



Canadian Nuclear Society  
Société Nucléaire Canadienne

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**CNS**  
**BULLETIN**  
**SNC**

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## CNS '81 - REPORT

### THE YEAR AHEAD - PRESIDENT

### THE YELLOWCAKE WALK

The CNS Bulletin is the membership newsletter of the Canadian Nuclear Society.

*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 \$20.00 annually.

*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 est de \$20.00.*

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# CNS BULLETIN SNC

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## EDITORIAL

### The Real World

It is sometimes dangerous, and often misleading to attempt to discern a pattern or common theme in a series of events--as William Golding notes, the pattern seeker becomes the pattern maker. However the temptation to extract a theme from the Second Annual Conference is strong, and, like one of Wilde's characters, we can resist anything except temptation.

We must remember the real world, and the realistic perspective was best articulated by Milt Levenson in his lunch address to the society: the real world, he reminded us, was one in which radioactive iodine does not behave like the noble gases, and in which splashing molten uranium around was a most inefficient isotope separation process. "We have to find a way of returning to sound engineering" he concluded.

Any paper analysis must be checked against what goes on in the real world. It is certainly true that it's very much easier to carry out a paper analysis than to build something and see if it works. It is also true that thoughtless action has probably more potential hazards than actionless thought.

At the same time, paper analyses carried out in isolation from the real world can be deceptive, dangerous, useless--even funny.

From a reductio ad absurdum viewpoint, one needs only to examine the problem posed by the proof that cats have three tails. Or Zeno's paradox. The former can be resolved by walking around and looking at cats. The latter, by observing that Achilles, in the real world, would not have felt bound to reduce his stride by successive stages--he would have simply overtaken the tortoise. Less classically we observe the problem faced by the centipede who, when asked which leg moved first, fell over--despite a previous history of pedestrian effectiveness.

Milt Levenson's argument focussed on nuclear safety. But his argument surely extends to all facets of the nuclear enterprise. Analyses must take into account the lessons we learn from the real world.

We could do worse than remind ourselves of the credo of an aviation pioneer: "To design an aircraft is nothing. To build an aircraft is nothing much. But to build and fly that aircraft--that is everything."

## **THIS ISSUE**

What with mail strikes and summer vacations breaking out with their usual virulence CNS Bulletin SNC is not only late, but merged. This means that there will be ten issues a year instead of twelve--the June and July issues will be combined, as will the August and September ones. This, making a virtue of necessity, shows the CNS/SNC Editorial Group's commitment to the metric system, as we toss duo-decimal to the winds.

## **The contributors**

**Phil Ross**--Ross is the Society's new President for the 1981-82 term. He received his M Eng from McGill in 1951 after which he worked with Avro on the Orenda and Iroquois engines for the CF-100 (Canuck) and CF-105 (Arrow) fighters. He joined AECL in 1959 to work on power reactor fuel channel development at the Chalk River Nuclear Laboratories--one of several Arrow alumni to achieve eminence in the nuclear industry.

**Ray Silver** is an internationally recognized writer and analyst of the energy scene, especially nuclear. In fact his involvement with nuclear energy in Canada goes back to the late forties. Ray is a regular contributor to The Financial Post, Nucleonics Week, Oil Week, Nuclear Fuels and Nuclear Engineering International. A former navigator with RAF Bomber Command (in World War II), Ray devotes his navigational talents in this issue to unravelling some of the convolutions of the so-called uranium cartel.

**Neil Paolini** is a welding consultant with STELCO Inc, an active member of several CSA code committees, the Welding Institute of Canada and the Canadian Advisory Council of the International Standards Organization. His comments on the use and abuse of codes are taken from a presentation to AECL staff, one of a series of lectures organized by the Canadian Society for Nondestructive Testing.

## THE YELLOWCAKE-WALK

### Cartel Convolutions

The man in the middle of the Canadian uranium cartel case, O John C Runnalls says the federal government initiated international marketing arrangements in response to US "predatory protective pricing practices"; and that the American, West German, Japanese and British governments were kept advised from the outset. The prime concern was to assure a domestic fuel supply for Canadian nuclear power plants in the 1980's by keeping the industry alive through lean times. In fact, the government imposed price and export quota controls through the Atomic Energy Control Board five times in the 1972-74 period then cancelled them because "specified minimum price levels had long since been overtaken by market forces."

That rationale is contained in a comprehensive report on the uranium industry which Runnalls wrote last January for Ontario's Ministry of Natural Resources. Now a board member of Ontario Hydro, which was the only potential victim of uranium price rigging in Canada in the 1970's, Runnalls has been named a co-conspirator in the anti-combines case against six Canadian uranium companies but he has not been charged himself. As senior uranium advisor at Canada's Energy Mines and Resources ministry in the 1970's, consultant to one of the companies charged (Eldorado Nuclear) and a director of two others (Uranium Canada and Uranerz Canada) Runnalls will undoubtedly be a key figure when the case comes to court.

