



Science for Peace

BULLETIN

Vol. 8 No. 5 May 1988

SATURDAY, MAY 7
ANNUAL GENERAL MEETING
2 p.m., Trinity College, University of Toronto

The Annual General Meeting of Science for Peace will be held in the Combination Room of Trinity College, University of Toronto, Hoskin Avenue, on Saturday May 7 from 2:00 p.m. Please come! Following adjournment of the AGM, the new Board of Directors will meet to elect officers for the coming year and to consider matters of urgent business.

Letter from the President

PUGWASH SYMPOSIUM ON DISENGAGEMENT IN EUROPE: TOWARDS ARMS REDUCTION AND WEAPON-FREE ZONES

As a member of the International Pugwash Council I attended the recent Pugwash Symposium in Prague. I was impressed by how quickly the Europeans seem to be responding, in their thinking about European security, to the new situation presented by the INF Treaty and by new attitudes in the USSR. Nevertheless the symposium noted that little progress was being registered at the 35-member Conference on Security and Cooperation in Europe (CSCE) in Vienna, with Western delegates accusing the East of too little progress in human rights and the East claiming that NATO countries are not responding to the Warsaw Pact's latest proposals (and previous proposals) on arms control and disarmament and are thus negating the spirit of the INF Treaty and losing the opportunity it created.

The "latest proposals" in question are those addressed to members of NATO by the Foreign Ministers' Committee of the Warsaw Pact, meeting on March 10th in Sofia. They amount to a series of proposals for gradual disengagement in Europe, as a follow-up to the signing of the INF Treaty, and include:

- the conclusion of a treaty between USA and USSR on a 50 per cent reduction of strategic offensive weapons;
- general and complete prohibition of nuclear weapons tests; speeding up the USA-USSR talks on verification in order to secure ratification of the 1974 and 1976 threshold treaties, in order to facilitate a comprehensive test ban;
- prohibition of chemical weapons and elimination of stockpiles; completion of a mandate in the CSCE talks on the reduction of conventional weapons and armed forces from the Urals to the Atlantic;
- commencement of separate talks on the reduction of tactical nuclear weapons including dual designation systems;
- development of further confidence-building measures following from the Stockholm conference;
- creation of zones free of nuclear and chemical weapons in the Balkans, and in the centre and north of Europe, and the creation of a nuclear-free corridor along the lines of contact between NATO and Warsaw Pact forces;
- moratorium of one or two years on the growth of military spending in NATO and the Warsaw Pact;
- greater openness and predictability in the military field, with verification;
- exchange on doctrines on strategy, especially on "no-first-use" of nuclear weapons and no replacements for weapons eliminated.

In spite of disappointment at the lack of NATO response to these proposals, the Symposium reflected the more hopeful atmosphere created by the signs of changing priorities in the USSR, which moderated that country's militaristic policies in order to give domestic needs more importance. The opportunity for detente and disengagement should not be lost. NATO was urged to respond to the Warsaw Pact with counter-proposals. Accurate data should be produced about the strength of arsenals and armed forces and data exchanged between governments to expedite the CSCE talks. The Symposium was in favour of the mutual reduction of armed forces - both nuclear and conventional. It was not possible to deal with them separately, especially in view of NATO's insistence that the other side enjoyed superiority in conventional forces. The Soviets stressed that dialogue on doctrine was essential to break the stalemate as the NATO doctrine of relying on nuclear weapons to make up the perceived imbalance in forces was in their view the main impediment to progress. NATO's idea of the need for post-INF "modernization" of nuclear and conventional forces also made agreement on disengagement difficult.

Movement towards a Common Strategy was the desired objective and if reduction could not be agreed to in the first stage at least ceilings should be imposed on further increases. This discussion will be continued at the Pugwash Annual meeting at Dragomys (near Sochi) next September.

The main impression I carried away was that while inter-governmental negotiations may be stalemated, all kinds of unofficial contacts are being used to promote detente and disengagement in Europe. These include contacts between the SPD in the Federal Republic of Germany and the Poles as well as the GDR, and contacts between various peace-oriented foundations in the West and the East. Canada needs to keep in touch through NGOs as well as through governments, if we are not to be left out.

