

SUBMISSION TO ARPANSA ON ANSTO'S REACTOR OPERATING LICENCE APPLICATION

by Friends of the Earth, Australia

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1. INTRODUCTION

ANSTO's application for a reactor operating licence should be rejected for numerous reasons including:

- * the failure to establish a net benefit;
- * the failure to resolve radioactive waste management issues; and
- * the lack of an independent, credible regulator.

Friends of the Earth has been engaged in debates over the future of the Lucas Heights nuclear plant for 30 years and welcomes the opportunity to speak at the planned ARPANSA public forum on the reactor operating licence application.

2. NO RESOLUTION TO RADIOACTIVE WASTE PROBLEMS

ARPANSA should not issue a licence to construct a new reactor because of the failure of ANSTO and the federal government to put in place satisfactory waste management strategies:

- * The government abandoned its plan to impose a nuclear waste dump on Aboriginal land in SA and it is highly likely that the plan to dump waste in the NT will also fail because of public and political opposition and because of the government's propensity for incompetence, secrecy and deceit in such matters.
- * Spent fuel management plans are variously uncertain and/or problematic. Plans to store reprocessing wastes are likely to be scuttled.
- * No progress whatsoever has been made with respect to ultimate disposal of spent fuel reprocessing wastes and other long-lived intermediate-level waste (LLILW). The only plan for LLILW is interim storage at one of three sites in the NT.

BROKEN COMMITMENTS

ARPANSA CEO Dr John Loy has stated that he would need to see “significant progress” with waste management plans before issuing a reactor operating licence (Statement by the CEO of ARPANSA – Licence to construct the Replacement Research Reactor, 5/4/02). Significant progress had not been made yet the licence was issued.

Likewise, Dr Loy said: "at the time of a decision on a licence to construct the replacement reactor, arrangements for the reprocessing of the specific fuel proposed for use in the reactor would need to be demonstrated to be available when the reactor would be in operation and there would need to be progress on the strategy to establish a store for ILW, including for the waste arising from the reprocessing of spent fuel." (Personal communication, 1/6/2000.)

Dr Loy issued the reactor construction licence though no progress had been made on an ILW store.

In issuing a licence for the preparation of a site for the proposed new reactor, Dr Loy said: "It is true that the waste repository proposal is still in the development stage, that the long-lived intermediate level waste storage facility is yet to be definitely planned and no decisions have been taken on final disposal of long-lived intermediate level waste. There are significant environmental, social and political issues that will need to be dealt with for these plans to come to fruition. The question for me in this application is whether, at least in principle, I could see that there was sufficient commitment to the current plan and the general availability of alternative approaches so as to be confident that a way through would be found in a reasonable timescale. I took into account that there is clear progress on the siting of a low level waste repository and a Government commitment to examine co-locating a store for long-lived intermediate level waste in association with the repository." (CEO/ARPANSA, 22/9/99, Issue of a Licence to ANSTO to Prepare a Site for Replacement Research Reactor Facility.)

The government’s “clear progress” to dump its waste in SA came to nothing, and the plan to co-locate LLILW was abandoned several years ago.

Dr Loy said in a June 1, 2000 letter: “at the time of a decision on the licensing of the operation of the replacement reactor, the arrangements for reprocessing of its spent fuel would need to be entirely firm. With regard to the ILW store, there would need to be substantial and evident progress such as the features of the design settled, siting criteria established and a strategy and timetable in place - that is, that it was moving forward with clear paths to its future establishment.”

There has not been “substantial and evident progress” on the LLILW store proposed for the NT. The design has not been settled. Some progress on siting criteria had been made by the National Store Committee but its criteria were ignored, the Committee disbanded, and its short list of potential sites kept secret (but leaked to the media). There has been no attempt to justify the NT sites on public health or environmental criteria (except for ignorant and racist statements to the

effect that the sites are in the “middle of nowhere”). Underground dumping is being considered by the federal government at the proposed NT dump yet none of the short-listed sites were short-listed by the Bureau of Resource Sciences in the 1990s.

Dr. Loy is quoted in the 3/8/00 St George and Sutherland Shire Leader saying: “I have said ... that at the construction stage I would want to see progress towards a store. ... Should it proceed and go to a commissioning time, I would want to be very much assured that there would be a store.” (Dr. Loy in evidence to the Senate Select Committee for an Inquiry into the Contract for a New Reactor, Canberra, 9/2/01, p.553 of transcripts.)

Dr Loy cannot possibly be “very much assured” that the proposed store in the NT will be developed. So Dr Loy clearly cannot issue a licence.

Dr. Loy said he would need to see "really clear progress" towards a LLILW store before issuing a reactor operating licence, "... my view is now that I wouldn't issue such a licence if there weren't substantial progress toward the store". (ABC Radio National, Breakfast, 8/8/02).

So Dr Loy clearly cannot issue a licence.

Dr Loy said: “You don't necessarily have to have every loose end tied at the time of the operation license, but I have to be convinced that there will be a store.” (ABC Radio National, PM, 13/9/02).

So Dr Loy clearly cannot issue a licence.

Dr Loy said: “I am expecting ... that there will be significant progress by the time any licence to operate the RRR is sought. I will be writing to the Minister for Science advising him of this expectation.” (Statement by the CEO of ARPANSA, Dr John Loy – Licence to construct the Replacement Research Reactor, 5/4/02).

So Dr Loy clearly cannot issue a licence.

Dr. Loy ignored a number of recommendations contained in a February 2002 report by ARPANSA's Nuclear Safety Committee (<www.arpansa.gov.au/pubs/rrrp/nsc150302.pdf>). In particular, Dr. Loy ignored the recommendations that contingency plans for the management of radioactive waste generated at Lucas Heights be prepared by ANSTO and submitted to ARPANSA prior to the granting of a reactor construction licence. No such contingency plans were prepared either before or after the granting of the licence. Specifically, Dr. Loy ignored these recommendations from the Nuclear Safety Committee:

* “A contingency plan for additional spent fuel storage arrangements and/or spent fuel conditioning in Australia should be submitted to ARPANSA by ANSTO as part of its conditions of licence to construct the RRR [Replacement Research Reactor]. The Applicant should demonstrate a 'fall-back' position which is feasible, practical and socially and politically acceptable in case the international options are not available.”

* “That ANSTO submit a workable contingency plan for the management of Lucas Heights-generated wastes, before a licence is issued to construct the RRR. The nature of such plans should inform the conditions of the construction licence. This contingency plan should contain provisional information about alternate arrangements to the proposals for a national repository and national store currently under discussion.”

The 1993 Research Reactor Review said that a new reactor should not be contemplated until "a high level waste repository site has been firmly identified and work started on proving its suitability" (p.xv) and that "A crucial issue is final disposal of high-level wastes, which depends upon identification of a site and investigation of its characteristics. A solution to this problem is essential and necessary well prior to any future decision about a new reactor. ... It would be utterly wrong to decide on a new reactor before progress is made on identification of a high level waste repository site." (p.xiv)

A reactor EIS condition accepted by the Minister for Industry, Science and Resources (ISR) and the Environment Minister was that “Reactor construction should not be authorised until arrangements for the management of spent fuel rods from the replacement reactor have been demonstrated to the satisfaction of ARPANSA and the Minister for the Environment and Heritage.”

ARPANSA's Regulatory Branch said in its Safety Evaluation Report on ANSTO's application to prepare a site for a new reactor: "A licence to operate the reactor would not be issued by ARPANSA without there being clear and definite means available for the ultimate disposal of radioactive waste and spent nuclear fuel. Recommendations 26 and 27 arising from Environment Australia's review of the EIS are relevant to this issue.”

The Department of the Environment and Heritage (1999 Environmental Assessment Report) said that "The current timing is for the store to be in operation by the time the replacement reactor is commissioned in 2005. Clearly, any long-term planning depends on the establishment of such a facility."

The Senate Select Committee, "A New Research Reactor?", May 2001, p.230, made the following recommendation:
The Committee recommends that the Government satisfactorily resolves the question of the safe disposal of new reactor spent fuel before approval to construct a new reactor is given."

And on p.209 the Senate Select Committee said: “The Committee considers that assurances concerning the timely establishment of a Storage Facility for waste arising from the reprocessing of Australia's spent fuel rods must be critically examined. The Committee once again notes the pre-conditions proposed by the MacKinnon Review namely that a solution to the problem of waste 'was essential and necessary well prior to any future decision about a new reactor'. The Committee condemns the Government for ignoring this important recommendation of the MacKinnon Review."