Runnalls report, Ontario's Uranium Mining Industry - Past, Present and Future is, in fact, a national and international review. Contrary to the picture of government and industry representatives plotting market quotas and price-fixing in secret, he cites a Canadian Embassy message to the US Atomic Energy Commission director AS Friedman on February 14, 1972 which said: "Regarding the uranium meeting in Paris the week before last, Canada took the initiative in calling the meeting of government officials from Australia, France, South Africa and Canada to explore all facets of present uranium market problems. The prime motivation (was) Canada's concern that the chaotic price situation could reduce uranium exploration to a point endangering adequacy of supplies in the latter part of this decade." Similar messages went to Bonn, Tokyo and London, says Runnalls who was a participant at the meetings abroad.

"Informal marketing arrangements excluded the domestic markets of France, Australia, South Africa and Canada as well as the US domestic market," Runnalls writes. He says the Canadian government "supported the arrangements" by issuing a new Atomic Energy Control Act regulation in July 1972. This authorized



the AECB to withhold an export permit unless it was satisfied that prices and quantities met criteria "specified in the public interest by the Minister."

Runnalls recalls how the PC opposition "goaded" the Trudeau government into ordering an anti-combines probe of the uranium cartel allegations in September 1977 because MP's, recalled from a summer recess, were left sitting on their hands when an expected debate on a Mackenzie Valley gas pipeline failed to materialize. Like other industry analysts he thinks the cartel arrangements of 1972-74 were overtaken by other market factors. He cites a Labour government in Australia that failed to develop uranium resources; the French plans to produce 70% of their electricity by 1985 from nuclear fuel; South African distraction from uranium exports because of gold ore values. By early 1974 Canadian producers were quoting prices in the range of \$32 per kilogram uranium--well above the government-set minimum. In the first half of 1974 Canadian companies committed some 35,000 tonnes of uranium for export sale--ten times Canada's annual output at that time, Runnalls reports.

Named to the Ontario Hydro board in February Runnalls admits that the prices Hydro pays Denison Mines and Rio Algom under the long-term \$7 billion contracts negotiated in 1974-77 period "may be somewhat higher for the next few years than (it) might have (paid) on the currently-depressed market. However, in the longer term the value of a contracted, assured supply for 40 years into the future will undoubtedly work to the financial benefit of the utility." Initial delivery of 38 tonnes of uranium, a fractional amount, from Denison last year was at \$125 per kilogram uranium or about 40% above spot market price then. "During the extensive period of negotiation of the two contracts and while they were being scrutinized by the Select Committee, the uranium market was strong and gave every indication of remaining that way for years," Runnalls observes. "However, in spite of prognostications at that time the market has turned dramatically downwards within the past few months." The spot market price was down to \$78 per kilogram of uranium in February 1981. In constant dollar terms uranium spot market prices fell about 200% from the 1976 peak to last year-end, most of the drop in 1980, Runnalls reports.

He predicts that Canadian uranium prices will fluctuate only moderately because there are relatively few producers and they have substantial long-term commitments. Canadian demand will grow only modestly but still double between now and the mid 1990's. Saskatchewan high-grade production will be nearly double that of Ontario.

Runnalls cites "out-dated federal policies which put the industry at a competitive disadvantage in the world market-place. Nevertheless, there is some evidence that a pragmatic approach is (now) being taken by federal authorities." He cites the March 1977 policy, in particular, which said future uranium contracts must be based on a pricing mechanism that utilized an escalating floor price, or on the world market price renegotiated annually, whichever was higher. Such a pricing formula is "unrealistic in the realities of today's soft market," he says. "Such criticism seems to have had impact on the Uranium Exports Review Panel" the federal government export control agency who he believes is now taking "a pragmatic view in interpretation of the March 1977 policy." Contracts based on prices negotiated two or three years in advance are being approved and in some cases Runnalls thinks the Panel has recommended approval of export contracts where the price is simply based on "reference to certain market indices" rather than advance negotiation.

Foreign customers have not been allowed more favourable pricing terms than domestic customers under Canadian government policy in the past. But Runnalls says "the exigencies of the market would seem to overrule a strict interpretation of this policy principle...the Panel would appear to be adopting a pragmatic approach in comparing pricing terms of domestic and export contracts." While the contracts initially submitted for federal approval must still ensure that domestic purchasers are not treated unfairly, later pricing negotiations "should fall within reasonable limits as imposed by the market at that time." If the Panel does follow this line Runnalls thinks it will overcome major problems in marketing uranium abroad.