**INVITATION TO PARTICIPATE IN
THE UNIVERSITY OF GUELPH CONFERENCE
ON
"ETHICAL CHOICE IN THE AGE OF PERVASIVE
TECHNOLOGY"
October 25-28, 1989**

Technologies profoundly affect the lives of everyone in every sector of the world - frequently for the better - sometimes for worse - and often with unintended and unknown consequences. Yet, human creativity, the free pursuit of knowledge, market forces, social expectations and the common belief that the advent of new technologies is synonymous with progress, drive forward the development of technologies at a relentless pace.

Is this the natural and neutral manifestation of the forces of history that will supposedly bring about the best of all possible worlds? If, however, this is not the case, then who should choose what technologies to innovate and develop, for whom and upon which scientific, economic and ethical bases?

The reality is that technological progress has also been accompanied by human and ecological damage throughout the world. Choices should no longer be left to isolated individuals, agencies nor to specific interest groups to determine future developments upon narrow economic, political, social or other sectarian grounds. There are issues, such as in the fields of ecology, international development, peace and security, bioethics, agriculture, medicine, education, communications, as well as those concerning the workplace, public perception and so forth, which should be considered on the basis of interdisciplinary, cross-cultural, governmental and inter-governmental consultations. Obviously, the list is either incomplete or otherwise inadequate.

The preliminary conference design calls for the examination, by a selected group of internationally eminent scholars, philosophers and statesmen, of such universally accepted values as justice, socio-economic and political equity and rights, freedom and security for a sustainable future. These values should guide the development, implementation, management and control of new technologies. Workshops on specific issues will reflect the broader philosophical, scientific and social concerns inherent in the relationship between social values and technologies.

As Conference Chair, I invite Science for Peace to submit ideas on how best to structure and mount this Conference and to find out whether Science for Peace may itself be interested in cooperating in the design and implementation of one of the sub-themes. Preliminary discussions with national and international institutions, scholars, and governments indicate that this Conference will rival the one on "International Peace and Security in the Nuclear Age" held at the University of Guelph in October 1983. The Conference recommendations will receive the widest distribution possible both nationally and internationally.

For further information, please feel free to contact, Dr. Henry Wiseman, Conference Chair, or Jokelee Vanderkop, Executive Assistant at the University of Guelph, Department of Political Studies, Guelph, Ontario, N1G 2W1. Telephone (519) 824 4120, Ext. 3535 or 3532.

(The following is extracted, with permission, from an article in Ryerson Forum, 11 March 1988.)

**NEW POLICY ON MILITARY RESEARCH AT
RYERSON**

The academic council of Ryerson Polytechnic Institute in Toronto has approved a new policy on military research:

Ryerson shall not engage in secret military research, whatever the source of the funding. The only exception to this rule would be if international circumstances warrant research concerned with the defence of Canada, sponsored, co-sponsored, or approved by the Government of Canada. Should the Institute be approached to do such research, the president will make a recommendation to council, without revealing classified details, and council will vote on the appropriateness of Ryerson's participation in the project.

During the debate, Dr. Ron Stagg told the council that military research is a broad category. "A good deal of military research has significant civilian application," he said, "Council should consider very carefully what it wants to put restrictions on, if anything. If you put restrictions on open research you have to be very careful about what you are restricting. You may be putting restrictions on very worthwhile projects." He noted that Ryerson is something of a maverick in adopting such a policy. "The committee," he said, "has found that the majority of Canadian universities have no policies on military research. Those that have tend to address the matter of secret research of any kind; only a small number put restrictions on military research. Ryerson already has a policy on secret military research, and the committee is suggesting to tighten up the wording a bit."

The research committee set out four additional restrictions for council's consideration, only one of which was approved, namely that "academic council urges all faculty members as an act of individual conscience to refuse to participate in any research which might serve to increase militarism and the arms race".

There was much discussion at the meeting concerning the word "secret" in the policy, with "secret" meaning that the results of the research cannot be published. Some at the meeting argued for the deletion from the policy even though the report said "While there is no unanimity among universities as to the restrictions on military research, there appears to be a growing feeling that research, the results of which cannot be published, should not be permitted except in very limited circumstances, since such research contradicts the principle of openness which underlies university research."

