CNS BULLETIN SNC

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Editorial

Guilt by Association?

On 16 December AECB President Jon Jennekens wrote to CNS President Joe Howieson to say that the AECB's Executive Committee had interpreted the Conflict of Interest/Post Employment Code for Public Office Holders (effective 1 January 1986) to the effect that AECB members and staff would be prohibited from CNS membership (see letter in this issue).

The point at issue here for the AECB is the relationship between the CNS and the CNA. The latter organisation is, among other things, a promotional group dedicated to the continuing, and expanding, peaceful applications of nuclear energy. Clearly, it could be argued that membership in such a group is incompatible with employment in an agency whose raison d'etre is the regulation of nuclear applications. And it is true that the relationship between the CNA and the CNS is a close one — indeed CNS letterhead identifies the CNS as "the technical society of the CNA."

As indicated by Joe Howieson in this *Bulletin* (and noted by Jon Jennekens in his letter) moves are under way to prepare for a formal separation between the CNS and the CNA through incorporation of the CNS as a distinct entity. It is possible to infer from Mr. Jennekens' letter that this will enable the AECB to lift the prohibition on CNS membership. But how separate is separate? Suppose CNS were incorporated as an independent society, but maintained shared office accommodation with the CNA? Would this, in the perception of the AECB, compromise the independence of the society? Rightly or wrongly, society at the present time makes certain assumptions about the behaviour of two people of the opposite sex who share the same address. If the CNA and the CNS both reside at 111 Elizabeth Street, will they be assumed to be in bed together?

This is not an entirely frivolous question. Nobody who has viewed objectively the activities of the CNS over the years would seriously suggest that the CNS is the trained poodle of the nuclear industry lobby, and we doubt that the AECB so regards it. The question of one of *perceived* conflict of interest, and the problem with perceptions is that they are far from immutable and are difficult to quantify. It could well be that a legally independent CNS, with a shared CNA/CNS secretariat would *currently* be perceived as sufficiently independent to preclude any conflict of interest accusation being sustainable against a CNS member employed by the AECB. But supposing the perception changes, and a year or so later the AECB Executive Committee decides that AECB personnel who are CNS members will be perceived as being in a conflict of interest situation unless the CNS physically removes to a locale remote from the CNA? Could the perception of conflict of interest arise through the CNA and the

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Perspective

Impressions of Nuclear Plant Design and Construction Methods in Japan

By Peter Stevens-Guille, Past President, CNS

The visitor's hard hats and coveralls are all neatly stacked in plastic bins, each name tagged in English. Before we walk to the construction site we struggle into the clothing. The hard hats don't fit; the coveralls just cover the elbows. At least the white gloves fit. Our Japanese hosts barely contain their amusement at the sight. "Don't worry," smiles the largest guest, "Its been like this at the last three construction sites." Geometric as well as cultural factors characterise the differences between Japanese and Canadian nuclear plants.

Tight clothing at the Kashiwazaksi-Kariwa Nuclear Power Station was a small price for the Canadian team to pay for the wealth of information, generosity, and good times experienced in a two-week tour of Japanese utilities, manufacturers and construction sites.

The Canadian team consisted of Bill Penn, Peter Stevens-Guille and Neville Fairclough, all from different parts of Ontario Hydro. Their mission was to study Japanese design, project management and construction methods which have yielded dramatic results in that country. The visit was an example of Ontario Hydro's determination to learn from its counterparts worldwide with the objective of reducing construction costs and increasing flexibility in future plans.

The team's host was EPDC, the Electric Power Development Company of Japan. EPDC was instrumental in arranging a comprehensive itinerary covering talks with three utilities, visits to sites where five reactors were in various stages of construction and discussions with two leading manufacturers. Detailed planning EPDC, an itinerary scheduled to the minute, and the cooperation of the team (who wished to see more and talk longer at every opportunity) bore fruit. In a little less than two weeks, the team travelled 3000 km by plane, train, bus, limo and on foot, met over three dozen engineers, managers and technicians, and visited nine different places.

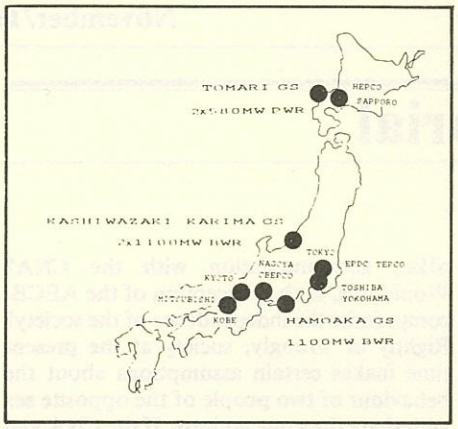
A Vibrant Industry: After setbacks with PWRs and BWRs in the early 70's, the Japanese nuclear industry is vibrant. With 30 plants in operation and another 10 under construction, the industry contributes 14% of all electricity generated in Japan. Plants are built in record time; 60 months or less from site preparation to commercial service is common.

The team, with the help of EPDC, dug into the reasons underlying this success. How are plants built so rapidly? Are there unique features in Japan that ensure good design and construction? Are they cultural or technological?

Answers to some of these questions were forthcoming early in the trip when Akira Kunito, general manager, planning, EPDC shared his personal views with the team. In the early days of nuclear power in Japan both PWR and BWR plants were built from US designs. They both suffered from severe teething problems which prompted utilities, vendors and the government promoter/regulator, MITI to embark on a staged, long-term improvement program. Now complete, this program allows a utility to incorporate a wide range of improvements when a new plant is ordered. During the brief visit, the team investigated most of these improvements first hand.