**Ray Silver**

## PERSPECTIVE

### Codes - Uses and Abuses

"General" codes should be (and often are) followed by commentaries to guide the user regarding the intent, and background of various clauses. The more professional user will probably make greater use of the commentary than of the code itself. Conversely, the least experienced or least qualified user incapable or unwilling to make rational judgments based on the intent will invoke the letter of the code most frequently.

...There are three basic steps to be followed in producing a code. 1) Define the reason for the code's existence. 2) Choose a philosophy that will outline the principles that will guide the code writers. 3) Write, balance and assemble clauses that are pertinent, meaningful and compatible.

We are faced with a multitude of codes and philosophies, all striving to ensure sound welding. This assurance is sought by trying to control the welding procedure and verifying the skill of the welder. The controls are also constantly being revised, updated and tightened, to the point that many of these procedures and performance controls have become an end in themselves, rather than a means to an end...Why is it that so many authorities have different views and opinions and recommendations to achieve a common goal? Perhaps an analogy might clarify the situation.

Doctors are concerned about people's health. One doctor will advocate a balanced diet, no smoking and moderate drinking only. Another will swear by jogging, skipping or swimming. Yet another will stress exercise, weight training, vitamins and regular hours. Each doctor will emphasize his special interest based on the professional problems he has been exposed to and many write books advocating their particular approach.

As a result, the dock-worker reads the book on weight training and builds himself up. The office worker reads the book on jogging and develops his cardio-vascular efficiency. However, one day a kid steals the dock-worker's lunch and while chasing the thief, he has a coronary. Meanwhile, the office worker gets married, and while carrying his ample bride across the threshold he suffers a double hernia.

Our imaginary health freaks followed the advice of experts, yet their health suffered. The experts weren't wrong, but the emphasis was not on health in general, but on one or two facets only. The all-round healthy, professional athlete will follow a program that insures strength, muscle tone, cardio-vascular efficiency, good sleeping, eating and drinking habits and develops a healthy mind as well. From that broad base, he



concentrates on additional activity to further develop the particular physical needs of his professional sport.

With that in mind, perhaps we should be adopting or emulating the code that comes closest to giving us a general broad base that satisfies the basic requirements for obtaining good welds. Such a code would give us the general procedure and performance qualification requirements. Then, a separate product design code invoking the general code could make provisions for fewer or more restrictions based on the special service conditions of the product.

Complex codes create unnecessary costs as well as frustration and controversy over interpretation. When a code becomes so complex that it is used only to the extent forced on the fabricator by the owner, the engineer or the inspection agency its value is questionable.

What we need is a sound philosophy with sufficient depth and comprehension to enable a code committee to compile a document that is visionary in its recognition of all the direct and indirect factors which are essential in the production of sound functional elements. It must be simple and clear in its intent. It should also be compatible with other codes used by government and industry. It should, in fact, be acceptable to users to the extent that they can reduce the number and variety of codes presently being used.

**Neil Paolini**

**CNS '81 - REPORT**

**Return to reality, Levenson Urges**

"We have to find a way of returning to sound engineering". That sounds simple but it was the key to Milt Levenson's lunch address to the Second Annual Meeting, June 10. Mr Levenson is a former director of the Electric Power Research Institute, and it was in this capacity that he co-authored the paper "The Realistic Consequences of Nuclear Accidents". This was the subject of his talk to the CNS and the talk was as uncompromising, outspoken and convincing as the original paper.

Essentially, Levenson's thesis is that there exists a deplorable tendency to overestimate the consequences of reactor accidents. He explained how, after the Three Mile Island accident in 1979, he had examined the effects of over one hundred nuclear accidents involving reactors, fuel reprocessing facilities and nuclear weapons, and in every case "the radioactive releases to the environment were up to 10,000 times less" than computer calculations have suggested. This could not be due to blind luck he suggested. In fact, Mr Levenson pointed out, a look at the Three Mile Island showed that while noble gas releases from the station were in accordance with predicted values, iodine releases were 10,000 times less. This was primarily due to the fact that in the predictions iodine was not allowed to dissolve, in or react with, anything, a totally unrealistic assumption. "The predictions did not recognize that physically certain things have to happen before other things can happen", Mr Levenson said.

Reactor safety analysis in the United States has devoted a very great deal of time and effort to establishing the probabilities of different accidents, yet very little time or effort in establishing realistic consequences, ie. consequences based on the realistic behaviour of real materials in the real world. Mr Levenson expressed concern about this approach noting that before one can have any idea of the real risks involved in nuclear energy, one must know not only the probability of an event, but also its consequences. "The probability of my car having a flat tire may be so and so", Mr Levenson said, "but the consequences are very different if the car is parked in the garage compared with the car being driven at 120 mph on the autobahn. In the first case there are no safety consequences, while in the second there are very serious consequences".