President Brian Segal told the meeting that he was comfortable with the word "secret". "I and others in the administration have been extremely careful to ensure that any research with any military funding at this institute is publishable and in the public domain," he said, "and I think that this amendment continues to recognize that, and places some other constraints that I think are responsible and moral for this institute to take." Bob Guerriere, director of the Office of Research and Innovation, finished the discussion when he told council that if Ryerson was offered some classified research "the procedures we would have to go through to live up to the classification requirements of the government are so horrendous that we would probably not even get to council with it in the first place."

Nuclear Proliferation and Nuclear Terrorism: Research by the Nuclear Control Institute

Philip Ehrensaff

Université du Québec à Montréal

Opposition to the 30-year agreement between Japan and the United States concerning air transportation of frightening quantities of plutonium has received a serious setback. The Senate Foreign Relations Committee voted 15-3 to reject the agreement. On March 21, the full Senate reversed the Committee's recommendation. By the end of April, 1988, Japan will have essentially carte blanche to acquire at least 150 metric tons of plutonium from spent uranium that is legally subject to U.S. approval for activities such as reprocessing and international shipments.

The U.S. and Soviet nuclear arsenals combined are estimated to include 200 metric tons of plutonium. If European and Japanese projects for reprocessing spent fuel from civilian reactors proceed as planned, there will be an estimated 400 metric tons of plutonium controlled - or, rather, poorly controlled - by the nuclear energy sector in the year 2000. (Leventhal and Hoenig, 1987:5)

Acquisition of 7 to 10 kilograms of plutonium by a terrorist group or renegade state would be sufficient to construct a crude but effective nuclear bomb. The possibilities for acquiring such kilogram quantities, whether by violent seizures or quietly diverting plutonium in bulk processing and storage installations, will multiply as tons of plutonium are reprocessed each year. Both the Department of Defense and the Nuclear Regulatory Commission are uneasy with the terms of the plutonium agreement.

One barrier to Senate approval of the Japan-U.S. agreement stemmed from Alaska's opposition to proposed flight plans to fly plutonium cargos from Europe to Japan through Canadian airspace, with a refueling stop in Alaska. Science for Peace became involved in Canadian opposition to this flight plan. Alaska's opposition to the agreement was muted by a new flight plan which involves a non-stop Arctic route from Europe to Japan that avoids flying over land in either Canada or Alaska. This route involves flying through the narrow Bering straits and thus the risk of straying into Soviet airspace. Presumably these arrangements will include careful coordination with the Soviets to avoid a nuclear KAL47.

The Nuclear Control Institute (NCI), a Washington-based think tank focusing on nuclear proliferation issues, is a key actor in the opposition to the Japan-U.S. plutonium agreement. The NCI has both conducted solid research projects on the issue and skillfully communicated the results and conclusions to the U.S. Congress. A recent full page advertisement that the NCI placed in the New York Times (April 18, p. A13) was part of an effort to mobilize broad public pressure to stop the plutonium agreement.

The objective of this review is to 1) synthesize the NCI's analysis of the plutonium agreement and its implications and 2) give an overview of the NCI's research on non-proliferation issues. The NCI approach to research on proliferation is particularly interesting because the goals include not only analyzing the problem but also developing concrete strategies for stopping the spread of nuclear weapons.

A compact statement of the NCI's analysis of the plutonium agreement is contained in testimony presented by its president, Paul Leventhal, before the House Foreign Affairs Committee on March 2, 1988. With reference to the Nuclear Non-Proliferation Act of 1978 (NNPA) and long-standing goals of U.S. policy, Leventhal begins his testimony by stating that "...it is useful, I think, to come directly to the point: the proposed agreement with Japan is illegal and dangerous."

The flaws of the agreement are: 1) it provides an unprecedented blanket, long-term consent to Japan to receive plutonium from nuclear weapons states (France and Great Britain) and to use this plutonium not just in existing facilities but in any future bulk-handling and facilities and reactors which Japan builds; this contrasts with NNPA requirements of case-by case review procedures for each transaction; new facilities will be authorized to receive plutonium on the bases of simple "notification" by Japan without any requirement that the changes be made public or be subjected to effective Congressional oversight and public review.