Cultural factors also play a large part in the success of the nuclear industry. Factors such as lifelong employment, intense team spirit, single union companies, unique decision making and many others all have a part to play. These factors, in contrast to the technical ones, are uniquely Japanese, and can probably not be transported. The cultural factors remained the most enigmatic for the team.

Lifetime employment: Throughout Japanese industry lifetime employment (for males) is accepted practice. The team met only one manager in its travels who had worked for more than one company. One result of this practice is a large investment in personnel training. Managers frequently have broad training in several jobs within a large company.



Map of Japan with sites/places visited by Canadian team.

Labour Unions: Generally, workers' unions are specific to a company rather than a trade. For instance, utilities each have a union, similar to Ontario Hydro's OHEU; manufacturers are the same. All employees, including university graduates belong to the union. Union-management discussions cover similar topics concerning working conditions and pay as in Canada. We were told that as the common objective of both management and the union is the continued prosperity of the company, discussions take place in a different environment to Canada.

Working and Communicating: All the offices we visited were of the open plan — taken to extremes. Everyone from the manager down worked in large rooms at tables or crowded desks. Supervisors sat at end tables able to keep a watchful eye ov their subordinates. Only senior people rat separate offices. While team work is promoted and interpersonal relations are emphasized, privacy is absent. Due to the complexity of the three "alphabet" Japanese written language and the difficulty of printing, the traditional "inter-office memo" is either handwritten or does not exist. The emphasis is on personal contact.

Most decisions, we were told, start this way at junior levels and by the unique decision making method, elevated to a fine art in Japan, are massaged by other levels until they float to the top and are endorsed.

Innovative Methods: The team saw many innovative methods in use throughout their travels. Some examples: extensive use of modules containing pipe, valves, and supports, shipped to the site and installed with large cranes; use of new methods of concrete formwork and extensive concrete pumping systems; use of "robots" to place rebar (in reality, tracked electro-hydraulic manipulators equipped with adaptive learning). They also saw many other methods which were good common sense; extensive use of 1/25 scale models of all aspects of the plant; use of up to a dozen on-site cranes (requiring a computer system to prevent interference); vertical excavatio

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Editorial *(continued from page 1)*

CNS having their annual meetings at the same locale on sequential dates?

Conflict of interest is not always very easy to define unequivocally. We can be pretty sure that a senior member of Revenue Canada moonlighting as a consultant for H & R Block would not only be perceived to have a conflict of interest but would, in reality, have one. But what about a medical doctor in federal government employ who is also a member of the Canadian Medical Association? Or an economist at the Department of Finance who is also a member of the Canadian Economics Association?

It would be interesting to know what other (if any) organisations the AECB has placed on its "index." Energy Probe? The NDP? Friends of the Earth? If a case can be made that membership of a technical society which is **legally** associated with an organisation which has "inter alia, promotional objectives in the nuclear field" somehow pollutes regulatory rigour or compromises Board member or staff objectivity, then how will the situation change when a few pieces of paper have been signed? Some CNS members are employees of organisations which have "inter alia promotional objectives in the nuclear field" such as Ontario Hydro or Atomic Energy of Canada Ltd. Will not Board members and staff be contaminated by contact with these people at meetings?

If such a case cannot be made then the AECB action must be regarded as a retrograde step. Retrograde for Board staff and members who will lose access to an invaluable forum for technical information exchange, retrograde for the Canadian Nuclear Society which will lose the valuable contributions of a significant number of members and retrograde for Canadian intellectual life in general as, inevitably, Control Board staff turn to the Amercan Nuclear Society.

CNS BULLETIN SNC

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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 $40.00 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, veuillez bien entrer en contact avec le bureau de la SNC, les membres du Conseil ou les responsables locaux. La cotisation annuelle est de $40.00 ($5.00 pour les étudiants).

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methods using soil bolts for walls 37 m high; even inflatable fabric roofs supported by temporary steel to offer all-weather protection on the coldest, snowiest sites on the Sea of Japan (the team waded through 2m of snow at -5C on one site).

Impressions: The team generally refrained from giving opinions, realizing that comparisons with Canadian practices could often be misleading. However the team was most impressed with the high standards and level of innovation they saw. At the close of the trip we told our hosts, "We are impressed with your teamwork and dedication, but most of all with your organizations which allow all these things to happen."

Peter Stevens-Guille

FYI

Retubing Progress at Pickering

(Staff)

At Unit 1 all pressure tubes have been removed, calandria tubes have been cleaned and the east end-fittings (which are to be retained) are being refurbished by honing. Installation of new pressure tubes is scheduled to start 10 February. Criticality is predicted for November and return to service in January 1987. At Unit 2 pressure tube removal is expected to be complete by March and installation of new tubes should begin in early April. Current estimates suggest criticality in late February 1987 and a return to service in May of that year.

Darlington Cancellation Possible, Not Probable

(Staff)

The Ontario Select Committee on Energy released its report on Darlington NGS in December, finding that it is not likely that the station will be cancelled. However, the committee made three recommendations:

- No further significant contracts for units 3 & 4 should be let for materials not required for construction during the next 6 months while the committee studies demand and supply options.
- The committee should undertake an independent review of the Ontario Hydro demand/supply options study backed by such expertise as may be required to illuminate specific and critical issues embodied in it.
- ...the committee should give priority to an examination of the relationship between the Government of Ontario and Ontario Hydro for the purposes of clarifying the relationship, setting out the specific responsibilities of each and defining the mechanisms that can activate the responsibilities.

At the time the committee met, $3.66 billion had been spent on the project and $3.385 billion had been irrevocably committed, 65% of a total estimated cost of $10.895 billion. The four units of Darlington are due in operation between 1988 and 1992.