Mr Levenson reminded his audience that applying over-conservatism to each element in a system did not give a safe system in general. He emphasized that safety is achieved by applying well established knowledge of the behaviour of materials and by "asking the right questions". "We must find a way of returning to sound engineering", he concluded, "nuclear power is too important for the future of the world. We have to assess it honestly".

### Levenson highlights

"...in the intervening year (after the Three Mile Island accident) it has become very clear that almost everyone has been considering hypothetical disasters that were not only hypothetical, but more likely impossible".

"...we do not believe this issue should be categorized as a new argument. It is rather a request that all people working in the field go back and look at what is the actual experience and what is a possible reaction and possible mechanism rather than assuming catastrophic conclusions..."

"Just because a particular computer model cannot handle the details of chemistry does not mean that the chemistry does not exist or that the reactions will not occur".

"In many cases the assumptions, when extracted from the interior of the calculations, call for aerosols at a density of pounds per cubic foot. Such a material may be defined as a sponge but hardly would qualify as an aerosol."

"Some of the analyses assume that the instant material leaves the primary system it reaches the dome of the containment building with no attenuation whatsoever. This is probably not an unrealistic assumption for the true noble gases. But it is a very bad assumption for everything else."

"The primary concern is that incorrect perception of the extent of possible public hazards can lead to non-optimum or even counter-productive policy decisions. It is time to start using technical facts rather than fantasy for policy planning".

## **CNA ANNUAL MEETING HIGHLIGHTS**

What is Canada's potential contribution to the world's energy supply? In Ottawa at the joint Canadian Nuclear Association/Canadian Nuclear Society meetings the answer was, unequivocally, considerable. At a time when energy demand growth rates are dropping -- within Ontario, Canada, and North America -- it seems paradoxical to suggest that a financially beleaguered nuclear industry can provide an escape route from poverty and starvation for the Third World.

### **CANDU experience - Campbell**

The paradox is resolved when the design features and the performance record (to say nothing of the developmental potential) of the CANDU nuclear power system are examined in an objective light. The facts are, as CNA chairman, Pat Campbell pointed out, that CANDU reactors routinely beat out all the competition on the basis of reliability. Also, as Campbell emphasized, the design features of CANDU have made possible a smooth transition from the 25MW demonstration station at Rolphton to the 850MW Darlington units.

For a utility performance and design are two major elements in influencing the bottom line -- energy costs. And here, for Ontario, CANDU was a clear winner, Mr Campbell emphasized, with total unit energy costs just over half those of coal fired power -- without even taking into account the not insignificant environmental costs of the latter energy source.

### **Cautious federal optimism**

Federal Energy Minister Marc Lalonde told the June 8 lunch meeting of the CNA that "we have a technically outstanding product" but warned "the nuclear industry is in for a difficult time for the next few years, due principally to economic conditions" in Canada and abroad which were acting to soften demand and slow growth-rates. There were, however, good short-term export prospects, Mr Lalonde suggested, citing Mexico, Roumania and Korea. (Earlier in the day AECL's Jim Donnelly had outlined AECL's Mexico proposal which would offer four 600MW CANDU units similar in design to New Brunswick Power's Pointe Lepreau station, or two of the new 950MW units).

Mr Lalonde's arrival at the Skyline hotel was preceded by an anti-nuclear demonstration sponsored by about 20 anti-nuclear groups including Energy Probe and the Canadian Coalition for Nuclear Responsibility (CCNR). CCNR Chairman, Gordon Edwards was on hand to support the efforts of between 20 and 30 demonstrators bearing placards carrying such messages as "Nuclear Killing Machines" and "One two three four, we don't want a nuclear war".



### Public issues in Ontario and UK

The chairman of Ontario Hydro, Hugh Macaulay, noted that the debate about nuclear power is not a debate about nuclear power but about lifestyles. Mr. Macaulay warned his audience that the debate had moved out of the realm of technical detail and operational safety to become a philosophical one. "This may not be what we in the industry want" he said "but we have to live with it". Looking at opposition groups, Mr Macaulay observed that these groups were able to pick and choose their arguments to match shifts in public mood, but noted that their values and goals were not necessarily those of the society they claimed to represent.

Indeed, he said, a fair definition of a public interest group might be a group whose views are opposed by more than 50% of the public.