Secondly, the plutonium will be transported by air even though no certified safe cask has yet been developed, much less tested, for bulk shipment of plutonium in large cargo planes; 3) future safeguard requirements for new facilities that process or use plutonium are set not in terms of arrangements that could effectively secure the plutonium but in terms of the services which the International Atomic Energy Agency, with its already limited resources, will be able to provide; 4) "timely warning" of proliferation risks will be provided almost exclusively by vague, political statements and evaluations rather than concrete safeguard and physical security arrangements; 5) in practical terms, the agreement is such that the United States has no suspension rights if Japan's handling of plutonium involves proliferation risks.

In short, the Reagan administration's plutonium agreement with Japan provides as much protection against proliferation as its present policies provide protection against acid rain.

Why would the United States sign such an agreement? Leventhal points out that almost all of Japan's enrichment requirements are presently supplied by the U.S. Department of Energy and that these orders make up nearly one-quarter of DoE's enrichment business. The Japanese have made commitments for enrichment services through the year 2000 that could produce between \$260 and \$435 million annually for the DoE.

The fear on the part of some elements of the U.S. nuclear establishment is that if the U.S. did not negotiate this type of agreement, Japan would take its business elsewhere. Current worldwide enrichment capacity exceeds demand by 2-to-1. If Japan gave notice today, it could cancel all its contracts with DoE without penalty after 1995. By the year 2000, Japan will have the capacity to enrich half of its own uranium needs. The other half could come from European facilities or even the Soviet Union. There were also fears that Japan could sever relationships with U.S. vendors for co-development and manufacture of major components for the current generation of reactors and for advanced reactor designs. (Leventhal, 1988:12) These co-

development efforts are viewed as crucial to the survival of the ailing U.S. nuclear industry, which has no new domestic reactor orders on its books.

Leventhal counters this position by responding that Japanese decisions to continue to enrich uranium in the U.S. and engage in joint nuclear research and development has less to do with the plutonium agreement than with perceptions of 1) the reliability of the U.S. enrichment industry and 2) the capacity of the U.S. reactor sector to generate innovations.

Lawsuits by U.S. uranium producers to ban DoE enrichment of foreign uranium, the accumulated \$8 billion debt associated with DoE enrichment activities, financial disputes between the DoE and the Tennessee Valley Authority, doubts concerning government financing for the next generation of enrichment technology, and the possible privatization of the DoE's enrichment facilities create uncertainty for all foreign purchasers of U.S. enrichment services. This uncertainty, rather than pique over U.S. requirements on plutonium reprocessing, will be the determining factor in Japanese decisions on enrichment contracts. Similarly, if Japan thinks the U.S. is the most interesting partner for developing nuclear technologies, it is unlikely to drop this partnerships because of non-proliferation policies as applied to plutonium shipments.

The thrust of Leventhal's arguments on the plutonium agreement indicate the general orientation of the NCI. Many of its board members and people who have conducted research for the Institute have been associated with the nuclear energy industry. In contrast to the mainstream of the industry, which downplays the proliferation and terrorism risks of nuclear energy, and has a rosy vision of the capacity of the International Atomic Energy Agency to control these risks, the NCI looks these problems straight in the eye.

For example, the NCI sponsored the International Task Force on Prevention of Nuclear Terrorism, which included 26 experts from 9 countries. The results have been published in P. Leventhal and Y. Alexander, eds., *Preventing Nuclear Terrorism* (1987). A good synthesis of the task force's research is presented in an article by Leventhal and Hoenig (1987). This research demonstrates the vulnerability of nuclear power stations to either violent attack or slow infiltration by terrorist groups which are increasingly sophisticated and ruthless in their techniques. The volume highlights the large gap which exists between the IAEA's mandate to safeguard civilian reactors and the budget, equipment, and personnel which is available to perform this task.

