he is rumoured to have had nearly 2000 articles published in OMNI magazine under various pseudonyms. Under his leadership, Gecko Solar is active in many solar developments, however the unexpected withdrawal of funding by a large US oil company recently may affect the realization of their first product, known as "solar beach spray," which had potential applications for using solarvoltaic energy on the beach. Another ongoing project is a solar tower in mid-Manhatten.

Construction of 500 rooftop mirrors focused on the Citicorp collector tower is well advanced, although testing shows power output to be disappointing. But all is not lost on this project since Club Med has reportedly shown interest in establishing a centre at the focal point. And under Dr. Breeder, ASLEEP is very active too. With the great success of ASLEEP's new solar breakthrough kit, 937 additional solar breakthroughs have been achieved and reported in the media recently, and a student chapter has been formed.

Chuck Wood

Solar Apocalpyse — The Threat from the Sky - Part 2

Serious (and unexplained) accidents at the Sunnyside Stream Solar Generating Station have not been infrequent. It was, in fact, their disturbing frequency that alerted CRASS (Canadian Researchers Against Solar Suicide). CRASS president, Dr. Armitage Loathing is Chairman of Aphasia University's Department of Underwater Ornithology, and his scientific credentials have made him one of Canada's most influential critics of solar energy.

Dr. Loathing feels that while the continuing series of human and mechanical failures at Sunnyside Stream are in themselves good enough reasons to reconsider the decision to pursue the solar energy option, solar energy poses an inherent threat to humankind's continued existence on this planet. It's the "Archimedean syndrome", what could happen as a result of a major accident at a solar plant. Dr. Loathing explains: "Under normal circumstances, the giant reflectors at a solar generating station track and elevate to follow the sun, and reflect concentrated solar radiation onto a heat collection unit. But were there to be a simultaneous failure of all control devices, then it is possible that all the reflectors could focus solar radiation on a single area of the ground and burn a hole through the earth's surface." Dr. Loathing points out that no-one has even attempted to evaluate the devastation that this could cause.

Accidents aren't Dr. Loathing's only worry. A determined terrorist group, he points out, could relatively easily gain control of a solar station and hold the surrounding area to ransom. "The really frightening element here" he adds "is that there exists *no defence* against this kind of threat."

Naturally Dr. Dennis Molestrangler, CORPSE Director of Solar Generation, disagrees. He dismisses the alarming history of mechanical malfunction and operator error at Sunnyside Stream as the sort of thing to be expected in any large and complex installation. Dr. Molestrangler is at pains to point out that Sunnyside Stream's Contingency Emergency Plan provides for residents in the area of the plant to be issued with reflective aluminized sunshades which would be deployed in the event of any improbable "incident." As for the "Archimedean Syndrome," Dr. Molestrangler is emphatic: "This kind of incident is only conceivable if all the reflectors had control system failures simultaneously at high noon on June 21. With the sort of defence in depth designed into the station it's so improbable as to be almost impossible."

An increasing number of concerned Canadians, along with Dr. Loathing, are becoming increasingly sceptical about such assurances. Quite apart from the prospect of our grandchildren having to grow up under the shadow of a solar umbrella, Dr. Loathing feels "almost" isn't good enough. "We need to know how much 'almost really means, says Loathing. "CORPSE must come into the open with its safety calculations, sundial design details and sunlight exposure contingency plans, so that independent scientists can evaluate them."

Only such a approach will put an end to the sorry tale of secrecy and downright deception that has been all too characteristic of CORPSE's dealings with both the general public and the Solar Energy Regulatory Agency (SERA). "In order to make an informed choice about their energy future" Dr. Loathing says, "the Canadian people need to see the whole story about the massive threat to human life and the devastating environmental impact characteristic of solar energy."

So there the matter stands. The choice is our to make. On the one hand we have an incredibly complex and awesomely expensive energy system which, its proponents assure us, is as safe as is humanly possible. On the other hand there is the near certainty that we will one day have to face the solar apocalypse when a technician somewhere makes a mistake, or some piece of equipment fails.

Icarus flew too close to the sun, and was destroyed. Have we not learned from him?

Ernest Worthing