Findings of the report include: Ontario Hydro's financing needs represent no threat to the province's credit rating; Darlington is not needed for the sole purpose of helping Ontario Hydro meet acid gas emission standards because alternatives exist; all Darlington units are not likely to be needed to meet demand until the turn of the century; Darlington is justifiable primarily as a cost minimization strategy; Ontario Hydro does not allow adequate public participation; and, Ontario Hydro would not give adequate consideration to conservation, promotion of efficiency, or alternative electrical sources due to significant excess capacity when Darlington begins operation.

The committee recognizes that 80% of the cost of construction of units 1&2 of the 4 unit station is committed and their construction is substantially complete; cancellation of these two units could not be justified. The committee also notes that it would not be wise to cancel units 3&4, where less than 50% of the construction costs have been committed: 85% of the total Darlington costs would be expended if these were cancelled now, in other words, an 85% expenditure for a 50% asset.

The committee places much importance on reviewing Ontario Hydro's current demand/supply options study, since the committee feels that electricity growth could be much less than Ontario Hydro's annual forecast of 2.6% due to a drop in the intensity of electricity use, which could occur due to government policy decisions.

AECB Notified of MAPLE-X

(AECB)

The Atomic Energy Control Board has announced that it has received a notice of intent from Atomic Energy of Canada Ltd. to build and operate a new research reactor at the Chalk River Nuclear Laboratories, on the Ottawa River near Petawawa, Ont.

The proposed reactor is of the "MAPLE" type, for "Multipurpose Applied Physics Lattice Experimental", a concept being developed by AECL for the international market. As well as providing a demonstration of the concept, the prototype MAPLE-X is intended for use as a dedicated producer of radioisotopes for application in medicine, industry and research.

The AECB has been advised that the basic MAPLE reactor concept consists of an open-tank-type reactor assembly within a light water pool. The core is light water cooled and moderated but includes a heavy water reflector.

The proposed MAPLE-X will be fueled with low-enriched uranium and will operate at thermal power levels up to 20 megawatts, about 1,000 times the power of the most common research reactor in Canada, AECL's SLOWPOKE-II.

Plans call for MAPLE-X to be located in a separate building adjacent to the NRX reactor building, sharing services with the 40-megawatt NRX which began operation in July, 1947.

Submission of a notice of intent is a preliminary step in the AECB licensing process. Should AECB approval eventually be given to operate the MAPLE-X reactor, the facility will be included in the site licence for the Chalk River Nuclear Laboratories, which currently covers the operation of four research reactors at that location.

Pt. Lepreau Has Outstanding Year

(NBEPC)

The New Brunswick Electric Power Commission has announced that the Point Lepreau Nuclear Generating Station achieved a 100% capacity factor for the month of December and 97.4% for the calendar year 1985.

The achievement of 97.4% of maximum possible production for a full calendar year is expected to rank Point Lepreau among the top five in over 200 reactors of its size worldwide and first among all CANDU type reactors in 1985, when international results are tallied and reported. The Point Lepreau station has already received worldwide attention as a highly successful operating station and NB Power staff have been invited to a number of international meetings to report on its successful operation.

successful operation.

Nuclear Power Prospects Sound: OECD

(OECD NEA)

The outlook for nuclear energy in OECD countries is encouraging in spite of expected slow growth of total energy demand and problems of public acceptance of nuclear power in some countries. This conclusion emerged from a three-day meeting of experts from government and industry convened by OECD's Nuclear Energy Agency (NEA) and the International Energy Agency (IEA) to discuss prospects for nuclear energy to 2000 and beyond.

Nuclear-generated electricity has multiplied by 3.5 in the past ten years as many nuclear plants ordered in the 1960s and '70s have come into operation. There are presently about 265 reactors operating in OECD countries, providing nearly 20 percent of OECD electricity generation. This nuclear generation has displaced a great deal of oil-fired power which has dropped in market share from 24 per cent in 1974 to less than 11 per cent in 1984.

In spite of a subsequent slowdown in the commitment of new plants, and cancellation of some earlier orders, nuclear electricity production is expected to approximately double by the end of the century and by then to supply over 26 per cent of OECD electricity. This increase in supply is expected in part from higher operating efficiencies of existing plants and in

part from new plants planned or currently under construction. Four OECD countries each currently generate over 1/3 of their electricity from nuclear power. By 2000 seven countries expect to be in this category. Moderate growth rates are also expected to continue beyond the turn of the century. Although the experts did not offer any specific forecasts they agreed that for planning purposes an expansion in installed nuclear capacity of from 1.5 to 3 times should be expected between 2000 and 2025. They noted that too low a rate of nuclear growth could lead to renewed dependence on oil and negative impacts on economic growth.

The experts agreed that the Agencies should continue studies and other activities on a number of economic and technical areas related to nuclear energy. These include options for future development, such as the breeder reactor which continues to hold economic promise for some countries.

At the same time, the experts agreed that technical questions relating to the safe operation of nuclear plants have now been largely resolved, but said there would always be scope for improvements and continued research. The current generation of power plants should continue to evolve by way of simplification and standardization of design, better utilization of fuel material, development of even more economical fuel cycle technologies, streamlining of operational procedures and processes and reduction of construction lead-times.

The experts concluded that safe disposal of nuclear waste, although not a technical problem, is the single biggest public concern about nuclear power. This could be best resolved through intensified international co-operation among OECD countries.

Since the confidence of the experts in all aspects of nuclear technology is not sufficiently recognized by the public, the communication of scientific conclusions to the public must be improved.

