Comments by Non-Government Organizations

on

Atomic Energy of Canada Limited's (AECL)
Cernavoda Reactor 2
Environmental Assessment Summary

Table of Contents

1. Executive Summary

These are comments by non-government organizations on the *Environmental Assessment Summary* on the proposed completion of the Cernavoda 2 nuclear reactor, released by Canada's state-owned reactor vendor, Atomic Energy of Canada Limited (AECL).[1] AECL's main partner is Ansaldo Nucleare, an Italian company which is a division of Ansaldo Energia SpA, which is part of Finmeccanica. Cernavoda 2 will be owned and operated by Societatea Nationala Nuclearelectrica (SNN), Romania's state-owned nuclear company. The organizations which have endorsed this submission are listed in section 14.

AECL's *Environmental Assessment Summary* concludes that the effects of the construction, operation and decommissioning of the Cernavoda 2 reactor will be "not significant, unlikely to occur or beneficial under normal operating conditions [...] AECL, its partners and SNN are committed to applying mitigative measures such that significant adverse environmental effects are not likely to occur."[2] However, these claims are not substantiated by the contents of the environmental assessment summary document. The environmental assessment completed by AECL is inadequate, and should be redone and subjected to independent review through a public hearing process, in order to address numerous deficiencies.

This submission makes 23 specific recommendations for an improved environmental assessment, which appear throughout and are listed together in section 13. The Export Development Corporation and other financial institutions should not use the current AECL environmental assessment for approval of Cernavoda 2 project financing. The endorsing organizations do not favour any use of government loans or financing for nuclear power plant exports, but if such a decision is made, it should be based on a properly conducted environmental assessment.

Some of the principal deficiencies in the AECL environmental assessment include:

1. the lack of an adequate public process, including the failure to provide complete versions of the environmental assessment documents;

2. the failure to consider alternatives to completing Cernavoda reactor 2;

3. the failure to assess the consequences of a catastrophic nuclear accident;

4. the failure to disclose details of the nuclear emergency plan;

5. the failure to conduct an adequate Probabilistic Risk Assessment;

---

1. AECL, *Cernavoda Unit 2 Nuclear Power Plant, Environmental Assessment Summary*, CES-03702-ENA-001, December 2001. Annex 1, *Alternatives Study Summary*. Annex 2, *Romanian Public Consultation Process Summary*. Annex 3, *Cernavoda NPP Site Environmental Management Plan Summary*. Annex 4, *Cernavoda NPP Site Quality Assurance Program Summary*. Annex 5, *Thermal Studies of the Danube River and Danube-Black Sea Canal Summary*.

2. AECL, *Environmental Assessment Summary* , December 2001, p. 19.

6. the failure to assess the security provisions at the Cernavoda nuclear plant and the ability to defend against a terrorist attack;

7. the failure to disclose the complete nature of seismic risks near the site and the ability of Cernavoda-2 to withstand these risks;

8. the failure to present details of additional pollution control options which would reduce harm to health from ongoing radioactive pollution from the plant;

9. the failure to identify the full range of decommissioning activities required to rehabilitate the site and manage associated nuclear wastes in perpetuity;

10. the failure to define the hazards that may have resulted from past labour practices and faulty equipment at the partially-constructed nuclear reactor; and

11. the failure to discuss safety-related financial matters, including possible problems obtaining sufficient funds to support ongoing operations and maintenance work and to pay qualified staff.

2. Environmental Assessment Process

The environmental assessment on the proposed Cernavoda 2 project is precedent-setting. This is the first time that AECL has ever invited public comment on an environmental assessment of a reactor export. To the best of our knowledge, it is also the first time that the Export Development Corporation (EDC) has ever invited public comment on an environmental assessment of a project for which it has provided financing. Not only this, but the application of the Projects Outside of Canada Regulations of the Canadian Environmental Assessment Act (CEAA) to the export of two CANDU reactors to China in 1996 is currently being tested before the courts in a lawsuit by the Sierra Club of Canada against the government of Canada. Furthermore, Bill C-31 to amend the Export Development Act has exempted EDC projects from CEAA. Finally, EDC has yet to settle the procedures under its Environmental Review Framework (ERF).

It should therefore come as no surprise that there are numerous problems with the process which need to be remedied.

Inadequate process

In the introduction to its Environmental Assessment Summary, AECL states:

> Although not required by law, the decision was taken for the scope of information given in this EA to be broadly consistent with the requirements for an environmental assessment under the Projects Outside of Canada Regulations, under the Canadian Environmental Assessment Act.[3]

3. AECL, *Environmental Assessment Summary* , December 2001, p. 1.

If the Canadian Environmental Assessment Act is indeed being used as a model, we believe that the appointment of an impartial Panel to conduct public hearings is justified by the scale of this project; by the size and the risk of financing requested from the EDC; by the failure of the proponent to demonstrate need for the project; and by public concern.

Using CEAA as a model, the EDC would act as the responsible authority for the project because it is the funding agency. It would therefore be appropriate for the EDC to request the Minister of Environment to invoke a panel hearing and appoint a panel. A panel hearing would provide a credible, independent review, rather than allowing AECL to be its own judge and jury. A panel hearing would also provide intervenors with some minimal level of intervenor funding to hire independent experts to analyze the AECL environmental assessment report and present evidence to the Panel members, as well as question the proponent and regulator during the course of public hearings.

Inadequate documentation

AECL has provided for public review only summaries, with five annexes, of its environmental assessment of the proposed Cernavoda 2 reactor.[4] The Sierra Club of Canada has requested full documentation without success.[5] As it stands, every area of the environmental assessment suffers from inadequate information. Public review is meaningless if the public is not provided with full information in order to verify and test the assumptions of the proponents.

Inadequate comment period

The comments period of 45 days (December 1, 2001 to January 14, 2002) is too short and, in addition, straddles a major holiday period, thus cutting into the time that interested parties have available for preparing comments and seeking expert advice. The Sierra Club of Canada has requested that the comments period be extended to at least 60 days, and that an allowance of 15 days be added in order to compensate for the holiday period.[6]

Inadequate advance notice of EA

In order to allow for meaningful public comment, we suggest that, in future, at least one month's notice should be given to the public of environmental assessments being made public.

Recommendation 1

An independent review of the environmental assessment document prepared by AECL should be conducted by an impartial Panel with a mandate and sufficient resources to undertake

4. The documents are posted on the web site of the Romanian nuclear state company, Societatea Nationala Nuclearelectrica (SNN), at http://www.nuclearelectrica.ro/

5. An initial request for full documentation was made to AECL on December 19, 2001.

6. Letter from David Martin, Sierra Club of Canada, to Robert Van Adel, President & CEO, AECL, December 25, 2001.

independent expert review and public hearings. This must be done prior to any decision on funding by the EDC for completion of the Cernavoda 2 reactor. The Panel should make provision for the involvement of all interested parties in English, French and Romanian, regardless of geographic location.