The Senate Economic References Committee, A New Reactor at Lucas Heights, September 1999, said in its Executive Summary and Recommendations (p.xvii):

“The Committee believes that the finding of the Research Reactor Review that 'a solution to this problem is essential and necessary well prior to any future decision about a new reactor' is still a relevant pre-condition.

Accordingly, the Committee recommends:

- (1) that this issue be further considered by the proposed public inquiry, and
- (2) that no new reactor be constructed until a permanent site for disposal of the Lucas Heights nuclear waste is determined."

The Draft reactor EIS claimed ANSTO would have completed a whole raft of important radioactive waste management tasks prior to the new reactor being commissioned, such as having “transported low level radioactive wastes from Lucas Heights to the national radioactive waste repository.”

SPENT FUEL

There has been no serious attempt to consider:

- * non-reprocessing options for spent fuel (which would be preferable given the proliferation, environmental and safety concerns associated with reprocessing)
- * domestic management of spent fuel (NSC advice ignored by Loy).

It is not certain that overseas reprocessing/storage options will be available for the lifetime of the new reactor:

- * the agreement to send some spent fuel to the USA is time-limited (and it undermines the non-proliferation objective of the US spent fuel take-back program since the agreement does nothing whatsoever towards that objective). The agreement also breaches the principle frequently stated by the Australian government that each country should manage its own radioactive waste.
- * reprocessing options may become increasingly constrained because of broad concerns over reprocessing (e.g. the opposition to French and British reprocessing operations by European governments as expressed in OSPAR resolutions).
- * research reactor spent fuel reprocessing is further constrained, e.g. ANSTO acknowledged in its Draft reactor EIS (p.10-18): "Currently no facility is routinely reprocessing low enriched uranium research reactor fuels."

Argentina's constitution prohibits the importation of radioactive waste. Article 41 of the Argentinian National Constitution states: “The importation of current or potentially dangerous residues and radioactive wastes is prohibited.” So the contingency plan to send spent fuel to Argentina is a breach of that country’s constitution. Does ARPANSA subscribe to the fiction that spent fuel is not radioactive waste? As the 1993 Research Reactor Review (p.xxiii) said: "The pretence that spent fuel rods constitute an asset must stop."

Domestic spent fuel options need to be explored (as do non-reprocessing options), but again there are limitations, not least the legal ban on reprocessing in Australia under the ARPANS Act.

ANSTO is only too happy to dump its nuclear waste on others:

* e.g., ANSTO's plan to send more spent fuel to Dounreay came to grief in 1998. In March 1999, ANSTO's communications manager described Dounreay as a "dirty, broken-down old plant", yet ANSTO was keen to send as much spent fuel as possible to Dounreay.

* e.g., ANSTO support for plans to dump its waste in SA or the NT.

ANSTO said in its Draft reactor EIS (p.10-18): "In the unlikely event that the overseas options should become unavailable, it would be possible at short notice to take advantage of off-the-shelf dry-storage casks for extended interim storage at the national storage facility, pending renewed arrangements being negotiated for reprocessing/conditioning of the fuel."

However, DISR/DEST later stated unequivocally that spent fuel will not be stored at the planned LLILW store.

So what contingency plan is there in the event that overseas reprocessing/storage plans fall through?

This issue must be addressed by ARPANSA. If it is not possible to send spent fuel overseas, it appears the only 'interim' strategy is to leave the spent fuel at Lucas Heights ... which is illegal under the ANSTO Amendment Act. ARPANSA cannot justify issuing a reactor operating licence under these circumstances.

FINAL DISPOSAL OF LLILW

The government hopes to send spent fuel reprocessing wastes and other LLILW to the proposed NT 'facility' but has no plans for ultimate disposal.

A submission from the Nuclear Safety Bureau on ANSTO's Draft EIS stated that an acceptable strategy for the ultimate disposition of the replacement reactor fuel would be required before ARPANSA would authorise reactor construction. No progress has been made on ultimate disposal yet Loy has issued a reactor construction licence and now plans to issue a reactor operating licence.

The federal Department of the Environment and Heritage (1999 Environment Assessment Report) said, "It should be noted that the National Storage Facility would only provide for above-ground storage of some wastes. It would not constitute a final solution for disposal of long-lived intermediate-level wastes."

The Department of the Environment and Heritage stated: "The Department is of the view that it is now timely to consider strategies for the long-term storage and eventual permanent disposal of Australia's long-lived intermediate-level nuclear wastes, and associated issues. This would assist in facilitating public understanding and input into a 'solution' (if one exists), and in ensuring that a timely response is developed."

Subsequently, Condition #27 attached to the approval of the new reactor EIS is that "The Minister for Industry, Science and Resources and the Minister for Health should give timely consideration to strategies for the long term management and eventual permanent disposal of Australia's long-term intermediate-level nuclear wastes, and associated issues."

The Safety Evaluation Report attached to ARPANSA's issue of a licence to prepare a site for a new reactor states, "A licence to operate the reactor would not be issued by ARPANSA without there being clear and definite means available for the ultimate disposal of radioactive waste and spent nuclear fuel."

Obviously clear and definite means are not (yet) available for the ultimate disposal of radioactive waste and spent nuclear fuel, so the reactor operating licence application must be rejected.

3. DECISION-MAKING PROCESS

Eight years after the federal government announced its decision to build a new reactor, and still there has been no independent or rigorous analysis of the most fundamental questions:

- * does Australia need a research reactor?
- * do the benefits outweigh the financial and other costs and risks?

To date, ARPANSA has been complicit in this failure and the current licensing process provides one final opportunity for ARPANSA to thoroughly investigate the benefits, costs and risks. What is still required - after all these years - is a fully developed, fully-costed set of alternative programs to meet the objectives associated with the reactor. This will include a fully developed, fully-costed set of alternative programs and technologies for Lucas Heights.

The study should encompass:

- * future supply of medical radioisotopes, greater reliance on imported radioisotopes and/or accelerators and/or spallation sources and/or non-isotope-based medical procedures;
- * further development of scientific research infrastructure (e.g. accelerators, spallation sources, various other possibilities) and greater funding for suitcase science; and
- * national interest issues, e.g. greater funding for suitcase science to maintain reactor expertise; further development of non-reactor-dependent safeguards initiatives (e.g. diplomatic initiatives, accelerators for isotopic fingerprinting, etc.).

ENVIRONMENTAL IMPACT ASSESSMENT

"If it is normal for the proponent to tell the truth, but not necessarily the whole truth, then ANSTO's presentation is normal. Sometimes the difference between the truth and the whole truth is quite remarkable."

--- Tony Wood, Former Head, Engineering and Reactors, ANSTO, 1998, EIS submission.

The Environmental Impact Statement (EIS) was an expensive bureaucratic whitewash. The fact that ANSTO prepared the EIS is completely unacceptable given its vested interest in a new

reactor and ANSTO's demonstrated track record of secrecy and dishonesty. That this was within the parameters of the (then applicable) EPIP legislation does not make it any less farcical.

The Sutherland Shire Council (submission to 1997-99 Senate Economics References Committee) called on the Federal Government to put in place an environmental auditor to oversee the reactor EIS process. That call went unanswered.

ANSTO had millions of dollars of tax-payers' money to prepare the EIS whereas local residents and other opponents of the reactor plan had no funding whatsoever.

ANSTO hired PPK Environment and Infrastructure to help prepare the EIS. PPK was heavily criticised by an independent auditor during the Holsworthy airport EIS. The PPK project team has no expertise in nuclear sciences. PPK's "information stalls" were high farce: PPK distributed information on the EIA/EIS process but hardly any information on the reactor proposal per se. PPK refused to organise a public meeting at which both proponents and opponents would speak. PPK refused to publicly release research documents being produced by ANSTO and NNC (the sub-contractor) during the preparation of the Draft EIS.

ANSTO failed to respond to many questions during the EIS process. For example, Dr. Furzer's (Sydney University) submission on the Draft EIS notes that he twice asked ANSTO to supply four papers listed in the Draft EIS. The papers were not supplied and Dr. Furzer said his submission was "limited in scope" because of ANSTO's failure to supply information.

Another submission to the Draft EIS noted that a request to ANSTO for a tape of a radio debate featuring Helen Garnett was not met in time for it to be of use in making a submission on the Draft EIS. ANSTO was in possession of the relevant tape.