Particular attention is paid to the dangers of plutonium fuel cycles. This builds upon an earlier study which Canadian physicist Walter Patterson conducted under the auspices of the NCI (see Patterson, *The Plutonium Business*, 1984)

The military vulnerability of plutonium-based energy production is highlighted by the current "nuclear Watergate" in West Germany. Federal investigators have demonstrated that the nuclear fuel company Nukem had illicitly shipped plutonium and Cobalt 60 in canisters purporting to contain only low level waste. Between 1982 and 1987, Nukem's subsidiary Transnuklear distributed \$10 million in bribes to nuclear industry employees and government inspectors. At this point, it is not certain whether the scandal only involves a corrupt means of handling wastes or, more gravely, whether

plutonium was being sold abroad for use in weaponry. Non-proliferation experts are reserving judgment on the issue until further evidence is in (*Energy Economist*, 1988:6-7).

With respect to links between nuclear energy in general and the proliferation of nuclear weapons, the NCI's stand is the following:

The Nuclear Control Institute supports the "once-through uranium fuel track" ... which ends with disposal of spent fuel deep in the earth without separating the plutonium. This prevents the introduction of bomb material at any stage of the nuclear power program.

The NCI thus maintains that once-through nuclear fuel cycles can be diffused without proliferating nuclear weapons if, and only if, the very real weaknesses of the present arrangements are recognized and corrected rather than being swept under the rug. This stand will surely provoke debate among Science for Peace members.

This stance on once-through cycles is likely to enhance the NCI's political credibility when it presents anti-proliferation proposals to the U.S. Congress. The proposals are viewed as a means to resolve proliferation problems and not as an indirect way to attacking nuclear power. The presence of former weapons designer Theodore Taylor and retired admiral Thomas D. Davies on the NCI board also reinforce this credibility. The research produced by the NCI indicates a deep knowledge of the nuclear energy industry and the design and construction of nuclear weapons.

The "tritium factor" is now a major focus of the NCI's activities, and this holds a great deal of interest for Canadians (Albright and Taylor, 1988; NCI, 1987; Leventhal and Hoenig, 1987). The NCI proposes that U.S.-Soviet arms-reduction negotiations be couple to a mutual halt in new tritium production. This would serve as a self-enforcing mechanism for maintaining a minimum pace of reductions, due to the 5.5 percent annual decay rate of tritium.

Hydro Ontario's Tritium Removal Facility (TRF) is initially expected to recover 4 kilograms of tritium annually and eventually go into equilibrium at about 1 kilogram annually. The TRF is expected to produce 57 kilograms of tritium over a 20-year period (NCI, 1987:9). Albright and Taylor estimate that about 10 kilograms of tritium must be produced annually to replace the quantity that has decayed in nuclear weapons (1988:40). Thus it appears that the Pentagon would not be able to maintain its current level of nuclear weaponry even if it had the green light to purchase all of Ontario Hydro's tritium output. Furthermore, I think that the Pentagon would be loath to depend on a foreign supplier for tritium even if the Canadian government of the day was willing to sell it. The dangers of Ontario Hydro's tritium exports are more akin to the risks of plutonium fuel cycles: under present arrangements, it is hard to police the diversion of minor quantities which would be useful in the manufacture of several weapons in very dangerous hands.

The three active tritium-producing military reactors in the U.S. are all at least 30 years old. Pressure from the Pentagon and the Department of Energy to fund at least one

new multi-billion dollar reactor dedicated to tritium production is strong.

Given the present inclination of President Reagan to negotiate a strategic arms agreement before leaving office, the NCI's "tritium factor" proposal for arms control is quite timely. One could also remark that the President's desire for an arms control agreement is in contradiction to his plutonium policy, but nobody has ever accused this man of having consistent strategies.

In conclusion, the research and policy intervention efforts by the Nuclear Control Institute deserve the attention and support of members of Science for Peace. The NCI is located at 1000 Connecticut N.S., Suite 704, Washington, D.C. 20036 (tel. 202-822-8444). Membership is U.S. \$25 annually. Their research reports are essential reading on the spread of nuclear weapons.