Recommendation 2

AECL should provide the public with the complete versions of the environmental assessment, including the annexes and any referenced material requested, in English French or Romanian, as desired.

Recommendation 3

The comment period should be extended to at least 60 days, and an allowance of 15 days should be added in order to compensate for the holiday period.

Recommendation 4

In future, at least one month's notice should be given to the public of environmental assessments being made public. This notice should include at least the following: the name of the project; its general nature; cost of the project; location of the project; and the amount, type and terms of the financial assistance requested from the EDC and Canadian government. Notice should not only be made on the web sites of the proponent and the EDC, but should also be given to the Canadian Environmental Network, to non-government organizations (NGOs) in the host country, and to any other NGO that requests notification from the government.

3. Need and Alternatives

The stated reason for proceeding with the Cernavoda 2 reactor is to meet a predicted need for new electricity supply. The assumptions about future electricity supply requirements are based on a 25-year electricity demand and supply study which was completed in April 1998.[7] The so-called "Alternatives Study" is not referenced or appended to the environmental assessment report -- it is only described in Annex 1. The study was commissioned in 1996 by the Government of Romania and the PHARE Energy Programme Unit, and funded by the European Commission.

Moreover, the three scenarios reviewed in the study all included completion of the Cernavoda 2 reactor as a given, due to the fact that it is partially completed, and to the alleged availability of external financing through foreign loans which "would reduce pressure on the Romanian national budget",[8] among other factors. The Alternatives Study failed to address the option of *not* completing the Cernavoda 2 reactor. Thus, from the viewpoint of an environmental assessment, the study was methodologically deficient, since it did not examine scenarios that included alternatives to the undertaking. Reliance on this incomplete, methodologically unacceptable and out-of-date alternatives study is a major deficiency in the environmental assessment.

7. AECL, *Environmental Assessment Summary*, December 2001, p. A1-1.

8. AECL, *Environmental Assessment Summary*, December 2001, p. A1-4.

The AECL summary states,

> The Romanian National Electric Company S.A. (CONEL) has 59 fossil-fuelled thermal power plants, but more than one-third of this capacity is more than 25 years old. The Alternatives Study estimated that if rehabilitation of these older plants was not done in the near future, the dependable capacity of the current system would shrink to 3500 MW(e) [3.5 GW].[9]

In its 1999 report to the Nuclear Safety Assistance Coordination Group, Romania's nuclear regulator, the National Commission for Nuclear Activities Control, stated that installed electrical generating capacity in Romania was 19.6 gigawatts (GW), with 13 GW from fossil fuels, 5.9 GW from hydraulic and 0.7 GW from nuclear (Cernavoda 1); while peak demand in 1997 was 7.3 GW.[10]

Given these figures, there are some clear inconsistencies in the AECL report. AECL's suggestion that "the dependable capacity of the current system would shrink to 3500 MW(e)" is clearly inaccurate, and presumably refers to *fossil-fired* capacity. Even then, with over 13000 MW of installed fossil-fired capacity, it seems unlikely that only 3500 MW will remain dependable in the near future. Moreover, as AECL itself has noted, rehabilitation of six thermal plants was already underway at the time of the 'alternatives study'. Even if we assume the worst, that only 3500 MW of existing fossil capacity will remain dependable, there would still be more than 10 GW of installed capacity in the Romanian system, representing a respectable surplus of about 28% over 1997 peak demand.

AECL's claim that Romania will have an electricity supply shortage in the near future is simply not credible. Even if one accepts the assumption that a supply shortage will exist in the near future, completing Cernavoda 2 will add only 0.7 GW of new supply, and the question remains whether Cernavoda 2 completion provides a least-cost solution.

AECL does not provide any cost comparisons between the full life cycle costs of Cernavoda 2 and any supply or demand alternatives. We are given only a simplistic statement that "Unit 2 has 40% of its construction complete."[11], with no detail of the work that has been finished and/or the components that have been purchased or installed. We know only that the capital cost of completion of the plant has been cited in media reports as being about $750 million ($US).[12]

While we have little information on costs, we do however know that the performance of CANDU reactors has been notoriously poor in recent years.[13] It has long been argued by the nuclear industry that while nuclear power plants may have very high capital (construction) costs, the operating costs (primarily fuels costs) are very low, leading to an overall low lifetime unit energy cost. In fact, despite lower fuel costs, lifetime unit energy costs for nuclear power plants are relatively high. A study by the Institute for

---

9. AECL, *Environmental Assessment Summary*, December 2001, p. 1.

10. National Commission for Nuclear Activities Control (CNCAN), *Romania Country Report to the G-24 Nuclear Safety Assistance Coordination Group*, March 1999, p. 1.

11. AECL, *Environmental Assessment Summary* , December 2001, p. 2.

12. Mike Trickey, Southam News, "Deal Close for CANDU", *Windsor Star*, August 10, 2000, p. A11.

13. Internationally, Pressurized Heavy Water Reactors had an average load factor of 59.8% in 2000. "Load Factors to end December 2000", *Nuclear Engineering International*, May 2001, p. 34.

Energy and Environmental Research (IEER) found that the cost of nuclear generation is typically about twice the cost of combined-cycle natural gas-fired generation. Under several scenarios, the lifetime unit energy cost ranged from 4.58 cents/kWh to 8.79 cents /kWh for nuclear plants, while the unit cost of electricity from combined-cycle gas plants ranged from 2.26 cents/kWh to 3.897 cents/kWh.[14]

Another cost accounting of Canadian generating alternatives corroborated the IEER findings. A study conducted for the Independent Power Producers' Society of Ontario found that energy produced by CANDU nuclear stations was roughly twice the cost of that produced by gas-fired industrial cogeneration plants, both before and after environmental externalities were factored in. The study found that nuclear costs (based on Ontario Power Generation's most modern plant, the Darlington Nuclear Station) were 11.708 cents/kWh (1997 $Cdn), and gas-fired industrial cogeneration was 5.521 cents/kWh. When mid-range environmental externalities were added, the corresponding costs were 14.989 cents/kWh for CANDU nuclear and 6.621 cents/kWh for gas-fired industrial cogeneration.[15]

Thus, even if the 'sunk' costs of Cernavoda 2 are ignored, it is not clear that it would have a cost advantage over cost-effective supply or demand alternatives.