Safe Radwaste Disposal Predicted (AECL)

Nuclear fuel waste can be safely disposed of by sealing it in a vault deep in the plutonic rock of the Canadian Shield, according to a detailed preliminary study released by Atomic Energy of Canada Ltd.

While the authors of the report caution that the results and conclusions of the assessment may change somewhat as their computer models and data are refined by further research, they say that the results to date "give confidence that disposal in plutonic rock will prove to be an acceptable method of disposing of nuclear fuel waste."

The conclusions are contained in the Second Interim Concept Assessment of the Canadian Concept for Nuclear Fuel Waste Disposal (AECL Report 8373). The four-volume study is based on extensive scientific experiments and uses computer modelling to predict the future behaviour of a disposal vault for nuclear fuel wastes.

After about 500 years, most of the radioactivity in the wastes will have decayed away, and after about 10,000 years, they will represent about the same hazard as a naturally-occurring ore body.

In assessing the possible effects of such a vault, scientists evaluate what would happen during a 'pre-closure phase' when the facility is being constructed and operated, and the 'post-closure phase' when the waste vault has been sealed. This document states that there would be no unacceptable risks or effects from either phase. During the pre-closure phase, normal operation would result in no radiological dose to the public greater than that from natural background radiation. The analysis indicates that even in worse-case accident situations, the radiation exposure would be no greater than the regulatory limits established by the Atomic Energy Control Board for existing nuclear facilities.

The report concludes that the total occupational risk (radiological and conventional) associated with the construction, operation and decommissioning of the disposal facility would be no greater than the risk in comparable industries.

While the main focus of the report is on evaluating the possible risks due to the facility, a part of the analysis also addresses the potential benefits to a variety of community types. The report states that "An increase in employment, and in the economic base generally, would be beneficial to every type of community."

CNS News

Membership in CNS/SNC Considered Conflict of Interest by AECB Executive — Notes from the President

The CNS/SNC were informed on December 16 by Mr. J. Jennekens, the President of AECB, that AECB's Executive Committee decided to issue a policy statement forbidding AECB staff from participation in the activities of organizations which have promotional objectives in the nuclear field. The effect of this policy statement is to prohibit AECB staff from membership in the CNS/SNC because CNS/SNC is legally a part of the CNA.

Mr. Jennekens, who has been a member since CNS/SNC was formed, was prepared to review the decision if the CNS/SNC decides to incorporate separately from the CNA. Council has been aware of the AECB's consideration of this move and has argued against it.

The result of this AECB policy is to force the staff to obtain their technical information and an outlet for their technical papers in other scientific societies such as the ANS. Surely this is a retrograde step technically and patriotically both for AECB staff members and for the CNS/SNC.

Separate Incorporation of the CNS/SNC

Up to now, the fact that the CNS was formed as the technical society of the CNA and is not a separate legal entity, has never presented any problems. The action of the AECB (above) has brought the question of incorporation to the fore.

The CNS/SNC was originally encouraged by the CNA to proceed independently and has always done so in the technical areas of importance to its members. At the same time the society has relied on the CNA to provide the professional help from its office staff for many of the essential financial, communications and organizational functions.

It has been expected that at an appropriate time separate incorporation would be implemented. Incorporation was seen as a natural outcome of the maturing of the society.

There is now a further reason for proceeding with separate incorporation. As the planning for a journal proceeds it is clear that significant investments and some financial risk is involved. Separate incorporation, by creating the CNS/SNC as a separate legal and financial entity, means that the CNA would no longer have any concerns about financially underwriting the society's ventures.

An informal poll of the membership has indicated that most members do not have strong feelings on this question but generally support incorporation. Council is able to proceed with separate incorporation but wants to be sure that this informal poll was representative. Therefore you are requested to give your opinions either verbally or in writing to a member of Council so that Council's decision on this matter will reflect the wishes of our members.

J. Howieson
CNS President

Text of Letter to CNS President Joe Howieson from AECB President Jon Jennekens, 85-12-16

Dear Mr. Howieson:

Thank you for your letter of November 26, 1985 concerning the steps which the Society intends to take to seek incorporation separate from the Canadian Nuclear Association. As you know, I and members of the AECB staff who are members of the Society are very much interested in this matter and hope that the Society will act as expeditously as possible.

At its recent meeting, the AECB's Executive Committee reviewed this matter in the context of the Conflict of Interest/Post-Employment Code for Public Office Holders which becomes effective January 1, 1986. The Committee decided to issue a policy statement regarding AECB member and staff member participation in the activities of organizations which have, inter alia, promotional objectives in the nuclear

field. The effect of this policy statement will be to prohibit membership in the Canadian Nuclear Society.

Needless to say, the Executive Committee is prepared to review its decision when the aforementioned actions proposed by the Society have been implemented.

Yours sincerely
J.H. Jennekens

PVR

PRV is a new column for the ***Bulletin.*** *As the title suggests it allows members to let off steam, vent their spleen and release controversial ideas.* ***PRV*** *is especially designed for all those who want to say something that's longer than a letter, shorter than an article and, one hopes, more provocative than either. We solicit contributions from all readers — only submissions patently actionable will be refused. Everything else goes.*

Our first contributor is Dan Meneley who, as his friends and colleagues well know, never backs away from controversy, is always willing to identify naked emperors and ever ready to upset the applecart of preconceived ideas.

The November issue of *Nuclear News* contains, on pg. 52-53, a brief description of the difficulties now being encountered by the Tennessee Valley Authority in its nuclear power program. TVA is the largest electrical utility in the United States, with a generating capacity roughly double that of Canada's largest. Its structure and charter are rather similar to those of Canadian utilities. As noted in *Nuclear News,* "The TVA was once a model nuclear utility in the world." It is no longer. All of their nuclear units were shut down during 1985, pending review of operations and management within their program.