Bibliography

- Albright, David and Theodore B. Taylor. "A little tritium goes a long way", Bulletin of Atomic Scientists, Vol. 44, No. 1 (Jan./Feb. 1988), pp. 39-42.
- Energy Economist, "Nukem's Plutonium Hitches a Ride", Energy Economist, No. 75 (Jan. 1988), pp. 6-7.
- Leventhal, Paul. "Testimony on the Proposed U.S.-Japan Nuclear-Cooperation Agreement", House Foreign Affairs Committee, March 2, 1988.
- Leventhal, Paul and Y. Alexander, eds., Preventing Nuclear Terrorism, Cambridge, Mass.: Lexington Books, 1987.
- Leventhal, Paul L. and Milton M. Hoenig, "The Hidden Danger: Risks of Nuclear Terrorism", Terrorism. Vol. 10 (1987), pp. 1-22; "The Tritium Factor", New York Times, Aug. 4, 1987.
- Nuclear Control Institute, "Tritium Factor: Questions and Answers", Washington, 1987; "Dangers in a Plutonium Economy", Washington, 1988.
- Patterson, Walter. The Plutonium Business, New York: Sierra Club-Random House, 1984; "I think I'll have seen everything when I see plutonium fly...", Energy Economist, No. 75 (Jan. 1988).
- Wald, Matthew. "Turning Point Nears in Production of Fuel for Hydrogen Bombs", New York Times, Nov. 17, 1987.

ANNOUNCEMENTS

Conférence de Science et Paix:

"Les sousmarins nucléaires canadiens: implications pour la prolifération et la stratégie militaire canadienne" par Marie-France Desjardins et Daniel Haywood, Centre canadien pour le contrôle des armements et le désarmement, mardi le 10 mai à 20:00 heures, à l'université de Montréal, Salle Z305, bâtiment principal.

Sanity, Science and Global Responsibility

An international interdisciplinary conference at Brock University, July 9-13, 1988 in cooperation with the Global Futures Group at San Diego State University. Further information from: Robert Malone, Program Coordinator, Brock University, St. Catharines, Ontario, Canada L2S 3A1.

Learned Societies Conference - Call for Papers

A workshop on "Power Elites as War Mongers" will be included in the Canadian Sociology and Anthropology Annual Meeting at the Learned Societies Conference, University of Windsor, June 1988. This workshop calls for papers that research the role of the military-industrial complex in Canada. Please contact: Rose Csicsai, 24 Clyde Street, Hamilton, Ont. L8L 5R4.

FOUNDING MEETING!

SOUTH CENTRAL ONTARIO REGIONAL AFFILIATION of SCIENCE FOR PEACE (SCORASP?)

The proposal is to create an organization of Science for Peace members and chapters in south central Ontario. The purpose would be to share information and to facilitate cooperation in research and educational projects for peace. The region is meant to include those of the Brock, Guelph, Toronto and Waterloo Chapters and the area roundabout. Probably such an affiliation would want to set up periodic meetings to keep in touch. (This seems especially important since, if the National Executive is moved to Vancouver, it seems likely that there will be less frequent Board meetings in Toronto. These meetings helped in the past to maintain at least some contact between the Chapters of the region.) At any rate, the meeting announced here is for the purpose of considering the most effective form for such an affiliation. All members of Science for Peace in the region are invited, and urged, to attend.

Janet Wood and colleagues have very kindly arranged this founding meeting. In addition to discussing SCORASP, the meeting will hear reports from two speakers about their recent activities.

SCORASP FOUNDING MEETING

Host: Eric Fawcett

Speakers:

Alex Michalos

Walter Dorn

24 May 1988, 7:00-10:00 p.m.
UNIVERSITY FACULTY CLUB
UNIVERSITY OF GUELPH

For information contact:

Eric Fawcett 416-978-5217

Janet Wood 519-824-4120, Ext. 3866

John Valleau 416-978-3595

CALL FOR VOLUNTEERS

Science for Peace needs several volunteers in the Toronto area:

1. We need a coordinator of volunteers! The coordinator would look out for, and keep a list of, members with time and skills that they are willing to use to help Science for Peace, and would call upon those members when specific jobs need to be done.
2. There is a long-standing need for a promoter of books and other publications, to work in co-ordination with the Publications Committee. Ultimately we hope that chapters will also institute such volunteer positions. So far there have been two books published under the imprimatur of SfP, but during the seven years of our existence many other books of excellent quality have been published by members and friends of SfP.
3. We also need someone to mail out publications and reprints which are requested from the National Office.
4. There will be other tasks from time to time, especially in connection with the Arctic Conference this coming October. If you are willing to help but perhaps not available right now, please let us know so that we may add you to our list of volunteers.