Sir John Hill, Chairman of British Nuclear Fuels Limited, also addressed the question of nuclear issues, suggesting that hostility towards nuclear energy was a specific manifestation of a generalized hostility towards industrialized society. Sir John also noted that the unique features of nuclear energy were the bases for genuine public concern. "If the public could see, feel, taste, smell or hear low-level radiation then it is likely there would be no anti-nuclear movement" he said, adding that if radiation were sensible then "the public could better bring to bear its own great reservoir of common sense in assessing the hazard it presents".

### "Get on with the job" - Ontario Energy minister

Exports of nuclear generated electricity to the United States were the topic of a paper by Ontario's energy minister, Robert Welch. Mr Welch noted that electricity exports to the US already help reduce costs to Ontario consumers and that the proven performance of CANDU, together with its "inflation-proof" characteristics, meant that firm power exports from CANDU reactors could be a very lucrative proposition for the province. "When we are faced with the prospect of the US building more coal-fired plants under relaxed environmental regulations, then the advantages of exporting nuclear generated electricity become clearer" he said. Looking to the future, Mr Welch encouraged his audience to "be bold in our vision, and get on with the job".

## **CNS NEWS**

### **New Council**

At the Annual General Meeting in Ottawa on 11 June 1981 the following were elected to the council for 1981-82.

P A Ross-Ross (President), G R Howey (Past-President), J S Hewitt (Vice-President), P D Stevens-Guille (Secretary-Treasurer), E C Card, J Howieson, W Paskiewici, A H Colenbrander, T S Drolet, A Duchesne and W C Harrison. The 1982 Annual Conference Chairman is D A Meneley.

**P D Stevens-Guille**

### **The Year Ahead**

The evolution of the Canadian Nuclear Society from an idea to a recognized entity is progressing well. A number of basic policy statements and guidelines have been prepared and the requirements for a branch and technical structure identified. Five branches have already been formed (Manitoba, Toronto, Chalk River, Ottawa and Quebec) to cater to regional/local membership requirements. Four technical divisions have been formed to look after topical interests: Nuclear Science, Design and Materials, Mining, Manufacturing and Operations and Environment, Health and Public Affairs. Finally, a means of communication with members has been established in the form of the CNS Bulletin SNC.

### **Membership drive a priority**

The Society now must build on this base with programmes to attract members, and members are needed to run programmes. Thus a membership drive is a priority.

The programmes the CNS is putting into effect to attract members will be directed through the branches and through CNS organized conferences, seminars and symposia. A publications policy is important to our society and one is being formulated.

The CNS is receiving international recognition. Through co-operative arrangements with the Canadian Nuclear Association we have been invited to be a sponsor, and to participate on committees for conferences organized by the ANS or the ENS. Our own Annual Conference, held in conjunction with the CNA Annual Conference, has given us good experience in organizing and operating such events. We are planning our own events and the Environment, Health and Public Affairs Division has plans in train for a waste management conference (see Technical Division News). Arrangements for symposia on some more specialized topics are also in hand.

### **Branch-Council relationship**

Branch operation and programmes for the 1981-82 term will soon be underway, and Council will endeavour to make it as easy and practical as possible for branches to get assistance from the CNS Council and CNA/CNS Headquarters. The September Council meeting in Toronto will be primarily directed at branch operation and members from each branch executive will be invited to attend. Council will outline the responsibilities of Council and the various standing committees (Communications, Programme, Technical Division, Membership and Finance and Administration).

From the branches we hope to get ideas and proposals on how branches should be funded and how Council and Headquarters can help with communications and programming. As much as possible we hope to establish common means of servicing branches, though we recognize that they may well have widely different objectives and modes of operation. We have been well supported by an efficient group at CNA Headquarters and we are inviting them to the September meeting so they can explain their role and mode of operation and suggest how they can assist branches.

**P A Ross-Ross**

### **TECHNICAL DIVISION NEWS**

#### **Waste management conference planned**

The Environment, Health and Public Affairs Division is planning an international conference on radioactive waste management and environmental health. To be held in Winnipeg, the conference is tentatively scheduled for October 1982. Further details will be made available as soon as possible.

**T S Drolet**

FYI

Nuclear engineering position at U of T

The University of Toronto is looking for an Associate or Full Professor of nuclear engineering starting September 1. Candidates for the post 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 (neutronic and thermalhydraulic), advanced nuclear systems, nuclear shielding, safety and containment, nuclear calculational methods or nuclear chemical engineering. The successful candidate will contribute to teaching in established nuclear engineering programmes for the BAsC, MASc, MEng and PhD degrees at the University of Toronto, and is expected to develop and supervise graduate research in chosen areas. Teaching and research facilities include the SLOWPOKE reactor, a heavy-water uranium subcritical reactor, D-T neutron source, radiochemical laboratory and a broad range of modern nuclear instrumentation. The appointment is initially for a three year term. Applications should be sent to Professor M E Charles, Department of Chemical Engineering, University of Toronto.