It is important to note that the economic rationale for completing Cernavoda 2 has shifted dramatically. In the recent past, Romania's huge generating surplus was acknowledged and the main rationale for the completion of the Cernavoda 2 reactor was for export of electricity.[16] However, to the best of our knowledge no export agreements have been confirmed. For example, Moldova has rejected overtures to accept electricity imports.[17] Now, AECL and its Italian and Romanian partners are suggesting that the generating capacity from Cernavoda 2 will be needed to replace existing capacity supplying the domestic market. On the basis of the *prima facie* evidence noted, neither scenario appears to be plausible or economically justifiable.

Recommendation 5

The work completed to date on Cernavoda 2 should be disclosed, together with past expenditures and the budgeted capital costs for completion.

Recommendation 6

As it is the sole basis of AECL's alternatives analysis, the April 1998 alternatives study by TRACTEBEL, SEP and Edf for Romania should be made public.

---

14. Arjun Makhijani, "Reducing Greenhouse Gases and Creating a Sustainable Energy Supply", *Science for Democratic Action*, Institute for Energy and Environmental Research (IEER), March 1998, p. 7.

15. David Argue Consulting, *A Review of the Economic Cost of Power in Ontario*, Independent Power Producers' Society of Ontario (IPPSO), May 1997.The cost comparisons were based on a standard 20-year life with a 10% discount rate and a 65% load factor.

16. Mike Trickey, ibid.

17. "Cernavoda won't benefit Moldova", *Nuclear Engineering International*, September 2001, p. 9.

Recommendation 7

A new alternatives study should be commissioned which includes a review of the option of not completing the Cernavoda 2 reactor, including a comparative analysis of the life-cycle costs of Demand Side Management (energy efficiency and conservation programs), as well as renewable energy options and high efficiency natural gas combined-cycle co-generation (Combined Heat and Power) plants.

Recommendation 8

The economic rationale for Cernavoda 2 should be clarified. Is it intended for export or for the domestic market?

Recommendation 9

The status of Romania's fossil-fired generating capacity should be clarified, including the most recent plans.

4. Reactor Hazards

4.1. Severe Reactor Accidents

All nuclear fission reactors, regardless of design, location, operator or regulator, have the potential to undergo catastrophic accidents involving loss of control of the reactor core, failure of safety systems and subsequent widespread fallout of hazardous fission products. While such accidents are infrequent, the consequences are severe and involve effects on human health, the environment and the economy. One only has to look at the Three Mile Island and Chernobyl accidents to be reminded of these potential consequences.

It is imperative, therefore, that the accident consequences associated with operation of the Cernavoda 2 reactor be fully disclosed in the environmental assessment process, in order that the full extent of the potential negative effects on human health, the environment and the economy may be understood by the public and decision-makers. Low probability or chance of occurrence is not a valid reason for failure to review and assess the consequences of severe nuclear accidents. Risk is the mathematical product of probability and consequences, so low-probability and high-consequence accidents, by definition, have a high risk.

The Province of Ontario Nuclear Emergency Plan describes the potential effects of a serious CANDU reactor accident:

> In the very low probability event of a nuclear emergency resulting in a major contamination of the environment in extent and magnitude, the following effects could result, among others: a large area may become uninhabitable for an extended period of time; a large number of former residents of this area may need relocation; there may be a significant economic impact if this area contains many agricultural, industrial and commercial enterprises; if any major transportation routes pass through this area, they may become unusable for a significant period; depending on the ecological systems in the area, there may be environmental effects outside the initially contaminated area. To deal with these and other effects, it will be necessary to undertake a major, long-term rehabilitation operation to resettle displaced persons, overcome the economic disruption and losses, and protect and restore the

environment.[18]

While the Ontario Nuclear Emergency Plan does not yet have specific programs implemented for dealing with the consequences of catastrophic nuclear accidents at CANDU nuclear stations in the province, the potential for severe accidents has been acknowledged in Canada, and should be acknowledged and addressed in countries to which Canadian reactors are sold..

The International Atomic Energy Agency (IAEA) has established a ranking system for nuclear accidents called the International Nuclear Event Scale (INES).[19] A level 7 accident is described as having "widespread health and environmental effects". AECL's environmental assessment report on the proposed Cernavoda 2 reactor is limiting the accident analysis to a level 4 accident on the scale of 1 to 7, which is described as an accident without significant off-site risk. A catastrophic accident with widespread social, environmental and health impacts cannot be ruled out. The consequences of an INES level 7 accident at Cernavoda should be presented and analyzed in the environmental assessment process.

Recommendation 10

The environmental assessment should review the consequences of a severe reactor accident involving widespread radioactive fallout (level 7 on the IAEA International Nuclear Event Scale - INES), due to the fact that this type of accident cannot be ruled out. The effects on human health, the environment and the economy should be documented and assessed.

4.2. Special Safety Systems

The AECL summary report notes that the Emergency Water Supply System is to be shared by Cernavoda reactors 1 and 2,[20] but fails to present an analysis of whether this system can accommodate the needs of both reactors at the station for emergency water supply if there is a simultaneous accident involving the two reactors. A two-reactor accident could be caused by external events such as a terrorist attack or major local earthquake. It is important to note that the design of safety systems at multi-reactor sites in Canada does not accommodate the potential for simultaneous accidents at more than one reactor. This has been highlighted as a key design deficiency.[21]

4.2.1. Safety System Unavailability

The AECL environmental assessment summary report concludes that: "Monitoring records at Canadian NPPs indicate that abnormal radiological events are highly unlikely to cause significant adverse radiological effects".[22] This statement implies that safety systems can be relied on to prevent massive radiation releases during an accident. However, the record for safety system performance in Canada

---

18. Province of Ontario, Provincial Master Plan, March 1999, Appendix "O"

19. "International Nuclear Event Scale: Clearer: Communication", *IAEA Bulletin*, Vol. 34, #2, 1992, p. 23.

20. AECL, *Environmental Assessment Summary*, December 2001, p. 18.

21. G. Thompson, *A review of the accident risk posed by the Pickering A NGS - A report to the Standing Committee on Energy of the Canadian Senate*, August 2000, pp. 8-9.

22. AECL, *Environmental Assessment Summary*, December 2001, p. 19.

shows that these systems are not fail-safe or fool-proof and may not work as designed during an accident. Specific CANDU design features are listed as mitigation measures in the event of radiological accidents, including two emergency fast shutdown systems, emergency core cooling and containment.[23] The operating record at Canadian reactors includes the following notable problems involving safety systems. These examples show that there have been many occasions when safety systems have been 'unavailable' to perform as designed, increasing the chance that significant harm might have occurred had a serious reactor accident taken place during those time periods.