Can this sort of thing happen in Canada? What lessons can we learn from this recent history? It is generally assumed that small nuclear utilities are the ones who are vulnerable, because of their limited resources. The large utilities are presumed to have sufficient resources to cover any contingency. It is often forgotten that they generally have, per unit of capacity, *smaller* resources than a single unit utility. Reduced manpower requirement is an often-quoted advantage of larger size. However, if trouble comes in bunches (as it so often does), this advantage can disappear quickly.

Perhaps we should examine some of the reasons for the observation that trouble comes in bunches. In the case of TVA, it appears that the underlying cause was a loss of commitment to the program on the part of upper management. The cause of such a change of attitude might, in turn, be laid at the doorstep of the USNRC or some other convenient bogeyman. This sort of responsibility transfer is common but completely irrelevant; the *utility* must accept full responsibility once the plants are on line — if the regulatory process makes it impossible to continue then it is their responsibility to change it.

In a large organization it is upper management which sets the philosophical tone, but it is the people at the working face who keep things running. Their normal response to trouble is to increase their work commitment — to think and work harder to overcome current problems. This has happened many times in the past; exceptional performance has been achieved, and serious problems have been solved. But there is a limit to this human adaptability. Very high levels of performance are difficult to sustain over long periods of time. This is especially true when the people involved perceive that there is no reward for good performance or when they perceive a lack of commitment on the part of upper management. Individually, they begin to "opt out," to find ways in which they can avoid the pressure. This naturally increases pressure on remaining staff, producing a snowball effect. Productivity can decay very quickly, to a degree out of proportion to the apparent provocation. The only way in which upper management can avoid this occurence is to maintain a firm commitment to excellence in addition to providing resources to do the jobs at hand. If mediocrity is rewarded, mediocrity will flourish.

But surely this cannot happen in Canada. We have a superb product and first class people in the Canadian nuclear program. We can look at examples such as TVA, secure in the confident knowledge that Canadians are smarter than this. But it might be useful to study the case, just in case.

D.A. Meneley

CNS Branch Programs

Toronto Branch Meeting: Fusion Fuels and Fusion Bombs. Any Connection?

A study commissioned by Ontario Hydro to examine the weapons production implications of the Canadian tritium program has concluded that it is "highly improbable" that Canadian tritium would find its way into nuclear weapons, either in the US or elsewhere, Tom Drolet told a Toronto Branch meeting December 10. Since Canada would be extracting tritium at the Darlington Nuclear Generating Station, starting in the late eighties, and since tritium is indeed a constituent in some types of nuclear weapons, Dr. Drolet argued that it was incumbent upon Ontario Hydro to establish that any program to sell tritium must be predicated on a very high degree of assurance that the isotope would not find its way into nuclear weapons, either by diversion or substitution (freeing up other tritium resources for weapon manufacture).

To this end Ontario Hydro had commissioned a Tritium Issues Working Group to examine the issues raised by sales of Canadian tritium, Dr. Drolet reported. The principal public issues identified by the group related to the fact that tritium was perceived to be a major component in US nuclear weapons and the US is reported to have a tritium supply problem and thus a program of tritium sales by Ontario Hydro would directly or indirectly support US nuclear weapon production by:

- providing tritium directly for use in weapons
- providing tritium to US government fusion laboratories, whence it would be diverted to weapon production
- meeting commercial market tritium needs, which would allow the US to devote more of its own tritium production to weapon manufacture.

Dr. Drolet pointed out that Canada was the only country in the immediate post-World War II period to decide to refrain from exploiting its nuclear weapons production capability, and since then, a determination that Canadian nuclear technology should not be applied to weapon development or production has informed all national policy with respect to material or technology export or transfer.

But regardless of this policy, Dr. Drolet explained that the Working Group had found that there appeared to be no evidence to suggest that the US was facing a shortage of tritium for weapon manufacture. Current US tritium production is about 10-12 kg/y (a figure which should be compared with the Darlington Tritium Recovery Facility's estimated annual production of 2.5 kg). To maintain the current inventory in US nuclear weapons (ie, replace the loss of tritium through decay), about 4.5 kg/y is required and, Dr. Drolet suggested, no matter what one's perspective on the matter is, 4.5 kg is less than 10 kg. In addition Dr. Drolet noted that, under US law, production of strategic nuclear materials in licensed commercial facilities was prohibited. An even stronger argument might be that it is extremely unlikely that any country would allow its nuclear weapons program to become dependent upon a foreign source of strategic isotopes.

In summary, Dr. Drolet suggested that while nothing in life is 100 percent certain, the Working Group had concluded that the use of Canadian tritium in weapons was highly improbable and that there is strong evidence to support the position that Canadian tritium would not find its way into US nuclear weapons by direct sale, diversion or substitution.

CNS Division Update

Nuclear Science and Engineering (NSE) Division: Election of the 1986 NSED Executive

Five members are to be elected to the 1986 Nuclear Science Engineering Division (NSED) Executive. Following the "Call for Nominations" in the *CNS Bulletin* and some persuasion by members of the current Executive, eight candidates have been nominated. An election is being held to select five of these to fill the vacant positions on the 1986 Executive.

Enclosed with this edition of the *Bulletin* are a ballot and an addressed envelope. CNS members, who belong to NSED, are asked to vote for up to five of the eight candidates, and to place the completed ballot in the envelope. The member's name and signature are to be written in the indicated place on the envelope to allow the Returning Officer to verify that the ballot comes form a CNS member. The ballot should be mailed in time to reach the CNS office by March 5, 1986.