Staff

TMI Operators not at fault

A new report on the accident at TMI-2 challenges the theory that the accident was attributable to operator error. A memo by Ed Abbott, a senior fellow with the Advisory Committee on Reactor Safeguards, points to "faulty procedures" as the root cause. "The operators were adequately trained on existing operating procedures and adhered to those procedures...they did exactly what was expected of them. Therefore to characterize the accident as 'operator error' is misleading" said Abbott's memo which has been circulated within ACRS but as yet bears no official stamp. Abbott, himself a former operator, said his review revealed that "the plant's operating procedures were followed but were inadequate while the site's emergency plan and procedures were adequate but not followed. The former led directly to a degraded core and the latter left state and public officials inadequately informed".

Nucleonics Week



### Babcock & Wilcox sued for \$10 million

The Florida Power Corporation has filed a suit in Tampa Federal court against Babcock & Wilcox, designers of the utility's Crystal River nuclear power plant's steam supply system. The utility said the suit alleged that a unit of Babcock & Wilcox was responsible for a 1978 incident in which metal parts broke loose in the plant's reactor core and damaged portions of a steam generator. The utility said this resulted in a power outage from March 3 1978 until September 8 of the same year. Florida Power is suing for damages of more than \$10 million because of the incident.

New York Times

### Victims' widows compensated by BNFL

British Nuclear Fuels Ltd has agreed to pay the widows of two cancer victims who were employed at its Windscale works, and to a third cancer sufferer still employed at Windscale a total of about \$185 000 plus an undisclosed sum in legal costs in an out-of-court settlement of three suits against the company. Expert medical opinion was divided in all three cases whether the cancers were caused by the three men's work at Windscale, and BNFL also denied liability. But a BNFL spokesman, commenting on the payouts, said that as a "good employer" BNFL could not ignore the possibility that in a small number of cases an individual's employment with the company could be a factor in his contracting cancer. Payments to the two widows were reportedly related to their husbands' ages and loss of income. BNFL refused to detail how much radiation the three workers were subjected to. "We're not giving details of the radiation workers' own records", a spokesman said.

Nucleonics Week

### Fusion Patent

A new superconducting magnet system has been patented for the US Department of Energy. The patent was granted James Powell, Shi-Yung Hsieh and John Lehner, staff members at Brookhaven National Laboratories. The patented system employs superconducting magnets made in sections clamped together at their joints so if one section of the coil fails it can be replaced readily. The magnets are described as inexpensive and capable of being mass-produced. James Powell, head of the fusion technology group at Brookhaven, said that he and his associates have experimented with small-scale prototypes of the new system and speculated that the year 2000 might see nuclear fusion power a practical proposition.

New York Times

### Nuclear energy friendless

Too many countries are saying non to nuclear. That is the message from worried energy institutions, especially the International Energy Agency (IEA) and the OECD's Nuclear Energy Agency (NEA). The NEA's Ninth Activity Report concludes that, despite the agreed need for OECD countries to boost alternatives to oil, there has been "little or no progress" to push nuclear programmes.

Net, only four new plants went into operation or were completed last year, making a total of 205 in the 24 industrial countries belonging to OECD. France made most of the running, but the French nuclear boom may not last under President Mitterrand.

The OECD's nuclear industry is feeling the pinch. Even if its output rises in real terms by 15% a year to 1985 and 10% to 1990 -- the equivalent of completing 20 stations a year -- 75% of its estimated capacity for manufacturing reactors would still be left idle says the NEA. Growth at these rates is unlikely. Public opposition to nuclear energy is widespread, and getting better informed. Lead times for nuclear plants have lengthened by more than half since the 1960s. In America, which has almost half the OECD's nuclear generating capacity, it now takes at least 13 years for a proposal to get through the red tape. Some 40 plants have been cancelled since 1976 and there have been no new orders since 1978. Plants have been abandoned or delayed in West Germany, Japan, Italy, Belgium, Denmark and Holland.

Sweden now has a complete ban on new plants. Delays and disorganization have dogged the British nuclear industry: the Thatcher government's present aim of ordering at least ten new stations starting next year, may be abandoned.

Most forecasts of nuclear capacity look hopelessly optimistic after the event, so the NEA's latest projections should be handled with care. In 1977 the IEA reckoned that installed capacity in its member countries (which do not include France) would reach 246 gigawatts by 1985 and 411 by 1990. These forecasts have been downgraded to 185 gigawatts by 1985 and 276 in 1990, and the IEA said that even these new figures may be optimistic. The portion of that capacity which the agency regards as "at risk" of not materialising could mean that an additional two million barrels of oil a day will be required by 1990 -- an amount equal to the total current North Sea production.