- At Pickering reactor 2, a 100 sq. cm. hole existed between two moderator system rooms from early 1988 to March 1989 when it was discovered. If a large loss of coolant accident had occurred during that 15-month period, the resulting leakage between rooms could have compromised the recirculation of water to the Emergency Core Cooling System (Event Report # 89-38, Pickering A). Reactor 2 was restarted in 1988 after five years of work to replace the fuel channels and alter the safety systems, and the hole was evidently a result of work done during that period.

- In July 1989 a "loss of regulation" accident happened at Pickering reactor 5 when a worker investigating a power loss problem in the Emergency Core Cooling System inadvertently removed a fuse which supplied power to the "in core flux detectors". The computerized reactor regulating system read this situation as a drop in power and responded by raising the power level in the reactor (Event Report # 89-80, Pickering B).

- In November 1990 all moderator room pumps were found seized at Pickering reactor 4. Had a loss of coolant accident occurred during the eleven months prior to this discovery, the pumps would not have functioned as designed to aid in recirculation of water to the Emergency Core Cooling System (Event Report # 90-178, Pickering A).

- In July 1995 two technicians carried out work on the wrong reactor (Pickering reactor 5 instead of reactor 6), disabling the second fast shutdown system on reactor 5, which was operating at full power at the time (Event Report # 95-40, Pickering B).

- About 500 tonnes of water spilled into the Pickering reactor 6 building in February 1996 when employees working on an Emergency Water Supply valve failed to isolate it from the system. An investigation revealed that safety equipment, if needed, could have failed due to water damage (Event Report # 96-83, Pickering B).

- In April 1996 all eight reactors at Pickering NGS were closed in order to repair a back-up valve on the Emergency Core Cooling System, which had been tested a month earlier. The system may not have operated as designed if needed during an accident in the preceding few weeks (Event Report # 96-88).

23. AECL, *Environmental Assessment Summary*, December 2001, p. 47.

4.3. Examples of CANDU Accidents

Past accidents at CANDU reactors in Ontario illustrate a range of causes that could contribute to future accidents, including: faulty design of equipment and software; manufacturing, construction or installation flaws; equipment that is worn or unable to withstand harsh conditions (flooding, high radiation fields, etc.); worker errors including inadequate and incorrect maintenance; and ineffective sharing of operation and accident data between stations. Selected examples include:

- Pickering reactor 2 had a loss of coolant accident on December 10, 1994, which required the use of the Emergency Coolant Injection System for the first time. The accident was caused by a faulty valve design in the reactor core cooling system. Written instructions followed by the reactor operators actually contributed to the accident. (Event Report and Follow Up Reports # 94-94, Pickering A).

- During a shutdown at Bruce reactor 2 in March 1986, a major fuel channel break occurred when operators increased the coolant pressure to look for a small leak in a pressure tube. A sudden rupture of both the pressure tube and calandria tube occurred along a flaw which was thought to be caused by the installation method (*Nuclear Canada*, V.XXV, #4, April 1986).

- Pickering reactor 1 had a "power excursion" in November 1988 caused by operator error that resulted in damage to 36 fuel bundles. Ontario Hydro had not predicted that this type of accident would cause fuel damage. Ontario Hydro continued to run the reactor with broken fuel, and emissions of radioactive iodine to the atmosphere were elevated for several weeks (Event Report 88-204, Pickering A).

- In January 1990 a fueling machine at Bruce reactor 4 moved while in the process of refueling, causing a loss of coolant. The accident was traced to an error in the fueling machine software which instructed the wrong fueling machine support to move and the unsupported weight of a fueling machine broke the fuel channel assembly open. The supply of heavy water needed to keep the reactor core from melting was supplemented from reactors 2 and 3, which both happened to be shut down at the time (Event Report # 90-03, Bruce A).

- In September 1990 Pickering reactor 2 had a "severe flux tilt", with large power shifts in the reactor core, caused in part by inherent problems with the CANDU reactor design, as well as changes made to the fast shutdown system. Staff spent two days trying to stabilize the reactor core by moving fuel bundles, changing the reactor power levels, and moving adjuster rods, before finally shutting it down (Event Report # 90-137, Pickering A).

- In May 1995 a heavy water coolant spill at Bruce reactor 5 was caused by the same equipment that resulted in the December 1994 loss of coolant at Pickering reactor 2 (Event Report # 95-37, Bruce B). This accident happened despite a detailed analysis by Ontario Hydro that was shared with other CANDU stations.

4.4 Generic Action Items

In addition to the potential failure of special safety systems and the past operating record, CANDU reactors have inherent design problems which have been documented and tracked by Canada's nuclear industry regulator, the Canadian Nuclear Safety Commission (formerly the Atomic Energy Control Board). Called 'Generic Action Items', these reactor safety-related concerns have required research and testing programs to develop options for resolving the concerns.[24] As of 2001 there were several Generic Action Items outstanding, including the following issues:[25]

- Potential explosion of hydrogen gas inside containment, causing damage to the containment structure and other equipment and structures.
- Molten uranium fuel breaking through the fuel channel assembly and mixing with heavy water moderator, possibly causing a steam explosion, damaging other fuel channels and the shutoff rod guide tubes for one of the shutdown systems.
- Pressure tube breakage in the lower section of the reactor core, causing moderator leakage and thereby removing a source of fuel-cooling currently credited in the CANDU safety analysis.
- Positive void coefficient of reactivity of the CANDU design, which causes power levels to increase in the reactor core in the absence of coolant. This CANDU problem is shared with Soviet-era RBMK reactors, and was a contributing factor in the Chernobyl nuclear catastrophe.
- Lack of validated computer models which are used to predict the behaviour of reactors and safety systems under various accident conditions.

Taken in combination, these outstanding Generic Action Items and the operating record of CANDU reactors bring into question the safety claims made by the CANDU designer, AECL, and utilities which operate CANDUs. An objective reviewer of documented safety concerns can only conclude that there is considerable uncertainty about CANDU reactor safety. Claims made by AECL about the unlikely chance of a catastrophic CANDU reactor accident are unsubstantiated.

Recommendation 11

A Level 3 Probabilistic Risk Assessment (PRA) should be conducted, including estimations of the off-site consequences of accidents, and analysis of external accident causes. The Level 1 PRA reportedly underway is insufficient, since it will estimate only the probability of large radiation releases, not the consequences. The PRA should be completed prior to a decision by the EDC (and its related agencies in other countries) on whether or not to fund the Cernavoda 2 reactor.

---

24. AECB, Canadian National Report for the Convention on Nuclear Safety, April 1999, AECB Catalogue # INFO-0690, Annex 6.1.