Any number of other specific examples could be provided to illustrate problems experienced by the public during the EIS process.

The fact that there was no opportunity for public comments to be made on the Final EIS was unacceptable.

THE REALPOLITIK OF THE SEPTEMBER 1997 DECISION TO BUILD A NEW REACTOR

The government's Public Relations strategy in relation to the proposed new reactor was explained by a senior government bureaucrat, based in Canberra, on Radio National's "Background Briefing" program (March 29, 1998, <www.abc.net.au/rn/talks/bbing/bb980329.htm>):

"The government decided to starve the opponents of oxygen, so that they could dictate the manner of the debate that would follow the announcement. Because they couldn't win it on rational grounds ... they decided, right, we'll play the game and in the lead up to the

announcement catch them totally unawares, catch them completely off-guard and starve them of oxygen until then."

A Department of Industry, Science and Tourism (DIST) briefing paper, dated April 1998, obtained by Sutherland Shire Council under Freedom of Information legislation, says: "There is "no point in consulting with potential/hypothetical recipients of a new reactor. It was discovered through the course of inquiry into the new airport that such a course of action serves only to inflame the communities for no good reason."

1997-99 SENATE ECONOMICS REFERENCES COMMITTEE INQUIRY

The government and ARPANSA have ignored the recommendation of the Senate Economics References Committee (1999) for a public inquiry into the reactor proposal.

The Committee's majority report said the decision to build a new reactor was "premature and open to ongoing controversy" because of the failure to carry out a public inquiry into the proposal, to properly investigate alternative sites, to take into account community views, and to resolve radioactive waste management issues.

The majority report also said that the decision "relied largely on the vested interests of the Australian Nuclear Science and Technology Organisation (ANSTO) and those involved in, and dependent on, the nuclear industry."

The majority report argued that no reactor should be constructed "until a permanent site for disposal of the Lucas Heights nuclear waste is determined."

The majority report recommended the establishment of a public inquiry "similar to the 1993 Research Reactor Review".

Report by the Senate Economics References Committee on a New Reactor at Lucas Heights, September 1999.

NO COST-BENEFIT ANALYSIS

The federal Department of the Environment and Heritage (1999, p.42), in its assessment of ANSTO's EIS, said, "The Department accepts that a formal cost-benefit analysis for the proposal is not appropriate, in view of the comprehensive analysis by the Research Reactor Review (RRR)."

The Department (1999, p.34) also said that the "The RRR undertook a comprehensive examination of costs and benefits of a new reactor."

However, the RRR (1993) said that "a complete cost-benefit analysis of the case for a new reactor could not be done because of the inescapable arbitrariness of the financial values put on the national interest and benefits from science aspects."

1999 PUBLIC WORKS COMMITTEE

Senator Minchin described the Public Works Committee as an "independent public inquiry". In fact, the Public Works Committee process was a rubber stamp and a complete waste of time. This can easily be confirmed by consulting the Committee's report, which merely parrots ANSTO propaganda and misinformation ad nauseum.

Public Works Committee (Parliamentary Standing Committee on Public Works), 1999, Report relating to the proposed Replacement Nuclear Research Reactor, Lucas Heights, NSW, Canberra: Parliament of the Commonwealth of Australia.

1999-2001 SENATE INQUIRY

A federal senate committee slammed the proposal in a report released on May 23, 2001. The majority report of the committee is a joint production of the Labor Party and the Democrats. The Democrats also wrote a minority report, taking a more critical line on the reactor project than the Labor Party, and a minority report from Liberal and National Party senators restated the government's support for a new reactor.

On the alleged need for a research reactor in Australia, the committee concluded that "... no conclusive or compelling case has been established to support the proposed new reactor and ... the proposed new reactor should not proceed."

The committee found that "the decision to build a new reactor was taken without a detailed investigation of Australia's present and future scientific and medical needs". It was not convinced that logistical difficulties constitute a serious obstacle to the importation of radioisotopes, and also noted the expanding medical and scientific applications of alternative technologies such as cyclotrons.

On the foreign policy agenda driving the Coalition government's plan for a new reactor, the committee found that "... the justification for the new research reactor solely on national interest grounds is not strong where national interest is defined on purely 'security' and non-proliferation grounds." The committee said the government's argument that a new reactor is required to facilitate nuclear disarmament and the implementation of nuclear safeguards is "tenuous".

The committee went on to say, "The argument for the new research reactor on national interest grounds is more convincing when all areas of nuclear technology are considered, including its role in the region as an educational, research and training centre. The Committee believes, however, that this reason alone is not sufficient to justify the new research reactor. If the reactor is to go ahead, then the main considerations in establishing the need for a reactor must be its place as a research tool providing a neutron source for Australian researchers and products for industry, the health care system and the potential impacts on the environment."

The committee recommended that before the government proceeds any further with the project it should establish an independent public inquiry into the alleged need for a new nuclear reactor and related issues such as funding for both medical and scientific research in Australia. The government rejected that recommendation on the same day the senate report was released.

The senate committee was particularly critical of the Coalition government and ANSTO for their secrecy. It said: "The Committee is highly critical of ANSTO's attitude which seeks to make a parliamentary committee subordinate to the whims of a government agency and prevents that committee from exercising its responsibility to scrutinise the executive. The Committee therefore appreciates the frustration experienced by the Sutherland Shire Council and members of the public who have experienced a similar attitude."

The report also states, "The Committee is highly critical of ANSTO's approach to providing documents. Its attitude seems to stem from a culture of secrecy so embedded that it has lost sight of its responsibility to be accountable to the Parliament."

Even Liberal and National Party senators conceded that point, accepting "... that ANSTO could have been more helpful in providing certain less commercially sensitive information to the Committee and could have been more willing to seek a compromise when sensitive material was involved."

The committee recommended that Senator Nick Minchin, the then minister for industry, science and resources, should be censured for his refusal to comply with an order of the senate to table various documents relating to project including the reactor contract between ANSTO and the Argentinean company Invap, and the spent fuel reprocessing contract between ANSTO and the French company Cogema.

The committee recommended that the Australian National Audit Office "consider examining the tender and contract documents for the new reactor" with a view to determining whether documents sought by the committee and the senate should be made public; whether the cost estimate for the reactor is accurate; and whether, during the tendering process, ANSTO ensured that there was adequate and appropriate independent verification and validation of the tenderers' claims.

The committee also expressed numerous concerns about the failure of ANSTO and the federal government to put in place plans to manage radioactive wastes arising from the existing HIFAR reactor or the planned new reactor.

Longer summary of the Senate report at <<http://www.geocities.com/jimgreen3/senate3.html>>

The senate report can be downloaded at
<http://www.aph.gov.au/senate/committee/lucasheights_ctte>.

ARPANSA APPROVES REACTOR CONSTRUCTION - APRIL 2002

ARPANSA CEO John Loy, approved construction of the new reactor on April 5, 2002. The approval came as no surprise - so much so that the Associated Press and The Australian reported it before it had even taken place.

ARPANSA has a statutory requirement to establish a net benefit before issuing nuclear licences. A perfect opportunity to redress the government's failure in this regard. However Dr Loy chose to define net benefit in such a narrow way as to preclude any redress of the government's failure to thoroughly and independently evaluate the cases for and against a new reactor. Specifically, Dr Loy chose - arbitrarily - to limit consideration of costs/risks to radiological exposure.

Dr Loy back-tracked from previous 'commitments' that a licence to construct a reactor would not be issued unless ANSTO demonstrated progress on radioactive waste management.

4. ALLEGED 'NEED' FOR REACTOR / NET-BENEFIT ANALYSIS

Summary

- * most of the work at ANSTO's Lucas Heights facility does not depend on the operation of a reactor.
- * a good case can be made for greater investment in non-reactor technologies/programs at Lucas Heights.
- * pursuit of a non-reactor future for ANSTO offers several advantages, including a large reduction in the generation of radioactive waste.

Most of ANSTO's activities do not depend on the reactor:

- * Prof. Geoffrey Wilson analysed ANSTO's program expenditure and found that in 1991-92, reactor-dependent research cost \$8.35 million (31%), reactor-independent research cost \$18.45 million (69%). (Research Reactor Review, 1993, Appendix 1, pp.31-32, 41-43.)
- * Drawing on ANSTO's 1992-93 Program of Research, former ANSTO scientist Murray Scott concluded that the HIFAR and MOATA reactors were used in 8 of 17 projects. In person-years this amounted to 45/215 or 21%. The figure fell to 14% when the adjacent CSIRO facilities were included. (Submission to 1993 Research Reactor Review.)