### Reagan opposes GPU bailout

The Reagan administration has formally gone on record against a direct federal bailout of the utility faced with the staggering cleanup costs at Three Mile Island. In a letter to Rep Allen Ertel (D Pa), White House Budget Chief David Stockman said the federal government can help with "sound" cleanup regulations, nuclear waste disposal "on a reimbursable basis from the utility" and general research on how a damaged reactor can be decontaminated. "For the reactor at Three Mile Island it is reasonable to limit the role of the federal government to these three activities", Mr Stockman said. "The private business sector is responsible for sound business practices needed for providing safe, reliable and cost-effective electricity to the consumer".

Rep Ertel is sponsoring a bill that would require all US utilities with nuclear plants to form a special pool of Three Mile Island cleanup money. His bill would leave it to the state utility regulatory commissions to decide whether to pass this special levy on to consumers or make a utility swallow it.

### Wall Street Journal

### Firms explode over uranium charges

Like a hunter tossing a sled cover to distract the wolf pack at his heels, the Trudeau government threw a long-sought concession to federal Tories baying for the blood of uranium cartel participants. The conspiracy charges against six Canadian uranium producers under the Combines Investigation Act were a sudden, eye-catching gesture.

Donald Macdonald, the minister responsible for Canadian participation in the international uranium cartel notes that the key issue will be "whether the companies acted in some way to prejudice the Canadian market".

Denison Chairman Stephan Roman described the charge as frivolous. "The marketing arrangements (were) directed by the government of Canada as a matter of national policy and did not in any way harm the Canadian public" he said. Neil Taylor, Gulf Minerals Canada president, was dumbfounded that his company was charged while following federal government directions.

Economist James Fisher of Canada Consulting Group, technical consultant to the Ontario Select Committee said that the preponderance of evidence was "the cartel had no effect on the price Ontario Hydro paid", for uranium, a conclusion endorsed by government MPPs on the committee who found that "expert opinion (was) overwhelming that the so-called cartel between

1972 and 1975 did not have any significant effect on the recent increases in uranium prices" and would have none in the future. And A D McEachern of Ontario Hydro's Fuels Division pointed out that a detailed analysis by Nuexco in 1977 "found that there must have been more than a dozen factors that affected prices. They concluded that these (cartel) marketing arrangements had been ineffective in causing prices to move."

### Financial Post

#### NPD flooded

About 200,000 gallons of ordinary water from the dowsing tank flooded the lower boiler room at NPD when a rubber expansion joint failed July 19. The reactor was shut down and cooled rapidly with the result that some of the spilled water was pumped into the primary heat transport system, downgrading it to about 85% D<sub>2</sub>O.

By mid-afternoon the following day the boiler room had been pumped out and work had started on equipment inspection. Station manager Don Milley told the Bulletin that progress was being made at a faster rate than had been hoped, and the station could be back in service by the first week of August. Milley also expressed pleased surprise at the numerous offers of assistance received from outside Ontario Hydro: "for the last couple of days my phone's been ringing all the time. A long list of suppliers have called up to find out what we might need and how soon they can get it to us. Sure there's some self-interest at work here, but all the same they seem as anxious to get the station back on line as we are". The Toronto Sun quoted the AECB's Zigmund Domaratzki to the effect that the NPD operators appeared to have done "all the right things".

### Staff

#### Heavy water souvenirs

Licensed operators at Ontario Hydro's Bruce plant, Gary Karst and Mark Isber, were having an after work beer earlier this year when the idea struck them. Why not answer the question they are most often asked (what is heavy-water?) while providing the definitive Canadian souvenir: heavy-water. Karst and Isber brought some from a Montreal pharmaceutical supplier at \$1,778 per gallon and bottled it in perfume vials inserted in attractive cubes of northern hemlock. Their offer of "100% pure reactor-grade heavy-water" for \$5.95 plus tax, as advertised in Today Magazine, launched their sideline, KI Industries mail order business, with an investment to date of "pretty close to \$10,000" says Karst. "Initial interest was pretty good, especially from the media who thought we were in a



lot of trouble". Now they hope to get their curio into souvenir shops. "Heavy water is rare, of real value, and it is Canadian all the way," Karst notes.

#### Financial Post

#### CNS Council member joins fusion planning group

CNS Council member Tom Drolet has been designated as Ontario Hydro's representative in the joint negotiations between Ontario Hydro, the Ontario Energy Ministry and the National Research Council in establishing a fusion fuel and tritium technology programme. Announcing this assignment, Bill Morison (Director of Ontario Hydro's Design and Development Division) noted that recent advances in fusion "have resulted in an increased commitment by the world community into research and development of this future energy source". Describing the assignment as "one of the most exciting jobs I've ever had", Dr Drolet noted that fusion fuel handling and fusion materials problems were especially relevant to Ontario Hydro's experience with deuterium and tritium.