25. CNSC, Renewal of Pickering B Operating Licence, CMD 01-H3, February 2001, pp. 16-25.

5. Nuclear Emergency Planning

The AECL environmental assessment summary claims that an environmental monitoring program and nuclear emergency plan, as well as additional mitigation measures, are means for protecting humans and the environment.[26] Presumably the additional measures refer to nuclear emergency responses including evacuation, sheltering, stable iodine consumption, controls on the consumption of contaminated food and water, and the ongoing monitoring of food and water supplies. However, neither the environmental monitoring program nor the emergency plan are described in any detail, so it is impossible to judge their adequacy.

The environmental assessment summary notes only two isolated actions that have been taken to upgrade the emergency plan. The first is a new bridge over the Danube-Black Sea Canal which provides an alternate evacuation route in an up-wind direction.[27] The second is an off-site "emergency facility", likely a command and control centre for authorities, that is being built on the recommendation of a 1999 review by European nuclear industry regulators.[28] While these actions may be commendable, they do not constitute evidence of an adequate nuclear emergency plan.

No information about Romania's nuclear liability insurance arrangements are disclosed in the AECL summary report. If SNN is not required to purchase sufficient liability coverage, then Romanian taxpayers (and likely the international community as well) will be forced to bear a disproportionate burden in the event of a severe reactor accident with extensive off-site radiation damage.

Recommendation 12

The environmental assessment should describe how the nuclear emergency plan will minimize the radiation dose to humans from a severe reactor accident, including measures for environmental monitoring, public notification, evacuation and other protective measures. The features of the nuclear emergency plan which address long-term isolation and eventual rehabilitation of radiation-contaminated regions must also be defined and assessed. Estimates of long-term public doses, incorporating credit for the reduction in doses achieved by various protective measures, should be presented in detail and analyzed.

Recommendation 13

The environmental assessment should review Romania's nuclear accident liability arrangements to determine whether they are able to suitably compensate nuclear accident victims.

---

26. AECL, *Environmental Assessment Summary*, December 2001, p. 13.

27. AECL, *Environmental Assessment Summary*, December 2001, p. 18.

28. AECL, *Environmental Assessment Summary*, December 2001, p. 18. See also: Western European Nuclear Regulators' Association, *Report on nuclear safety in EU applicant countries*, March 1999, p. 60.

6. Transboundary Nuclear Fallout

The AECL summary report states: "Given the distance that the Cernavoda Site is from other countries, we have concluded that no significant adverse transboundary effects should occur".[29] However, a catastrophic reactor accident at Cernavoda cannot be ruled out, and such an accident would result in widespread radioactive fallout which would disperse in the direction of the prevailing weather patterns at the time of the accident. Cernavoda is only 40 kilometres from the Bulgarian border, and about 120 kilometres from Ukraine. Turkey is a nearby downwind neighbour, with Istanbul located 350 kilometres across the Black Sea to the south. Other nearby neighbours which could be affected by radioactive fallout from a catastrophic reactor accident include Greece, Yugoslavia, Hungary, Czech Republic, and Poland. The entire southeastern Mediterranean basin is also at risk from such an accident, including countries in the Middle East and northern Africa.

Recommendation 14

> The environmental assessment must incorporate estimates for long-distance transport of radioactive fallout via known weather patterns throughout eastern Europe and the eastern Mediterranean basin. The estimates should include the potential collective dose to exposed populations under various weather scenarios. The environmental assessment should also include details of the notification of affected countries and of financial provisions for the compensation of foreign governments and for rehabilitation costs borne by foreign countries.

Recommendation 15

> Under the Aarhus Convention, citizens of neighbouring countries must be given the same access to public participation in the environmental assessment as citizens in the host country. The environmental assessment process must therefore be extended to consultations with neighbouring countries.

7. Security

An assessment of the security measures at the Cernavoda nuclear plant, including its ability to withstand a terrorist attack, is completely absent from the AECL environmental assessment summary report. Section 2.5, entitled *Effects of the Environment on the Project*, includes the statement:

> For the Cernavoda NPP Site, these potential events included meteorological events, hydrological events (including flooding due to water level variations), earthquakes and human-induced events (such as land, sea and air traffic accidents).[30]

However, the report fails to describe any "human-induced" events and their potential effects. Following the attacks on the World Trade Center in New York and the U.S. Pentagon in Washington on September 11, 2001, there is little doubt that nuclear stations could not survive similar suicide attacks using commercial jumbo-jets loaded with fuel.

---

29. AECL, *Environmental Assessment Summary*, December 2001, p. 18.

30. AECL, *Environmental Assessment Summary*, December 2001, p. 14.

Recommendation 16

The environmental assessment should include an analysis of the additional features required to 'harden' the Cernavoda 2 reactor design, with the objective of determining whether it is possible for the reactor and associated peripheral buildings to withstand an intentional crash by a large jet with full fuel tanks or a direct hit by a large conventional bomb. Other anti-terrorist site security features should be defined and assessed, including anti-sabotage measures, and on-site air, marine and ground defenses capable of securing the Cernavoda site. The costs of these additional anti-terrorist measures should be included in the cost estimates for completion of Cernavoda 2. By necessity, specific details of this security analysis will have to be kept confidential. However, the general security scenarios and the cost of implementation should be made public, as these should be an integral part of the station operating costs paid by the utility.

8. Seismic Risks

Scant details regarding the seismic qualifications of the Cernavoda 2 reactor design are offered in the AECL summary report. The Design Basis Earthquake (DBE) for safe shutdown of the reactor is stated as "T>1000 years... with any significant release of radioactive material a negligible probability"[31]. A 1979 AECL-sponsored report, conducted by the firm D'Appolonia, reviewed the original Design Report on seismic risks in the Cernavoda area and adopted the Design Basis Earthquake (DBE) of 0.2 g (i.e., ground movement equivalent to 20% of the force of gravity) for the Cernavoda site.[32]

The D'Appolonia report identified a major fault, the Sabla-Black Sea fault, which runs within 80 kilometres of the Cernavoda site, off-shore from Constanta. A magnitude 7.2 earthquake associated with this fault occurred in 1901, and it has been estimated that a maximum magnitude earthquake of 7.7 could occur at the area of this fault located just 80 kilometres from Cernavoda. This differs from the assumptions made in the original Design Report, which did not account for the extension of the fault to the area of the Black Sea off shore from Constanta.[33]

The most prominent earthquake zone in Romania is the Vrancean region, where there have been four earthquakes of magnitude greater than 7 in the past 200 years.[34] Both the original Design Report and the D'Appolonia review place the maximum magnitude earthquake in this region at 7.5, but the D'Appolonia review places the nearest distance to the Cernovoda site at 140 kilometres, compared to over 200 kilometres stated in the original Design Report.[35]

---

31. AECL, *Environmental Assessment Summary*, December 2001, p. 15.

32. D'Appolonia, *Review of the Site Geological and Seismological Characteristics*, AECL Project #79-009, July 1979, p. 2.