Advantages of a non-reactor future at Lucas Heights

A good case could be made for further investment in non-reactor technologies if HIFAR is permanently shut down without replacement. These alternatives include particle accelerators (linear accelerators and cyclotrons), possibly spallation technology, safeguards projects using particle accelerators, etc etc. This would open up a win-win scenario:

- * few if any job losses (possibly more jobs)
- * broadly equivalent (perhaps greater) benefits for medicine and science
- * advantages in relation to 'national interest' / non-proliferation objectives
- * a large reduction in radioactive waste generation (and no more generation of spent nuclear reactor fuel)

- * less contentious management of existing waste stockpiles in the context of a serious attempt to minimise waste production by the closure and non-replacement of HIFAR
- * public support for ANSTO instead of division and hostility
- * public and occupational health and safety advantages (e.g. there have been no fatal cyclotron accidents, but at least five fatal research reactor accidents).

Research reactors are yesterday's technology

"The future direction of nuclear medicine lies with cyclotron produced products and accelerators. ... Labor remains unconvinced of the arguments for the need for a new reactor and believes it is completely inappropriate for a reactor in suburban Sydney at Lucas Heights. ... The Howard Government has committed more than \$300 million for the new Argentinian designed reactor. This is not the best investment of that money. It is the wrong way forward for Australian nuclear science." (Joint media release by then Shadow Ministers Martyn Evans, Jenny Macklin, and Nick Bolkus, 4/11/01.)

Over half of all research reactors ever built have been closed and the number in operation continues to decline. For example, according to the IAEA, there were 297 in operation in December 1994 but only 265 in May 1998, i.e. 32 permanent shut-downs in 3.4 years or almost 10 annually. Conversely, the number of cyclotrons in operation continues to increase.

Some multipurpose research reactors are being replaced by reactors, but most are not being replaced or are being replaced by non-reactor technologies. To give a few examples:

- * plans for a new research reactor in the USA were scrapped in favour of a spallation source.
- * in the USA, plans to resume production of the important medical isotope molybdenum-99 were scrapped in favour of ongoing reliance on imported Mo-99.
- * Belgium is planning to replace a research reactor with a spallation source.

Jobs at Lucas Heights

Staff numbers at Lucas Heights peaked at 1354 in 1976. Staffing has fallen to the current level of about 750-800 despite the operation of the HIFAR reactor throughout this period. The new reactor will not ensure job security for ANSTO employees. History suggests that staff cuts and cuts to program funding will partially fund the \$300 million new reactor. Staff cuts are all the more likely if/when cost blow-outs associated with the new reactor project begin to bite.

Alternatives to a domestic reactor for medical isotope supply

Ongoing reliance on existing cyclotrons in Australia, plus a greater reliance on imports, is a perfectly viable alternative to a domestic reactor. This option is tried and tested whenever the HIFAR reactor is shut down for extended periods for maintenance.

The only problem with greater reliance on imported reactor-produced isotopes is that it leaves other countries to address the waste legacy. Therefore, a R&D program should be initiated to reduce reliance on imports in favour of non-reactor technologies, esp. particle accelerators

including cyclotrons. Important in this regard is a paper by nuclear physicist Dr. Robert Budnitz, and energy and technology consultant Dr. Gregory Morris (the report is at: www.geocities.com/jimgreen3/medicine5.html). The report argues that "importation of radioisotopes and more extensive use of accelerators for isotope production represent a viable alternative to the building of a new reactor in Australia." The report argues that this approach would have several benefits when compared with the plan for a new reactor, including reduced generation of radioactive waste, possible cost benefits, similar or better employment prospects, and better intellectual property opportunities (arising from the development of accelerator/cyclotron technology).

Specifically, the Budnitz/Morris report argues that Australia ought to pursue a R&D project into accelerator/cyclotron production of technetium-99m (the most commonly used medical isotope): "Development of accelerator based production of Tc-99m would probably require a one-to-two year effort involving several person-years of work, and a few million dollars of investment. The pay-off would be that Australia would develop and possess valuable expertise in a nearly radioactive waste and proliferation free route to the production of the world's medically most important radioisotope."

Serious pursuit of a R&D program along the lines suggested by Budnitz and Morris would probably require investment of a medium-sized research cyclotron, and a good case could be made for locating it at Lucas Heights given the concentration of Australia's nuclear expertise there. The only other cyclotron of potential value for this R&D program is the National Medical Cyclotron in Sydney, but the NMC is already overstretched with its existing isotope-production role.

Closure and non-replacement of the HIFAR reactor might also free up resources - and generate political momentum - for the more rapid spread of small PET cyclotrons (costing a few million dollars each) for the production of short-lived isotopes for use in Positron Emission Tomography (the cutting-edge of nuclear medicine). Currently there are two PET cyclotrons in Melbourne and one is being built in Perth.

More information on medical isotope production and supply options at: www.geocities.com/jimgreen3. See especially the detailed paper "Medical Radioisotope Supply Options for Australia".

Alternatives to a domestic reactor for scientific research

In his approval of a reactor construction licence application, ARPANSA CEO John Loy questioned the need for a reactor to produce medical isotopes, but supported the case for a reactor on scientific research grounds. Dr Loy made no effort whatsoever to justify his assertion regarding the scientific research issues, nor did he point to supporting literature.

It has long been predicted by ANSTO-watchers that scientific add-ons would be sacrificed in order to cut costs, and this prediction has been vindicated as the project has progressed.

HIFAR's contribution to scientific research has been modest, at best. See the comments by Professor Barry Allen (former Chief Research Scientist at ANSTO), former ANSTO scientist Murray Scott, Professor Ian Lowe, the 1993 Research Reactor Review and others at <www.geocities.com/jimgreen3/science2.html>.

Even a more powerful, new reactor will be well down the global list (e.g. comparing neutron flux) and simply won't be capable of 'world class' research despite the government's claims to the contrary.

There is little scientific support for a new reactor beyond the small number of scientists with a direct interest in neutron beam research. There would be still less scientific support if not for the government's highly-questionable insistence that science funding has not been reduced to pay for the reactor. As then Shadow Science Minister Martyn Evans said in 1997, "The money should have been competitively offered and judged against other needs for science." ('Search' science magazine, 1997, Vol.28(10), p.296.)

In relation to the question posed by the Terms of Reference, whether the science at ANSTO is of sufficient distinction and importance to Australia to warrant a new reactor, the 1993 Research Reactor Review said (ch.6): "The Review is not convinced that that is the case - at least not yet. ... Nobody advanced the view that Australian scientists working at HIFAR are at the cutting edge of science. ... a picture of a vibrant field of science, energised by young people excited by the challenges and opportunities, did not emerge. ... The Review was not even convinced that (reactor-based) science has been a major focus of ANSTO activity. The full flowering of recent vigour might not be evident yet in publications, but at present the case for a new reactor on science grounds cannot be sustained, however compelling the need for such science."

There are several alternatives to a new reactor for scientific research, including particle accelerators, spallation sources, synchrotron radiation sources, and suitcase science (i.e. funding for Australian scientists to access overseas facilities). In all cases, the alternatives are preferable to a reactor in relation to radioactive waste and safety. Claims that synchrotron, accelerator and spallation facilities complement (but cannot replace) reactors understate the extent to which different facilities can be used for identical or similar applications. Alternatives to a new reactor were not properly evaluated prior to the September 1997 decision to fund a new reactor.

The science issues are dealt with in depth at:
<<http://www.geocities.com/jimgreen3/science2.html>>

Alternatives to a domestic reactor for national interest / foreign policy objectives:

ANSTO is involved in useful environmental sampling safeguards work - but this uses ANSTO's tandem accelerator, not the reactor. No doubt there is scope to increase ANSTO's involvement in safeguards work using accelerators and other non-reactor technologies. And of course non-proliferation and disarmament objectives are fundamentally political/diplomatic in nature (e.g. expanded IAEA inspection rights), not technical.

The HIFAR reactor is of little or no direct value in pursuing non-proliferation objectives. It has been used for a video monitoring safeguards project, but of course that project could have easily been carried out elsewhere. Whatever advantages stem from training scientists on a domestic reactor i) are minimal, ii) can be compensated for by overseas training, and iii) are negated by a range of problems which also stem from the operation of a reactor in Australia.