The Nuclear Science and Engineering Division is one of the four Technical Divisions of the Canadian Nuclear Society. Members indicate the Division(s) of their choice when they become CNS members. It if expected that this election will be primarily of interest to members of NSE Division. Because of the self-selecting feature of NSED membership, the Returning Officer will not reject ballots received form CNS members who are shown on the membership list as not belonging to NSED. Rather it will be assumed that the member is now interested in belonging to NSED and will advise the CNS office of this in due course.

To assist members in making their choice, short biographical sketches of the candidates are printed below. The sketches are printed as received from the candidates — they have not been edited by the Returning Officer. All sketches received from the candidates as of January 3, 1986 are reproduced below.

A.L. Wight
NSED Returning Officer

Jerry Hopwood

I was educated in England where I took my Bachelor's degree in Applied Physics at Oxford University.

My initial work experience was in the British nuclear industry including fluid flow assessments and commissioning experience on gas-cooled reactors.

In 1975 I came to Canada to work at AECL Power Projects (now CANDU Operations). I have specialized in analytical modelling of power plants in a variety of disciplines: fuel mechanical behaviour, two-phase fluid flow and heat transfer; containment reponse and fission product behaviour.

I recently spent two years at Point Lapreau NGS, during which I started up a new team of engineers and scientists to provide on-site analytical support for licensing and operation of the power plant.

Currently, I am back at the AECL CANDU Operations Sheridan Park offices, as acting manager of the Thermalhydraulics Branch. My responsibilities include representing AECL CANDU Operations on CANDU Owners' Group Committees, the CANDEV Safety/Thermalhydraulics Working Party and the COG Safety Analysis Technical Committee.

I have been a member of the CNS for several years, and have contributed papers at both the annual and specialist conferences arranged by the Society.

Joe Q. Howieson

Certainly the next few years are going to be challenging and interesting (I hope not as in the Chinese philosopher's curse "May you live in interesting times"). I have been working in the nuclear industry for about 10 years, and have been a long time CNS member. I feel that it is time to do a little bit extra, and thus am hoping to get your support for the Division Executive.

My background is with A.E.C.L., in the area of safety and licensing. This has allowed me to develop a fairly broad range of technical knowledge, as well as to become quite aware of utility, designer, and regulator interests. One major area has been my involvement with the potential export market (e.g. Japan). Also I have written and critiqued a large number of reports, and have attended or presented a paper at a number of Canadian and international conferences.

I hope that I can offer a fairly pragmatic and possibly creative effort to the CNS.

T.J. Jamieson

Terry Jamieson holds a B.A. Sc. in Engineering Science (1979) and a M.A. Sc. in Chemical Engineering (1981) from the University of Toronto.

From 1981 until 1984 he was employed as a Nuclear Design Engineer in the Nuclear Studies and Safety Department of Ontario Hydro, specializing in post-accident long-term containment response calculation for licensing of CANDU reactors.

From 1984 until 1985 he served as a Scientific Research Officer with the Federal Library of Parliament, providing technical expertise to members of both Houses of Parliament.

At present, he holds the position of Senior Nuclear Engineer with the Reactor Development Group of ECS Power Systems Inc. in Ottawa, where he is currently in charge of radiation protection for the SAGA-N sea shuttle project.

Terry is a charter member of the CNS, a member of the Canadian Radiation Protection and a Professional Engineer (APEO).

He has written numerous papers on radiation detection and measurement, and on methods for long-term containment analysis.

His professional interests include radiation transport, radiation detection and measurement, and computer techniques for performing calculations relating to these areas. Personal interests include downhill skiing and running.

Vaidyanathan Santhana Krishnan

Dr. V.S. Krishnan holds a B.Tech. degree in Chemical Engineering from the University of Madras, India and M.S. and Ph.D. degrees also in Chemical Engineering from the University of Rochester, New York. He is a member of the American Institute of Chemical Engineers, the Association of Professional Engineers of the Province of Manitoba, and the Canadian Nuclear Society. He has twelve years of experience in research on two-phase flow and heat transfer, and chemical plant design and operation. He has more than thirty conference, journal and corporate publications to his credit. He has held Research Associateship positions at universities, and production management positions in the chemical processing industry, before joining Atomic Energy of Canada Ltd. in 1980. Dr. Krishnan is presently Head of the Experimental Analysis and Operations Section, Thermalhydraulics Research Branch, at WNRE and is involved in nuclear reactor safety research.

N. J. Spinks

Norm Spinks has a Masters degree in Nuclear Engineering from the University of New South Wales, Australia, and has had 26 years of experience in the nuclear industry, moving from reactor physics research in the early years to thermohydraulics more recently.

Norm has recently joined the Advanced CANDU Project at CRNL which is intended to identify important features of future CANDU designs and ensure that the supporting R&D programs are in place.

For the previous 12 years he was Manager of the Thermohydraulics Branch at CANDU Operations where much of the safety analysis was done for licensing the CANDU 600s. This included the development of suitable mathematical models and computer codes and the specification of experiments at CRNL and WNRE for verification of these models and codes. He was a member of the CANDEV working parties in the thermohydraulics area and was chairman this year of the Safety Thermalhydraulics Working Party.

Norm has been the Canadian representative on the CSNI task group for the assessment of thermohydraulic codes for transients and breaks and has chaired sessions at international meetings on nuclear reactor safety. He has been a long time participant, organizer and session chairman at the annual Simulation Symposium of the CNS.