33. D'Appolonia, *Review of the Site Geological and Seismological Characteristics*, AECL Project #79-009, July 1979, p. 21.

34. United States Geological Survey, National Earthquake Information Centre, Earthquake Search Results, NOAA catalogue, online: www.usgs.org

35. D'Appolonia, *Review of the Site Geological and Seismological Characteristics*, AECL Project #79-009, July 1979, p. 24.

The 1979 D'Appolonia report noted that the Cernavoda region is also vulnerable to the chance of nearby earthquakes not associated with the known active faults. These "near-field" earthquakes could result in peak acceleration of 0.25 g, and the D'Appolonia report recommends that "a probabilistic analysis of near-field effects should be carried out before considering any values lower than the proposed upper-bound 0.25 g peak horizontal acceleration".[36] It is not known if the DBE of 0.2 g established for the site has been used for the Cernavoda 2 design, or whether design changes have been incorporated to increase its seismic qualifications to 0.25 g. The Romanian nuclear industry regulator, CNCAN – National Commission for Nuclear Activities Control, is now requiring that the utility conduct a seismic margin assessment, which, according to the AECL summary report, is being conducted as part of a "Level 1 Probability Safety Assessment", to be completed by 2003.[37] This is evidence that the 0.2 g DBE has not been upgraded for the Cernavoda 2 reactor. A 1993 AECL draft report noted that the CANDU-6 was only designed for peak ground acceleration of 0.2 g., and that the design would "require conceptually simple but extensive modifications... to qualify it for 0.25 g".[38] The recommended modifications included changes to process equipment and piping, control and instrumentation, and reactor fuel channels, fuel handling equipment and fuel storage systems.

Recommendation 17

Assuming that the 0.2 g DBE design rating has not been changed for Cernavoda 2, the environmental assessment should incorporate an analysis of the cost and feasibility of upgrading the DBE to at least 0.25 g, with cost-benefit analysis of higher qualification.

Recommendation 18

The Seismic Margin Assessment being conducted as part of the Probabilistic Risk Assessment should be completed prior to decisions by the EDC and associated funders from other countries on financing of the Cernavoda 2 reactor.

9. Routine Pollution and Public Health Impacts

CANDU reactors emit a range of radioactive pollutants to the air and water as a part of routine operations, which are outlined in the AECL summary report. The highest radiation dose estimated for the most vulnerable member of the public in the vicinity of the Cernavoda site is stated as 0.1 millisievert per year for infants at the station boundary.[39] This is one tenth of the public dose limit, which is 1 millisievert per year, and far exceeds similar estimates for public exposure at CANDU stations in Ontario, Canada. For example, the hypothetical dose to the most exposed infant at the Darlington nuclear station is estimated as 0.0018 millisieverts per year in 2000 – three orders of magnitude lower, for a site with more

36. D'Appolonia, *Review of the Site Geological and Seismological Characteristics*, AECL Project #79-009, July 1979, p. 34.

37. AECL, *Environmental Assessment Summary*, December 2001, p. 15.

38. S.A. Usmani, Seismic Design Envelope Limits of CANDU-6 and Recommendations to Enable Offer of CANDU-6 to Higher Seismic Sites, AECL, July 14, 1993, p. 1.

39. AECL, *Environmental Assessment Summary*, December 2001, p. 11.

than double the generating capacity of two Cernavoda reactors.[40] This raises serious concerns about the adequacy of pollution control equipment being installed on the Cernavoda 2 reactor, and the existing level of emissions at Cernavoda 1. Even less conservative public dose estimates based on a doubling of monitoring data from Cernavoda 1 operations places the infant dose estimate at 0.015 millisieverts per year, which is one order of magnitude above the estimated doses at Ontario's larger CANDU station at Darlington in 2000. All exposure to ionizing radiation increases the risk of cancer, birth defects and associated health problems.

Recommendation 19

The environmental assessment should describe the opportunities for additional controls of radioactive releases from the site, both airborne and waterborne, including the costs associated with these additional measures and the corresponding expected reductions in public dose. The pathways analysis used to estimate public dose should be defined and analyzed.

10. Decommissioning

The AECL summary report notes that decommissioning of Canadian nuclear facilities has shown that the work "can be carried out without significant adverse health and environmental effects".[41] This claim is not supported by Canadian experience. The decommissioning of the Gentilly I nuclear reactor in Quebec is cited as a model, yet the Gentilly I reactor has not been fully decommissioned, so it does not represent the total dose expected. The official Canadian conception of reactor decommissioning includes three phases.[42] In Phase I, irradiated fuel is removed from the reactor and from the site after a storage period of about ten years. Phase II is storage with surveillance to allow a reduction of radioactivity by decay. Phase III is the dismantling of systems and buildings and restoration of the site to allow reuse. It appears that by using worker dose records for the initial decommissioning stage of safe storage at Gentilly I, AECL is excluding the dose that can be expected from the Phase III reactor dismantling and remediation to return the site to green-field status.

AECL's experience in decommissioning its own facilities at Chalk River Nuclear Labs has not been positive. For example, on May 26, 1999, four workers preparing a radiation-contaminated building at Chalk River for decommissioning work were reportedly over-dosed with radiation, despite wearing protective gear.[43] The accident has resulted in the regulator prosecuting AECL for the over-exposure, and the case is still before the courts.[44]

Recommendation 20

The environmental assessment should incorporate more accurate estimations of worker and public dose, and long-term environmental effects from a complete decommissioning scenario,

---

40. Ontario Power Generation, *Annual Summary and Assessment of Environmental Radiological Data for 2000*, April 2001, p. xiii.

41. AECL, *Environmental Assessment Summary*, December 2001, p. 12.

42. Ontario Hydro, *Conceptual Plan for Decommissioning Pickering, Bruce and Darlington Generating Stations*, Report No. 89006 Rev. 0, January 1989.

43. Atomic Energy Control Board, *Significant Development Report 1999-7*, BMD 99-98, July 27, 1999.

44. Personal communication, S. Locatelli, CNSC, to I. Kock, Sierra Club of Canada, December 20, 2001

including dismantling of reactor systems and buildings and restoration of the site to allow reuse.

Recommendation 21

The public and worker doses and the effects on the environment should also be estimated for decommissioning of front-end fuel cycle activities including uranium mining, milling, refining and fuel fabrication, as well as the 'back-end' activity of long-term radioactive waste management.

11. Historical issues

The AECL summary report does not address the historical context for the Cernavoda 2 reactor project, including the fact that construction of the reactor building began in 1980 and was abandoned in 1989 when the national revolt took place and the President Ceausescu was deposed and executed. Ceausescu used forced labour for construction at Cernavoda, with appalling living conditions for workers.[45] Defects in construction and the use of Romanian-manufactured components were widespread. Because of these known problems, a thorough review should be provided of the quality of construction work and component manufacture carried out in that era.