The operation of a reactor compromises Australia's capacity to pursue non-proliferation / disarmament objectives in several ways:

* For example, it creates a political imperative to downplay the proliferation risks associated with research reactors and associated technologies. Research reactors are used to produce plutonium for the nuclear arsenals of India and Israel, and research reactors have been used in support of covert weapons programs (some systematic, some preliminary) in 20+ countries - see <www.geocities.com/jimgreen3/rrweapons.html>. The government's argument that building a new reactor will assist with non-proliferation objectives is circular, foolish and may be setting a dangerous new precedent.

* Ongoing generation of spent nuclear fuel (SNF) creates a political imperative to downplay the proliferation and safety risks associated with SNF reprocessing. This contradiction is most acute for SNF from HIFAR, which contains highly-enriched uranium (DFAT has said that reprocessing HEU-SNF is "contrary to sound non-proliferation principles") but also applies to the new reactor.

There is no direct connection between the operation of a reactor and Australia's place on the Board of Governors of the IAEA. In any case the IAEA position raises numerous problems, not least the active role played by the IAEA in the promotion of dual-use nuclear technologies. The 1993 Research Reactor Review said that there "was no evidence before the Review sustaining the view that permanent membership of the Board of the IAEA is crucial to advancement of Australia's national interest" and that there might even be advantages in not being so closely identified with some of the IAEA's stances (p.xix, pp.100-103).

Cancellation of the plan for a new reactor, and pursuit of non-reactor technologies for medicine, science and safeguards work opens up another potential benefit: Australian promotion of non-reactor technologies in the Asia Pacific region. The development and promotion of non-reactor technologies would represent a useful, if modest, non-proliferation initiative.

A detailed paper on the 'national interest' issues, written by Jean McSorley, is at <www.geocities.com/jimgreen3/mcsorley.html>.

5. MEDICAL ISOTOPES

SUMMARY

Instead of reliance on a domestic reactor, the following strategy can be used for the supply of medical isotopes:

1. Greater reliance on imported radioisotopes

2. Ongoing use of existing cyclotrons in Australia
3. Further research into non-reactor radioisotope production technologies (esp. cyclotrons) with the aim of reducing demand for imported, reactor-produced radioisotopes; and
4. Ongoing and possibly greater use of alternative clinical modalities such as Magnetic Resonance Imaging, Computerised Tomography, and Ultrasound.

None of the four strategies alone will suffice, but combined, they are more than adequate. That point needs emphasis because proponents of a new reactor often jump from a critique of just one of the four proposed strategies to the false conclusion that a new reactor is required.

The above strategies are tried and tested, so there is no risk involved in closing the existing reactor without replacement.

* Over 250 cyclotrons are being used for medical isotope production in 34 countries (including three in Australia).

* Many countries - including Australia - routinely import isotopes.

* Alternative clinical modalities are well advanced - in fact nuclear medicine is the least frequently used of the diagnostic imaging modalities (99% of nuclear medicine is diagnostic; 1% is for therapy/palliation).

That the closure and non-replacement of the HIFAR reactor at Lucas Heights would have little or no impact on nuclear medicine has been confirmed during extended maintenance shut-downs of the HIFAR reactor. For example, there was no evidence of disruption to isotope supply during the February-May 2000 shut-down of HIFAR - a fact confirmed by ANSTO scientists. Isotopes usually produced at Lucas Heights were simply imported. In fact the President of the ANZ Association of Physicians in Nuclear Medicine was not even aware of the shut-down of HIFAR - and he certainly wasn't the only one.

IMPORTATION OF MEDICAL ISOTOPES

The major global radioisotope suppliers have the capacity to supply world demand several times over. The supply chains, technologies (e.g shielding), and regulatory apparatus for international isotope trade are in place. Several organisations around the world have experience and expertise in the establishment of long supply lines; for example, the Canadian company MDS Nordion exports isotopes to over 60 countries. More than three-quarters of all nuclear medicine procedures carried out around the world use imported radioisotopes. Countries largely reliant on imported radioisotopes include advanced industrial countries such as the United States, Britain, and Japan; in these countries nuclear medicine is widely practised and technically sophisticated despite the heavy reliance on imported radioisotopes.

About 20% of the isotopes used in Australia come from a range of overseas suppliers; this figure jumps to about 80% during shut-downs of the HIFAR reactor at Lucas Heights. ANSTO has acknowledged that "it is possible to import many isotopes". The government and ANSTO have never produced a shred of evidence to justify claims that importation is unreliable.

CYCLOTRONS

Cyclotrons belong to a class of machines called particle accelerators, electromagnetic devices that accelerate charged particles to enormous velocities. The particles can then be directed to hit a target and thus produce radioisotopes. Because they are powered by electricity rather than the uranium fission reaction of a nuclear reactor, cyclotrons have three important advantages over research reactors: i) far less radioactive waste (and no spent nuclear fuel); ii) greater safety (no fatal cyclotron accidents; at least five fatal research reactor accidents); and iii) no risk of misuse of cyclotrons in covert weapons programs (c.f. use of 'research' reactors for plutonium production in India and Israel).

There are several reasons for the growing use of particle accelerators (especially cyclotrons) for medical isotope production, in particular growing interest in procuring functional, biochemical information. Technical advances have expanded the range of isotopes that can be produced with accelerators, and they have enabled more efficient, reliable, and economical production.

About 20% of nuclear medicine procedures in Australia use cyclotron-produced isotopes. Almost all of these isotopes are produced in the three cyclotrons in Australia: the National Medical Cyclotron in Sydney, and two much smaller cyclotrons in Melbourne which produce short-lived isotopes for Positron Emission Tomography. A small PET cyclotron is being built in Perth.

The Australian and New Zealand Association of Physicians in Nuclear Medicine acknowledges that "many of the reactor-produced isotopes have been made in cyclotrons". There are several examples of useful radioisotopes now produced in cyclotrons which used to be produced only in reactors. A recent example is palladium-103, used in cancer therapy. Reactor supply dried up, so scientists in the USA took up the challenge and successfully developed a cyclotron method to produce palladium-103. Problem solved.

CYCLOTRON PRODUCTION OF TECHNETIUM-99m

About 75% of all nuclear medicine procedures use the radioisotope technetium-99m. There are several methods of producing Tc-99m in cyclotrons. Cyclotron production of Tc-99m has been demonstrated, but further work needs to be done to resolve issues such as yield, cost etc. A strong case for pursuing R&D along those lines in Australia has been made by nuclear physicist Dr. Robert Budnitz and energy and technology consultant Dr. Gregory Morris (their report, 'Alternatives to a 20 MW Nuclear Reactor for Australia', is at: www.geocities.com/jimgreen3/medicine5.html).

The Budnitz/Morris report argues that Australia ought to pursue a R&D project into accelerator/cyclotron production of technetium-99m (the most commonly used medical isotope): "Development of accelerator based production of Tc-99m would probably require a one-to-two year effort involving several person-years of work, and a few million dollars of investment. The pay-off would be that Australia would develop and possess valuable expertise in a nearly radioactive waste and proliferation free route to the production of the world's medically most important radioisotope."

For Tc-99m (half life 6 hours) and its parent molybdenum-99 (half life 66 hours), the immediate option is importation of bulk Mo-99 with Mo/Tc generator manufacture at Lucas Heights. This is a tried and proven strategy, e.g. during the reactor shutdown from February to May 2000. About two-thirds of all nuclear medicine procedures in the world use Tc-99m drawn from bulk supplies of imported Mo-99.

In the longer term (with timing depending entirely on the availability of R&D funding), non-reactor options for Mo-99/Tc-99m production include:

- * electron accelerator, Mo-100 target, separation of Tc-99m (Bennett et al., Idaho N.E.E.L.)
- * cyclotron, Mo-100 target, separation of Tc-99m (Lagunas-Solar et al., University of California)
- * hybrid cyclotron/spallation system, uranium target, Mo-99 production (Myrrha-Adonis, SCK-CEN, Belgium).