Volunteers please contact the SfP office, University College, Toronto, M5S 1A1; tel. 978-6928.

Science for Peace ELECTRONIC MAIL DIRECTORY

In the past few months, with the active encouragement of Phil Ehrensaft, there has been rapid development of electronic mail communication among members of SfP. The following is a list of members who have agreed to have their e-mail addresses published.

National Office

DOVE@UTORPHYS.BITNET
Rob Dickinson (Waterloo, Comp. Sci.)
RDICKINS@WATDCS.BITNET
John Dove (U. Toronto, Chem.)
DOVE@UTORPHYS.BITNET
Phillip Ehrensaft (UQAM, Sociology)
R14644@UQAM.BITNET
Eric Fawcett (U. Toronto, Phys.)
FAWCETT@UTORPHYS.BITNET
Ray Kapral (U. Toronto, Chem.)
PKAPRAL@UTORONTO.BITNET
James King (U. Toronto, Phys.)
KING@UTORPHYS.BITNET
Jack Kornblatt
KRNBLTT@CONU1.BITNET
Paul LeBlond (UBC, Oceanography)
USERHELL@UBCMTSG.BITNET
David Parnas (Queen's, Comp. Sc.)
PARNAS@QUCIS.BITNET
Derek Paul (U. Toronto, Phys.)

SP@UTORPHYS.BITNET
Mike Pearson (U. Montreal, Phys.)
2067@UMTLVR.BITNET
PLOUGHSHARES
KJEPPS@WATDCS.BITNET
Bill Reimer (Concordia, Soc. and Anth.)
REIMER@CONU1.BITNET
Norman Rubin
EPROBE@WEB.UUCP
Floyd Rudmin (Queen's)
RUDMINF@QUCDN.BITNET
Gerhard Stroink
REGE207@DAL.BITNET
Lynn Trainor
LTRAINOR@UTORPHYS.BITNET
John Valteau (U. Toronto, Chem.)
JVALLEAU@UTORONTO.BITNET
Janet Wood
CHMWOOD@UOGUELPH.BITNET

(E-mail for the National Office may be sent to John Dove or John Valteau.)

Please send us your e-mail address, and also say whether you have any objection to its being published in the BULLETIN.

John Dove

SCIENCE FOR PEACE DIRECTORY

National Executive

George Ignatieff, President
John E. Dove, Vice-President
Lynn E.H. Trainor, Secretary
John P. Valteau, Treasurer

National Office: University College, University of Toronto,
Toronto, Ontario M5S 1A1. Tel: (416) 978-6928.

Open Mon-Fri, 8:30 a.m. to 4:30 p.m.

Electronic (BITNET) mail for National Office to DOVE@UTORPHYS

Chapter Contacts

Science et Paix Quebec: David Horwood, 3540 Durocher, #12,
Montreal, Que. H2X 2E5

Science for Peace British Columbia: Vera Webb, Dept. of Microbiology, U.B.C., Vancouver, B.C. V6T 1W5

Science for Peace Brock: Peter Nicholls, Dept. of Biology, Brock Univ., St. Catharines, Ont. L2S 3A1

Science for Peace Edmonton: Wytze Brouwer, Dept. of Physics, University of Alberta, Edmonton, Alta. T6G 2J1

Science for Peace New Brunswick: G.P. Semeluk, Dept. of Chemistry, University of New Brunswick, Bag Service #45222, Fredericton, N.B. E3B 6E2

Science for Peace Ottawa: Angelo B. Mingarelli, Dept. of Mathematics, Univ. Ottawa, Ottawa, Ont. K1N 9B4

Science for Peace Toronto: Phyllis Creighton, Univ. Toronto Press, 243 College St., Toronto, Ont. M5S 1A1

Science for Peace Waterloo: Cam Robinson, Dept. of Chemical Engineering, University of Waterloo, Waterloo, Ont. N2L 3G1