It is also clear that many design modifications have taken place in the CANDU-6 since Cernavoda was first designed and construction began in 1980. These modifications have presumably been retrofitted onto the CANDU-6 design of the 1970s, which may have involved safety trade-offs. Any subsequent changes to the design and modifications to the existing reactor building and equipment for Cernavoda 2 should be reviewed and all safety issues defined, including age-related decay of structures and equipment.

Recommendation 22

The environmental assessment should include a review of actions taken to correct defects in construction and component manufacture, as well as a safety review of design changes and modifications to the reactor and auxiliary buildings and equipment for Cernavoda 2 since construction first began in 1980.

45. C. Montgomery, "Knew Romanian work conditions were harsh, CANDU official says", *Globe and Mail*, May 25, 1990, pp. A1 & A2.

12. Financial Issues

A publication by the Romanian Nuclear Energy Association in reference to Cernavoda 1 notes that:

> Unfortunately, not only the outage activities, but all the unit's operation activities suffer because the necessary mechanisms are not effective to ensure that the budgetary cash flow is being provided to the [Cernavoda] station in timely manner and according to station's needs.[46]

Similarly, a review of nuclear programs of European Union-applicant countries noted:

> It is important that the Romanian government ensure that the current financial problems of the utility do not affect the ability of the management to maintain an adequate level of safety at the plant [and] the resources of the regulator [CNCAN] need to be strengthened to ensure it can accomplish all its regulatory duties effectively. Further, staff need to be recruited and trained. Staff working conditions should be improved and salaries increased in order to retain qualified personnel.[47]

In August 2000 the Romanian government passed a special ordinance, while Parliament was in recess, which included several financial measures aimed at supporting completion of Cernavoda 2 by December 2006. Some of the measures include long-term tax exemptions for the utility, for foreign contractors working on Cernavoda 2, and on the import of materials.[48] However, in the context of an uncertain future under deregulation, ensuring sufficient cash flow for the nuclear utility and nuclear industry regulator remains an essential safety issue. The AECL summary report does not address the matter of the financial capacity of the utility to adequately maintain the current reactor, let alone build and maintain a second reactor at the same site. The current state of the Romanian regulatory agency is also not discussed, but is a crucial part of the safety analysis.

Recommendation 23

> The environmental assessment should review restructuring plans for the electricity sector in Romania, and include proof from the utility and the regulator that both agencies are in a stable financial position and will have sufficient funds available to operate effectively. The utility should be required to prove that it has sufficient financial resources guaranteed and a sufficient workforce trained to build and commission Cernavoda 2, as well as simultaneously conduct maintenance and repairs on Cernavoda 1. Further, proof must be established that ongoing operations and maintenance of both reactors will be supported by sufficient funds for the expected life of the reactors, and that funds will be guaranteed to carry out long-term radioactive waste management at the site.

---

46. Romanian Nuclear Energy Association, "Unit 1 of Cernavoda Nuclear Power Plant - Achievements and Lessons Learned in Operation", *Energia Nucleara*, V. 9, Nr. 1-4, 1998, p. 11.

47. Western European Nuclear Regulators' Association, *Report on nuclear safety in EU applicant countries*, March 1999, p. 17.

48. *Government of Romania Ordinance No. 126/2000 regarding the completion of the Cernavoda NPP - Unit #2 Project (Summary)*, August 31, 2000. See also: A. MacLachlan, "Cernavoda-2 completion bolstered by Romanian government support", *Nucleonics Week*, September 14, 2000, pp.1, 10-11.

13. Summary of Recommendations

Recommendation 1

An independent review of the environmental assessment document prepared by AECL should be conducted by an impartial Panel with a mandate and sufficient resources to undertake independent expert review and public hearings. This must be done prior to any decision on funding by the EDC for completion of the Cernavoda 2 reactor. The Panel should make provision for the involvement of all interested parties in English, French and Romanian, regardless of geographic location.

Recommendation 2

AECL should provide the public with the complete versions of the environmental assessment, including the annexes and any referenced material requested, in English French or Romanian, as desired.

Recommendation 3

The comment period should be extended to at least 60 days, and an allowance of 15 days should be added in order to compensate for the holiday period.

Recommendation 4

In future, at least one month's notice should be given to the public of environmental assessments being made public. This notice should include at least the following: the name of the project; its general nature; cost of the project; location of the project; and the amount, type and terms of the financial assistance requested from the EDC and Canadian government. Notice should not only be made on the web sites of the proponent and the EDC, but should also be given to the Canadian Environmental Network, NGOs in the host country, and any other NGO that requests notification from the government.

Recommendation 5

The work completed to date on Cernavoda 2 should be disclosed, together with past expenditures and the budgeted capital costs for completion.

Recommendation 6

As it is the sole basis of AECL's alternatives analysis, the April 1998 alternatives study by TRACTEBEL, SEP and Edf for Romania should be made public.

Recommendation 7

A new alternatives study should be commissioned which includes a review of the option of not completing the Cernavoda 2 reactor, including a comparative analysis of the life-cycle costs of Demand Side Management (energy efficiency and conservation programs), as well as renewable energy options and high efficiency natural gas combined-cycle co-generation (Combined Heat and Power) plants.

Recommendation 8

The economic rationale for Cernavoda 2 should be clarified. Is it intended for electricity export or for the domestic market?

Recommendation 9

The status of Romania's fossil-fired generating capacity should be clarified, including the most recent plans.

Recommendation 10

The environmental assessment should review the consequences of a severe reactor accident involving widespread radioactive fallout (level 7 on the IAEA International Nuclear Event Scale - INES), due to the fact that this type of accident cannot be ruled out. The effects on human health, the environment and the economy should be documented and assessed.

Recommendation 11

A Level 3 Probabilistic Risk Assessment (PRA) should be conducted, including estimations for the off-site consequences of accidents, and analysis of external accident causes. The Level 1 PRA reportedly underway is insufficient, since it will only estimate the probability of large radiation releases, not the consequences. The PRA should be completed prior to a decision by the EDC (and its related agencies in other countries) on whether or not to fund the Cernavoda 2 reactor.

Recommendation 12

The environmental assessment should describe how the nuclear emergency plan will minimize the radiation dose to humans from a severe reactor accident, including measures for environmental monitoring, public notification, evacuation and other protective measures. The features of the nuclear emergency plan which address long-term isolation and eventual rehabilitation of radiation-contaminated regions must also be defined and assessed. Estimates for long-term public doses incorporating credit for these various protective measures must be presented in detail and analyzed.