PRIME MINISTER'S PRE-ELECTION MISINFORMATION

Before the 2001 federal election, Prime Minister John Howard made some grossly exaggerated - and unsubstantiated - claims about the importance of HIFAR and the planned new reactor for medical isotope supply. Howard claimed that: "If the Lucas Heights reactor is closed, we will lose a capacity to supply up to one-third of the radioisotopes used for cancer treatment in Australia." Rubbish. Hardly any of the isotopes used in nuclear medicine - for cancer treatment or other purposes - would no longer be available. A range of alternatives are available to cover for the tiny fraction of isotopes that would not be available, including alternative isotopes and alternative diagnostic imaging modalities (MRI, CT scans etc.). My attempts to ascertain the evidence for the PM's claim were ignored for over five months, and the belated attempt to justify the claim was disingenuous. For example, the government claimed that importation of molybdenum-99 and yttrium-90 would be "problematic", but ANSTO states in its draft reactor EIS (p.6-11--6-13) that "importation for routine clinical use [is] possible" for those isotopes. Yttrium-90 has been imported, and molybdenum-99 is imported every week (from Europe). More info on the PM's misinformation at: <www.geocities.com/jimgreen3/medicine6.html>.

UPDATE - APRIL 2005 ARTICLE

Summary by Physicians for Social Responsibility (US) of an April 2005 paper entitled "Production of Mo-99 in Europe: Status and Perspectives," by Henri Bonet and Bernard David of IRE (a major producer of medical isotopes):

* Nordion's current production is 40% of current world demand. The firms IRE and Mallinckrodt (Tyco-Healthcare), at Petten and BR-2, together currently produce 39 percent of current world demand. But their peak capacity production is 85 percent of current world demand. That means that IRE and Mallinckrodt, by themselves, could more than replace Nordion's entire current production.

* In addition, the Safari reactor in South Africa currently produces 10 percent of current world demand. But its peak capacity is 45 percent of current world demand. That means that the South African reactor, by itself, could almost entirely replace Nordion's entire current production.

* A final illustrative statistic is that worldwide peak capacity production today is 250% of current world demand. So, we do indeed have a surplus of production capacity. Worldwide production capacity is more than twice worldwide demand.

MORE INFORMATION ON MEDICAL ISOTOPES

Detailed research - plus references to the medical and scientific literature, at www.geocities.com/jimgreen3/#isotopes. See especially the detailed paper "Medical Radioisotope Supply Options for Australia".

SOME QUOTES ON THE MEDICAL ISOTOPE DEBATE

"The real agenda [behind the plan for a new reactor] has nothing to do with science or medicine; it's international politics."

--- ANSTO's medical research director Bill Burch (pers. comm, 1997 - before he took up the ANSTO job).

"I don't believe it will make much difference to patient treatment whether we have a new reactor or not."

--- Dr. Alan Zimmet, cancer specialist, who noted that many radioisotopes are imported and some hospitals produce their own with accelerators. (The Australian, 5/11/01.)

"I do not know exactly why the strategic thinkers within ANSTO pushed the radiopharmaceutical line [to justify a new reactor]. They would have been aware that the case was not entirely solid."

--- Former head of a nuclear medicine department in a capital city teaching hospital (pers. comm.)

"Probably not life threatening. I think that's over-dramatising it and that's what people have done to win an argument. I resist that."

--- Dr. Geoff Bower, then President of the Association of Physicians in Nuclear Medicine, when asked if it would be a life threatening situation if Australia did not produce medical isotopes locally. (ABC JJJ radio, 3/12/98.)

Professor Barry Allen, former Chief Research Scientist at ANSTO, Fellow in the Department of Pharmacy at the University of Sydney, Head of Biomedical Physics Research at the St. George Cancer Care Centre, and author of over 220 publications:

* "(The new) reactor will be a step into the past (It) will comprise mostly imported technology and it may well be the last of its kind ever built. Certainly the \$300 million reactor will have little impact on cancer prognosis, the major killer of Australians today. In fact, the cost of replacing the reactor is comparable to the whole wish list that arguably could be written for research facilities by the Australian Science, Technology and Engineering Council." ('Search' science magazine, October 1997)

* "It's reported that if we don't have the reactor people will die because they won't be getting their nuclear medicine radioisotopes. I think that's rather unlikely. Most of the isotopes can be

imported into Australia. Some are being generated on the cyclotron. But on the other hand a lot of people are dying of cancer and we're trying to develop new cancer therapies which use radioisotopes which emit alpha particles which you cannot get from reactors. And if it comes down to cost-benefit, I think a lot more people will be saved if we can proceed with targeted alpha cancer therapy than being stuck with the reactor when we could in fact have imported those isotopes." (ABC Radio National, Background Briefing, 29/3/98)

* "One couldn't escape the conclusion that because you can't generate alpha-emitting radioisotopes [for medical therapy] on a reactor, then it wasn't core ... business of ANSTO. The question is really what the tax-payer of Australia wants. Do they want new therapies or do they want the reactor to be the centre of all research." (ABC Radio National, Background Briefing, 29/3/98)

* "What worries me is that it might have an impact on the scientific development of new directions for the 21st century because at ANSTO for instance it will certainly require a lot of focussing of research to utilise the new reactor. That's absolutely inevitable. Nobody builds a \$300 million new reactor and then lets people do non-reactor-based research. So there's really two aspects of it. There's the dollar cost and then there's the redirection of research interests into areas where the potential is already known I would say." (ABC Radio National, Background Briefing, 29/3/98)

* "There's nothing intrinsically wrong with the new reactor; it's just that it's too late and it's not taking us in the new directions we should be going." (ABC Radio National, Background Briefing, 29/3/98)

* "The thing that worries me is that a lot of money is being spent on this reactor which will not advance our ability to develop new methods and new techniques. The reactor will continue to produce isotopes which we've been using in the last 10, 20 years. ... [T]here are some accelerator sources which could produce different types of isotopes. The type that I'm working with now are called alpha-emitting isotopes and they are really very difficult to produce on a reactor, but they do offer new opportunities and new potential for improved cancer therapy methods. Most of the reactor isotopes are good for diagnosis and imaging but not so good for therapy, so the search is really for improved isotopes which will give better therapeutic results." (ABC Radio National, 'PM', 13/7/00.)

"The reactor HIFAR will be shut down from 7 February to 1 May, 2000. ANSTO's radioisotope production has suffered no dislocation as a result of the shutdown, since bulk supplies of radioisotopes are purchased from the big international players in Canada and South Africa. Indeed it is understood that we can purchase bulk supplies of radioactive molybdenum (ANSTO's major seller in the form of a 'generator') from one supplier more cheaply than ANSTO can produce it. If HIFAR was so essential to the supply of radioisotopes why has there been no effective production dislocation during the shutdown."

-- ANSTO "Staff Representing Truth in Science", letter to Sutherland Shire Councillor, 3/4/00.

"We understand that ANSTO has been obtaining supplies of samarium from South Africa since the HIFAR shutdown in February with no dislocation, this isotope is usually manufactured by ANSTO. It is further understood that ANSTO has stopped its importation of samarium from South Africa to "prove" the need for a new reactor. If this is the case it would appear that ANSTO is orchestrating its own circumstances to ensure a new reactor." (Note: ANSTO

management says that ANSTO imported samarium during the early stages of the three-month reactor shutdown, but the imported product - presumably from South Africa - was of poor quality and it was too expensive. ANSTO management refused my request for independently-verifiable information on these claims.)

-- ANSTO "Staff Representing Truth in Science", letter to Sutherland Shire Councillor, 3/4/00.

"For a guaranteed high standard of nuclear medicine practice, a reliable supply of diagnostic and therapeutic radioisotopes from a new research reactor at Lucas Heights is vital."

-- Dr Barry Elison, President of the Australian & New Zealand Association of Physicians in Nuclear Medicine, press release, 13/6/00. In July 2000, when asked how doctors coped during the 3-month shut-down of the HIFAR reactor from February-May 2000, Dr. Elison admitted he was not aware that the reactor had been shut down ...

Dr. Khafagi, a nuclear medicine specialist and a member of the ANSTO Board made the following comment about nuclear medicine in the ANZ Nuclear Medicine journal in 1992: "... thorough evaluation of the only meaningful end-point - patient outcome - is scanty."