Staff

## CONFERENCES AND MEETINGS

### Decontamination of Nuclear Facilities

The Canadian Nuclear Society, together with the Canadian Nuclear Association will act as co-sponsors with the American Nuclear Society of an international conference on the decontamination of nuclear facilities. To be held at Niagara Falls, Ontario, September 19-22 1982, the topics will include: the development and application of decontamination processes, the health physics and economic aspects of decontamination, the Three Mile Island cleanup and the management of wastes arising from decontamination.

Contributed papers are invited and a summary of 500-900 words should be submitted by 1 December 1981 to Programme Chairman Eric LeSurf, London Nuclear Services Inc, 2 Buffalo Avenue, Niagara Falls, NY 14303, from whom additional information may be obtained.

Full papers will not be required until June 1982.

### Materials in Nuclear Energy

Hidden Valley Inn, Huntsville, Ontario, September 29-October 2. For full details see May Bulletin.

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### Application for Membership

Please forward completed form to: CANADIAN NUCLEAR SOCIETY

**PERSONAL DATA:**

111 Elizabeth St., 11th Floor, Toronto, Ont., Canada M5G 1P7

Surname: \_\_\_\_\_ Given Names \_\_\_\_\_  
(underline name used)

Indicate desired mailing address in one of the check boxes:

Home Address: \_\_\_\_\_  
(Street) (City) (Province)  
\_\_\_\_\_  
(Postal Code) (Phone Number)

Business Address: \_\_\_\_\_  
(Street) (City) (Province)  
\_\_\_\_\_  
(Postal Code) (Phone Number)

Employer \_\_\_\_\_

Business Title (if applicable) \_\_\_\_\_

**MEMBERSHIP DATA:**

Please list any Technical or Scientific Societies, Institutes and Professional Associations of which you are a member.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**EDUCATION:**

University, College, Institute, etc.	Discipline	Degree or Diploma	Date of Degree or Diploma
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Your association with Nuclear Technology:  
\_\_\_\_\_  
\_\_\_\_\_

**FEES:**

MEMBER: \$20.00 for Calendar Year - January 1 to December 31.  
STUDENT: \$ 5.00 for Calendar Year - January 1 to December 31.  
Cheque payable to: CANADIAN NUCLEAR SOCIETY

Are you willing to serve on the CANADIAN NUCLEAR SOCIETY COMMITTEES:

Administration	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Technical	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Branch	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Previous experience on Committees:  
\_\_\_\_\_  
\_\_\_\_\_

(Date) \_\_\_\_\_ (Signature of Applicant) \_\_\_\_\_

Language for Correspondence: \_\_\_\_\_

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### Demande d'adhésion

Veuillez retourner ce formulaire dûment rempli à: Société Nucléaire Canadienne

111 Elizabeth St., 11th Floor, Toronto, Ont., Canada M5G 1P7

#### DONNÉES PERSONNELLES:

Nom de famille: \_\_\_\_\_

Prénoms: \_\_\_\_\_  
(soulignez le prénom usuel)

Cochez la case appropriée pour l'adresse où vous désirez recevoir votre courrier:

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 (rue) \_\_\_\_\_ (ville) \_\_\_\_\_ (province) \_\_\_\_\_  
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Adresse au bureau \_\_\_\_\_  
 (rue) \_\_\_\_\_ (ville) \_\_\_\_\_ (province) \_\_\_\_\_  
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Employeur: \_\_\_\_\_

Fonction: \_\_\_\_\_

#### RENSEIGNEMENTS SUPPLÉMENTAIRES:

Veuillez indiquer les sociétés ou associations professionnelles dont vous êtes membre.

_____	_____
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#### EDUCATION:

Université, collège, institution, etc.	Discipline	Diplôme	Année
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Domaine d'activité ou d'intérêt actuel:  
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#### MONTANT DE LA COTISATION:

MEMBRE: \$20 par année civile - 1er janvier au 31 décembre

ETUDIANT: \$5 par année civile - 1er janvier au 31 décembre  
(Payable à la Société Nucléaire Canadienne)

Désirez-vous participer aux comités de la Société Nucléaire Canadienne?

Conseil d'administration	oui	non
sections techniques:	oui	non
groupes régionaux	oui	non

Expérience sur des comités:  
\_\_\_\_\_  
\_\_\_\_\_

(Date) \_\_\_\_\_

(Signature du candidat) \_\_\_\_\_

Langue de correspondance: \_\_\_\_\_