Recommendation 13

The environmental assessment should review Romania's nuclear accident liability arrangements, to determine whether they are able to suitably compensate nuclear accident victims.

Recommendation 14

The environmental assessment must incorporate estimates for long-distance transport of radioactive fallout via known weather patterns throughout eastern Europe and the eastern Mediterranean basin. The estimates should include the potential collective dose to exposed populations under various weather scenarios. The environmental assessment should also include details for notification of affected countries and financial provisions available for compensation to foreign governments and for rehabilitation costs borne by foreign countries.

Recommendation 15

Under the Aarhus Convention, citizens of neighbouring countries must be given the same access to public participation in the environmental assessment as citizens in the host country. The environmental assessment process must therefore be extended to consultations with neighbouring countries.

Recommendation 16

The environmental assessment should include an analysis of the additional features required to 'harden' the Cernavoda 2 reactor design, with the objective of determining whether it is possible for the reactor and associated peripheral buildings to withstand an intentional crash by a large jet with full fuel tanks or a direct hit by a large conventional bomb. Other anti-terrorist site security features should be defined and assessed, including anti-sabotage measures, and on-site air, marine and ground defenses capable of securing the Cernavoda site. The costs of these additional anti-terrorist measures should be included in the cost estimates for completion of Cernavoda 2. By necessity, specific details of this security analysis will have to be kept confidential. However, the general security scenarios and the cost of implementation should be made public, as these should be an integral part of the station operating costs paid by the utility.

Recommendation 17

Assuming that the 0.2 g DBE design rating has not been changed for Cernavoda 2, the environmental assessment should incorporate an analysis of the cost and feasibility of upgrading the DBE to at least 0.25 g, with cost-benefit analysis of higher qualification.

Recommendation 18

The Seismic Margin Assessment being conducted as part of the Probabilistic Risk Assessment should be completed prior to decisions by the EDC and associated funders from other countries on financing of the Cernavoda 2 reactor.

Recommendation 19

The environmental assessment should describe the opportunities for additional controls on radioactive releases from the site, both airborne and waterborne, including the costs associated with these additional measures and the corresponding reduction expected in public dose. The pathways analysis used to estimate public dose should be defined and analyzed.

Recommendation 20

The environmental assessment should incorporate more accurate estimations of worker and public dose, and long-term environmental effects from a complete decommissioning scenario, including dismantling of reactor systems and buildings and restoration of the site to allow reuse;

Recommendation 21

The public and worker doses and the effects on the environment should also be estimated for decommissioning of front-end fuel cycle activities including uranium mining, milling, refining and fuel fabrication, as well as the 'back-end' activity of long-term radioactive waste management.

Recommendation 22

The environmental assessment should include a review of actions taken to correct defects in construction and component manufacture, as well as a safety review of design changes and modifications to the reactor and auxiliary buildings and equipment for Cernavoda 2 since construction first began in 1980.

Recommendation 23

The environmental assessment should review restructuring plans for the electricity sector in Romania, and include proof from the utility and the regulator that both agencies are in a stable financial position and will have sufficient funds available to operate effectively. The utility should be required to prove that it has sufficient financial resources guaranteed and a sufficient workforce trained to build and commission Cernavoda 2, as well as simultaneously conduct maintenance and repairs on Cernavoda 1. Further, proof must be established that ongoing operations and maintenance of both reactors will be supported by sufficient funds for the expected life of the reactors, and that funds will be guaranteed to carry out long-term radioactive waste management at the site.

14. Endorsing Organizations

The following organizations have endorsed this submission:

Austria

OÖ Überparteiliche Plattform gegen Atomgefahr

Belgium

Friends of the Earth Europe

Bulgaria

Association AGROLINK

Za Zemiata

Centre for Environmental Information & Education, Sofia

Canada

Algoma Manitoulin Nuclear Awareness

Canadian Coalition for Nuclear Responsibility/
Regroupement pour la surveillance du nucléaire

Canadian Environmental Law Association

Canadian Voice of Women for Peace

Citizens for Renewable Energy

(continued through to page 28)

Clean North

Coalition for a Green Economy

Concerned Citizens of Manitoba

Conservation Council of New Brunswick

Concerned Citizens of Renfrew County

David Suzuki Foundation

Educating for Peace

Energy Action Council of Toronto (EnerACT)

Energy Probe

Environmental Coalition of Prince Edward Island

Falls Brook Centre

Greenpeace Canada

Healthy Community Partners

MiningWatch Canada

Mouvement Vert Mauricie

Northwatch

Ontario Voice of Women for Peace

Ontario Public Interest Research Group (OPIRG) - Carleton

Nanoose Conversion Campaign

Nappan Project

Nipissing Environment Watch

North Bay Peace Alliance

Pembina Institute

Saskatchewan Environmental Society

Science for Peace

Sierra Club of Canada / Sierra Club du Canada

Sierra Youth Coalition

Société pour Vaincre la Pollution

Society Promoting Environmental Conservation (SPEC)

Tantramar Environmental Alliance

Temiskaming Environmental Action Committee

Waterloo Public Interest Research Group

France

Réseau sortir du nucléaire

Germany

Bremen Information Centre for Human Rights and Development

BUKO Agrar Koordination

Rettet den Regenwald e. V.

Urgewald e.V.

Italy

Campagna Occhio alla SACE

Greenpeace Italia

WWF Italia

Netherlands

Both Ends

Friends of the Earth International Secretariat

Greenpeace International

World Information Service on Energy (WISE)

Romania

MAMA TERRA / For Mother Earth - Romania

Russia

Ecodefense!

Anti-Nuclear Campaign, Socio-Ecological Union International, Moscow

Slovakia

Society for Sustainable Living in the Slovak Republic

United Kingdom

EU-Enlargement Watch

United States

Blue Ridge Environmental Defense League

Citizens for Alternatives to Chemical Contamination

Citizens' Resistance at Fermi Two

Coalition for a Nuclear Free Great Lakes

Don't Waste Connecticut

Don't Waste Michigan

Environmental Defense, International Program

Friends of the Earth - US

Georgians Against Nuclear Energy

Great Lakes United

Nuclear Energy Information Service

Nukewatch

Western States Legal Foundation, California

Note: A version of this document was submitted on behalf of the NGOs listed in section 14, to Atomic Energy of Canada Limited and the Export Development Corporation (Canada) in January 2002. The document was written in response to release of the AECL Cernavoda Unit 2 NPP Environmental Assessment Summary (AECL document CES-03702-ENA-001 Rev. 1, dated December 2001).

This document is available from the Sierra Club of Canada website at: www.sierraclub.ca/national/nuclear/reactors/ngo-cernavoda-ea-comments.pdf

January 16, 2002