Norm looks forward to a deeper involvement in Nuclear Science and Engineering Division activities as a Member of the Division Executive.

Larry Watt

Following completion of my Master's degree (with a thesis on an improved nuclear particle counter), I have worked for two organizations in the Canadian nuclear industry — Atomic Energy of Canada Limited (AECL-CO) and the Group d'Analyse Nucléaire (GAN). GAN is a segment of the Institut de Génie Energétique of Ecole Polytechnique de Montréal.

At AECL-CO, I was appointed Safety Engineering Coordinator for the CANDU 300, a conceptual small power reactor under investigation by AECL for possible export to developing countries, and Thermo-hydraulic Branch Coordinator for the Electric Power Development Company project, involving the pre-licensing safety analysis and development of the CANDU under Japanese PWR licensing regulations. I wrote several reports on specific aspects of safety analysis for AECL-CO.

I am currently the Section Head of Thermal-hydraulics at GAN, an organization with strong ties with both the university and the industry. I supervise several projects of both prompt and developmental nature for electric utilities, as well as supervising a design assist and preliminary licensing study of a new SLOWPOKE-type reactor. My work experience includes substantial analysis, model development and computer simulation work on the thermalhydraulics of nuclear reactor systems or related thermalhydraulics experimental programs.

Evan G. Young

Background

A MSc in Low Temperature Solid State Physics from Dalhousie University, Halifax, was applied in two obviously related areas: teaching of applied physics in Africa (for two years), and provision of technical support to the Operations Group at a nuclear generating station.

Professional experience after joining NB Power Nuclear Operations (NOG)

1. Attachment to the Coleson Cove oil-fired station commissioning team.
2. Attachment to Ontario Hydro CNS group, with involvement in assessment of fuel performance and in Bruce Unit 2 start-up.
3. Attachment to AECL CANDU 600 Physics Group with specific tasks in
   a) Assessing flux-mapping performance.
   b) reactor fuelling studies using RFSP. (TDAI 158)
4. Technical Supervisor, Fuel Management and Reactor Physics, PLGS-1.
5. Supervisor, ROPT Reactor Physics and Core Monitoring Systems Commissioning and Analysis, PLGS-1.
6. Current: Safety Analyst Specialist, Compliance Group, PLGS-1.

Interests

Control systems, noise analysis, developments in fuel behaviour analysis.

Conferences & Meetings

Topical Meeting on Advances in Fuel Management

Sponsored by CNS, ANS and EPRI, to be held **March 2-5, 1986** in Pinehurst, North Carolina. For information contact: **Dr. G.M. Frescura, Ontario Hydro, Nuclear Studies and Safety Dept., 700 University Ave., Toronto, ON M5G 1X6.**

CNA Symposium on Small Reactor Opportunities

Sponsored by CNA, to be held **March 4-5, 1986** in Toronto, Ontario. For information contact: **CNA, 111 Elizabeth St., 11th Floor, Toronto, ON M5G 1P7.**

International Symposium on Optimization of Radiation Protection

Sponsored by IAEA, to be held **March 10-14, 1986** in Vienna, Austria. For information contact: **IAEA, P.O. Box 100, A-1400 Vienna, Austria.**

CNA/CNS Nuclear Engineering Student Conference

Sponsored by CNA and CNS, to be held **March 13-15, 1986** at University of New Brunswick. For information contact: **Judy Barr, Dept. of Chemical Engineering, P.O. Box 4400, Fredericton, NB E3B 5A3.**

Topical Meeting on Nuclear Power Plant Maintenance

Sponsored by ANS, cosponsored by CNS, ENS et al., to be held **March 23-27, 1986** in Salt Lake City, Utah. For information contact: **Ken Talbot, Ontario Hydro — Pickering NGS, P.O. Box 160, Pickering, ON L1V 2R5.**

12th Simulation Symposium on Reactor Dynamics and Plant Control — Call for Papers

Sponsored by the CNS Nuclear Science and Engineering Division, to be held **April 21-22, 1986** in Hamilton, Ontario. 300 word abstracts are due by **February 17, 1986.** Full papers are due by **March 17, 1986.** For further information, contact: **W.J. Garland, Dept. of Engineering Physics, McMaster University, Hamilton, Ontario, L8S 4M1.**

CNA 26th Annual International Conference

To be held **June 8-11, 1986** in Toronto, Ontario, For information contact: **CNA, 111 Elizabeth St., 11th Floor, Toronto, ON M5G 1P7.**

CNS 7th Annual Conference

To be held **June 8-11, 1986** in Toronto, Ontario. For information contact: **CNS, 111 Elizabeth St., 11th Floor, Toronto, ON M5G 1P7.**

Symposium on Advanced Nuclear Services

Sponsored by CNA, to be held **June 11, 1986** in Toronto, Ontario. For information contact: **CNA, 111 Elizabeth St., 11th Floor, Toronto, Ontario, M5G 1P7.**

4th International Conference on Emerging Nuclear Energy Systems (ICENES 4)

Sponsored by the Spanish Nuclear Society, CNS, ANS, et al., to be held **June 30-July 4, 1986** in Madrid, Spain. For information contact: **G. Velarde, Director, Dept. of Nuclear Energy, ETS Ingenieros Industriales, Universidad Politecnica de Madrid, P. de la Castellana No. 80, 28046 Madird, Spain.**

Second International Conference on Radioactive Waste Management

Sponsored by CNS, cosponsored by ANS, to be held **September 7-11, 1986** in Winnipeg, Manitoba. For information contact: **T.S. Drolet, Conference Registration Chairman, CFFTP, 2700 Lakeshore RD. W., Mississauga, Ontario, L5J 1K3.**