Evidence given by a nuclear medicine specialist, Dr. Harvey Turner, to the 1993 Research Reactor Review, pointed to non-commercial, non-medical aspects of the isotope market in Australia. Dr. Turner said that, in Western Australia, there was strong competition between ANSTO and foreign suppliers for supply of a number of isotopes. According to Dr. Turner, the Australian products were of inferior quality. Dr. Turner said: "Western Australia, for purely chauvinistic reasons, elected to go with the ANSTO product, because there was a threat that, if they did not have a market, they would close down their production facility for isotopes in Australia. ... In fact, the multinational companies were considering legal action under the Trade Practices Act, because they considered that what we were doing was not in the interest of freedom of trade and, indeed, I guess it was not". (Research Reactor Review, Transcript of Proceedings, Public Hearing, Perth, 23/3/99, p.780.)

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Medical Association for Prevention of War, Australia
Australian affiliate of International Physicians for Prevention of Nuclear War
Media release - 13 September 2004

Sydney Nuclear Reactor should not be Licenced: Doctors

A leading group of Australian doctors has called for an end to plans for a new nuclear reactor in Sydney, labelling the move as unnecessary, unsafe and a threat to Sydney residents. The call comes as ANSTO has moved today to seek an operating licence for the controversial reactor in Sydney's southern suburbs.

The ANSTO application is expected to be widely challenged given that there is no proven means to manage radioactive waste from the reactor. The federal ALP has stated that it will defer

consideration of any application and instead hold a public Inquiry into the reactor plan should it be elected at the coming federal election

A recently released report *A New Clear Direction: Securing Nuclear Medicine for the Next Generation*, by Medical Association of the Prevention of War (MAPW) has highlighted that claims about the medical importance of the new reactor are exaggerated and emotive.

“Our assessment is that a new reactor is simply unnecessary,” said Associate Professor Lou Irving, a leading respiratory physician. “Instead of building a dangerous new nuclear reactor in the growth suburbs of Australia’s biggest city, we can use a mixture of imports, non-reactor isotope production, innovation and advanced new technologies.”

“A new reactor would cost more than \$350 million and pose a serious environment and security risk. On top of this it produces radioactive waste for which we have no credible management plan. Without a clear way to manage the waste it is not acceptable to produce more.”

The *New Clear Direction* report examines the important role played by Australia’s nuclear medicine sector and clearly outlines why the planned new reactor is not needed. It highlights the growth in non-reactor based medical technology and how alternative production and sourcing options can ensure secure access to nuclear medicines. It offers a way ahead for a world-class nuclear medicine sector without the serious security, environmental, cost or radioactive waste impacts of having a nuclear reactor in the suburbs of our largest city.

Download the ‘*New Clear Direction: Securing Nuclear Medicine for the Next Generation*’ report:

<www.mapw.org.au>

<www.mapw.org.au/nuclear-reactors/New_Clear_Direction.pdf>

6. ARPANSA’S FAILURES AND LACK OF INDEPENDENCE

In Australia in the late 1990s, the federal government deliberately undermined the independence of the newly-created regulatory agency ARPANSA by allowing the then CEO of ANSTO to sit on the panel which interviewed applicants for the position of CEO of ARPANSA. While John Loy obviously was not responsible for the federal government’s decision to undermine ARPANSA’s independence, he has a statutory responsibility to guard ARPANSA’s independence and thus a responsibility to comment critically on the government’s action and to ensure it is not repeated.

The Australian National Audit Office (ANAO, 2005) has written a report critical of many aspects of ARPANSA's operations. The Audit Office's overall conclusions were as follows:

"The ANAO concluded that improvements are required in the management of ARPANSA's regulatory function. While initial under-resourcing impacted adversely on

regulatory performance, ARPANSA's systems and procedures are still not sufficiently mature to adequately support the cost-effective delivery of regulatory responsibilities.

"In particular, deficiencies in planning, risk management and performance management limit ARPANSA's ability to align its regulatory operations with risks, and to assess its regulatory effectiveness.

"As well, procedures for licensing and monitoring of compliance have not been sufficient, particularly as a licence continues in force until it is cancelled or surrendered. Current arrangements do not adequately support the setting of fees in a user-pays environment, nor ARPANSA's responsibilities for transparently managing the potential for conflict of interest."

Australian National Audit Office, March 2, 2005, "Regulation of Commonwealth Radiation and Nuclear Activities: Australian Radiation Protection and Nuclear Safety Agency", Audit Report No.30 2004–05,

<www.anao.gov.au/WebSite.nsf/Publications/CBC2DCF7CEB0EBFBCA256FB700792A8E>.

Excerpts from Friends of the Earth's April, 2004 submission to Australian National Audit Office on the failures of ARPANSA:

Flaws in the ARPANS Legislation

A number of criticisms of the ARPANS Bill were made in a June 1998 paper by lawyer Tim Robertson (from Frederick Jordan Chambers) prepared for the Sutherland Shire Council, e.g.:

- * the Bill did not answer site-specific questions concerning the immunity of the ANSTO site from State environment, health and safety laws.
- * the regulatory framework which the Bill established was not accountable, transparent, or fully independent.
- * all regulatory functions are vested in the CEO not the Agency.
- * the Bill provided wide exemptions for anything done for national security or defence purposes in relation to nuclear material or installations. Amorphous concepts such as reasonable likelihood of prejudice to national security or defence are the basis for refusing to abide by the CEO's direction or licence:
"... ANSTO can simply refuse to obey any directive of the CEO and any condition of a facility licence because it holds to the belief that to obey may be prejudicial to national security and defence."

The ARPANS Act contains all the flaws identified in the ARPANS Bill by Mr. Robertson.

There are a number of other flaws in the ARPANSA Act, e.g.:

- * only the applicant can challenge a licence decision. Applicants can challenge decisions from the CEO of ARPANSA to reject a licence application, to impose conditions on a licence, to suspend, cancel or amend a licence, or to refuse to approve the surrender of a licence. Appeals are lodged with the Minister who is empowered by the ARPANS Act to override decisions made by the CEO of ARPANSA. Applications may be made to the Administrative Appeals Tribunal for review of a decision of the Minister to confirm vary or set aside the licence decision.

* there is provision in the legislation for a representative of a licensed agency to play a role in the selection of the CEO of ARPANSA (hence Helen Garnett's inclusion on the panel which interviewed applicants for the ARPANSA CEO job).

* provisions for meaningful public consultation are lacking in the legislation.

* Section 83 of the ARPANS Act allows for a law of a State or Territory to be prescribed such that it does not apply to the activities of controlled persons under the Act. In other words, the ARPANS Act can be used to override state/territory legislation prohibiting legislation, such as the South Australian Parliament's legislated prohibitions on the establishment of a national radioactive waste repository, or a national long-lived intermediate-level waste store, being sited in SA.

Senate Select Committee Recommendations

The 2001 Report of the Senate Select Committee for an Inquiry into the Contract for a New Reactor stated:

10.1 The Committee finds that the provisions for public consultation in the ARPANS Act leave many questions unanswered. Although the present CEO, Dr John Loy, has indicated that he intends to follow a comprehensive process of public consultation, the Committee is uneasy that this is left to the judgement of the CEO rather than being legislatively guaranteed. The Committee would like to see the requirement for public consultation strengthened and made explicit in legislation and the process clearly defined.

10.2 The Committee notes that there is currently a review of the ARPANS legislation being conducted as part of the National Competition Policy. This will deal with a number of matters outside the scope of this inquiry, including the continuing problems of variations between the states on nuclear regulatory matters. However this review could raise significant issues of relevance to the current inquiry and there is a need to ensure the ARPANS legislation review is completed before any further commitments are made about the proposed new reactor at Lucas Heights.

10.3 In relation to the new research reactor project, the Committee understands that the licensing process will probably be well under way before any such changes to the legislation could be put in place. Further, it notes Dr Loy's commitment to extensive public consultation.

Recommendation

Nonetheless, the Committee recommends that, if the new research reactor project is to go ahead, the Government put in place a number of mechanisms to ensure that full and thorough public scrutiny of the proposal takes place during the licensing process. This is to ensure, to the greatest extent practicable, that the construction and operation of the proposed reactor would not adversely affect the health of the community or damage the environment. At a minimum, these mechanisms must include: publication of all submissions made to ARPANSA; publication of ARPANSA's responses to concerns raised in these submissions, detailing in what way those concerns have affected the CEO's decision; release of the full details of the design and the construction contract except for those items which are determined as truly commercial-in-confidence.

10.4 The Committee is of the opinion that the licence applications for the new reactor should be subject to a similar process of judicial public hearings as occurs in the United States. This will ensure world's best practice and allow for greater public involvement.