ANS International Topical Meeting on Waste Management and Decontamination and Decommissioning

Sponsored by ANS, cosponsored by CNS, US DOE, et al., to be held **September 14-18, 1986** in Niagara Falls, NY. For Information contact: **Eva Rosinger, Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, R0E 1L0.**

Topical Meeting on Advances in Reactor Physics and Safety

Sponsored by ANS, EPRI, NRC and CNS, to be held **September 17-19. 1986** in Saratoga Springs, NY. For information contact: **D.R. Harris, Department of Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY 12180-3590.**

International Topical Meeting on the Operability of Nuclear Power Systems in Normal and Adverse Environments

Sponsored by ANS, cosponsored by CNS et al., to be held **Sept. 29-Oct. 3, 1986** in Albuquerque, NM. For information contact: **L.L. Bonzon, Division 6446, Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185.**

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International Conference on CANDU Fuel

Sponsored by CNS, to be held **Oct. 6-8, 1986** in Chalk River, Ontario. For information contact: **Dr. I.J. Hastings, AECL Research Co., Chalk River, Ontario, K0J 1J0.**

CNS 2nd International Conference on Simulation Methods in Nuclear Engineering — Call for Papers

Sponsored by CNS, to be held **October 14-16, 1986** in Montreal. Papers should contain descriptions of the simulation methodology including a numerical approach, empiricisms used, verification, validation and results from practical applications. Applications may include simulation of operational situations, safety related simulations, including postulated accident scenarios, and simulation of relevant experiments. Session topics are: Thermalhydraulics and Fluid Dynamics; Reactor Physics; Control & Operation; Fuel Behaviour; Related and Interdisciplinary Studies; Small Reactors; and Maxi and Mini-Computers. Deadline for summaries is **April 15, 1986.** Deadline for full papers is **August 15, 1986.** For details on preparation and further information contact: **D. Rozon, GAN, Ecole Polytechnique, 6600 Côte-des-Neiges, Suite 215, Montréal, Quebec, H3S 2A9,** (514) 340-4201.

Water Chemistry & Materials Performance Conference

Sponsored by CNS, to be held **Oct. 20-21, 1986** in Toronto,Ontario. For information contact: **N.A. Graham, Westinghouse Canada Inc., Dorset St. E., Port Hope, ON L1A 3V4,** (416) 885-4537, ext 297.

The Unfashionable Side

The Year Ahead

Once again The Unfashionable Side presents its predictions — for the year 1986. Unfortunately, Madam Sosostris had a bad cold and was unable to provide this column with her usual annual data package. However, with the aid of a 1200 baud sub-etheric voice-grade telephonic link with usually reliable sources and the column's trusty steam-powered difference engine, the following predictions can be made with a high degree of confidence:

January: Canadian Prime Minister Brian Mulroney claims that existing conditions are likely, and will probably continue so for the next twelve months. John Turner disagrees and accuses the Prime Minister of "conscienceless distortion of the facts" and compares him to Mussolini, Hitler, Stalin and Queen Victoria. Mr. Turner is Leader of the Opposition.

February: Energy Mines and Resources announce that as of 1 March all staff in its Surveys and Mapping Branch will be prohibited from membership in the Flat Earth Society.

March: Ontario Hydro changes the in-service dates for the Darlington Nuclear Generating Station again. Since this it the fourteenth time these have been rescheduled nobody knows whether this is a good or bad news for the nuclear industry, not even Ontario Hydro.

April: Atomic Energy Control Board refuses Operating Licence for Aphasia University research reactor until more data on the reactor's reactivity control system — trained boron-fed goldfish — are made available.

May: Major reorganization announced at Ontario Hydro by new Hydro President R.C. Franklin (former CN President). The giant electrical utility will be split into two independent corporations. One, under the original name, will serve commercial and industrial sectors, while the other (yet to be named) will meet the requirements of domestic consumers. Equipment and installations (transmission lines, power stations etc.) owned by the latter organisation will be distinguished by a blue paint scheme with yellow accents.

June: The Flat Earth Society announces that with effect from 1 July, no member will be allowed to take employment with the Surveys and Mapping Branch of Energy Mines and Resources.

July: Atomic Energy of Canada Ltd. Candu Operations announces the layoff of 500 engineers and scientists in order to "streamline" its operations. A spokesman notes that despite the layoffs, the company will maintain a "vital core group" of CANDU marketing specialists.

August: The Chairman of Aphasia University's Department of Underwater Ornithology, Prof. Armitage Loathing, calls for a review of Canadian climatological data under the provisions of the Charter of Rights. Noting that the current Canadian climate discriminates against the application of solar energy systems, he demands legislative action to (a) increase the number of sunshine hours in Canada, and (b) improve the thermal performance of solar energy collector systems "by at least two orders of magnitude."

September: Armitage and Hardcastle Forest Products (Nuclear) Inc. demonstrate new bio-degradable plywood pressure tube at Aphasia University's Mechanical Engineering Laboratory. Nuclear industry spokesperson expresses "interest," especially with respect to the tube's hydrogen uptake rate.

October: It is discovered that a freak windstorm severed all communications with Ottawa in July for a period of five days. This satisfactorily explains the unprecedented rise of the Canadian dollar to US $1.05 during that month.

November: As an aid to electrical energy conservation the Ontario government repeals Ohm's Law.

December: Atomic Energy Control Board hires 250 lawyers to "help with the regulatory backlog," 45 PR staff to explain the hiring of 250 lawyers and 30 more lawyers to sue the media for making nasty remarks about hiring the original 250 lawyers.

Happy 1986.
Ernest Worthing