Recommendation

Given that there are doubts about privilege and the powers of such an inquiry to obtain documents because the ARPANS Act is silent on these issues, the Committee recommends that the Government appoint a panel including the CEO of ARPANSA under other legislative powers to conduct the inquiry.

Recommendation

The Committee further recommends that, in the longer term, the Government undertake a public review of the kinds of public consultation process required in other jurisdictions and in relation to other proposals with public health and environmental implications. The object of such a review should be to determine best practice and to amend the ARPANS Act accordingly.

Maralinga 'clean-up'

ARPANSA's 29/2/00 letter to Senator Minchin, the Minister for Industry, Science and Resources regarding the Maralinga rehabilitation, said, "ARPANSA also certifies that the burial trenches at Taranaki, TM 100/101 and Wewak have been constructed consistent with the national Code of Practice for the near-surface disposal of radioactive waste." It was well known to ARPANSA that the 1992 NH&MRC Code of Practice did not apply to the Maralinga rehabilitation - in the jargon the rehabilitation was an 'intervention' not a 'practice'. The authors of the NH&MRC Code stated that the Code was not applicable to a situation such as that which prevailed at Maralinga. Yet the irrelevance of the NH&MRC Code has never once been acknowledged by ARPANSA. By contrast, Senator Minchin belatedly acknowledged in a 17/4/00 media release that "... the Code of Practice for the near-surface disposal of radioactive waste in Australia (1992) does not formally apply to this clean up." Leaked minutes from a Maralinga Rehabilitation Technical Advisory Committee meeting quoted a senior officer from ARPANSA saying it was not necessary to meet the letter of the NH&MRC Code since it was not meant to apply to situations such as the Maralinga rehabilitation (ABC Radio National, Background Briefing, April 16, 2000, <www.abc.net.au/rn/talks/bbing/stories/s120383.htm>)

Dr Loy said in an April 17, 2000 media release that the Maralinga clean-up was "world best practice" although it was clearly short of "world best practice"; for example shallow burial of plutonium in unlined trenches certainly would not be tolerated in the UK. ARPANSA officials made suggestions about options for managing contaminated debris - such as encasement with concrete - which were simply dropped when the Department and its consultants proposed cheaper, inferior options. The contaminated debris has been buried just a few metres below grade in an unlined trench. (Alan Parkinson, DEST National Radioactive Waste Repository - A Second Round Submission to ARPANSA, 25/2/04; see also Alan Parkinson, "Maralinga: The Clean-Up of a Nuclear Test Site", Medicine and Global Survival, Volume 7, Number 2, February 2002, <www.ipnww.org/MGS>.)

In the 1990s the Australian Radiation Laboratory was contracted to provide services to the Department of Primary Industries and Energy for the Maralinga clean-up. That contract was taken over by the Environmental and Radiation Health Branch of ARPANSA when ARL was merged into the newly-formed ARPANSA in the late-1990s. Yet ARPANSA also had regulatory

responsibilities. (Issue of a Facility Licence for the Maralinga Rehabilitation Program, Statement by the CEO of ARPANSA, 30/10/2000, <www.health.gov.au:80/arpansa/mar_stmt.htm>.)

ARPANSA rarely had personnel on-site at Maralinga and thus its first-hand knowledge of the rehabilitation project was limited as was its capacity to regulate the project.

Nuclear engineer Alan Parkinson wrote in his submission to the Senate Select Committee for an Inquiry into the Contract for a New Reactor at Lucas Heights (September 2000) that "The newly formed Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) also has not performed particularly well in its first major assignment - the Maralinga project. Unless their performance as regulators improves, then the new reactor project will be a trail of compromises as is the case on the Maralinga project."

ANSTO Licensing

ARPANSA originally intended to licence all of ANSTO's nuclear facilities simultaneously. The process was so problematic that eventually it was abandoned in favour of a staged licensing process. Jean McSorley, then representing the interests of the public on ARPANSA's Nuclear Safety Committee, argued:

The credibility of ARPANSA, particularly in relation to its regulation of ANSTO, has been further strained since early 1999 because of the way in which ARPANSA had handled the licensing process. In early 1999, ANSTO was keen to start the licensing process for the new reactor. A major issue for the public, however, was that the existing facilities had not yet been licensed. In April 1999, however, ANSTO submitted its first licence application - to prepare a site for the new reactor. Under the terms of the licensing process the licence for the new reactor had to establish the suitability of the site for where it would be built. How could ARPANSA and the public assess the suitability of the site for the new reactor, if the current facilities and arrangements had not been fully assessed?

When the above point was put to ARPANSA the reply was that it has accepted the licence application from ANSTO, as it was the first application it (ANSTO) had submitted. So much for ARPANSA being a regulatory agency. Surely it should have directed ANSTO to put the licence to prepare a site in context - that context would have meant delaying the licence application until the existing facilities had been thoroughly examined.

This is one example of where ARPANSA appears to be working to ANSTO's timetable, rather than setting the agenda itself. Moreover, despite the best intentions of some parts of the Agency, it is basing its decisions on what it knows of ANSTO, of its "understanding" of what happens on site. This 'understanding' comes from people who were members of the Nuclear Safety Bureau, as well as former ANSTO staff who now work for ARPANSA. This is not quite as sinister as it might appear, but it this close relationship inevitably means that there is a lack of transparency because ARPANSA and ANSTO are working on an unwritten 'understanding' rather than due and open processes in which all salient points are raised for examination.

(Jean McSorley, Supplementary submission to the Senate Select Committee for an Inquiry into the Contract for a New Reactor at Lucas Heights: Comments on the role of Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the new reactor, 7/10/00.)

ARPANSA's handling of ANSTO's application for a licence to prepare a site for a new reactor was also problematic, e.g.:

- * ARPANSA's advertising of ANSTO's application was extremely limited;
- * the time allowed for public comment was insufficient;
- * many were excluded from the process because they could not access a hard copy of the ANSTO application (and related documents) nor could they access the information via the Internet;
- * ARPANSA failed to address some issues raised in public submissions, while other issues were dealt with in a cursory manner. ARPANSA allowed ANSTO to apply for a licence to prepare a site for a new reactor even though existing facilities had not been licensed.

Those and other problems have been evident in relation to ARPANSA's handling of other licence applications.

ARPANSA has unnecessarily and unjustifiably limited the scope of its licence application assessments. For example ARPANSA sidestepped the crucial issue of liability and insurance arrangements (or the lack of them) when assessing ANSTO's application for a licence to prepare a site for a new reactor at Lucas Heights. ARPANSA simply asserted in its Safety Evaluation Report that liability and insurance arrangements fell outside the scope of its assessment.

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Supplementary Submission – Reactor Operating Licence

I would like this supplementary submission to be sent to Prof Falk and Dr Hogberg, panelists at the reactor forum. The submission addresses just one issue – absolute liability. Below is an excerpt from the presentation by Mr Tony Wood at a 2000 Senate inquiry. Mr Wood is a nuclear engineer who used to be head of the division of engineering and reactors at AAEC/ANSTO. Without providing detail, Mr Wood's comments make it clear that a number of countries have insurance arrangements in place which are far superior to those applying in Australia.

Senate inquiry into proposed Lucas Heights replacement reactor.
Wednesday, 25 October 2000

WOOD, Mr Tony (Private capacity)

I would like to concentrate now mainly on the two questions of 'nuclear liability' and 'the worst accident', because these two items are still both open to the committee to influence change, should it choose to do so. First, on nuclear liability, in our society, if we feel exposed to some risk of financial loss from the activities of some third party, we have two options: we can take

out insurance, or we can accept the risk, knowing that if we are damaged later we may exercise our common law right to seek damages through the law courts. However, it would be prudent to check first on the financial status of the party we intend to sue—it could be a man of straw and not worth suing.

It is little different with respect to possible damage from nuclear installations, as Mr Priceman mentioned earlier, because we all know that we are not insured against this risk. He mentioned in Australia; I say around the world, because nobody around the world these days is insured against nuclear risk. For the last 20 years or so, all of our insurance policies have had nuclear exclusion clauses. This does not worry most of us because we are not exposed to the risk. But let us consider the people living near the reactor, who are exposed to the risk. Let us think the unthinkable: say there was a reactor accident at Lucas Heights and the affected people wanted to sue ANSTO for damages. There are no worries about ANSTO's ability to pay—the Commonwealth owns ANSTO. However, you may be aware that it is a common law requirement that, for a damages claim to be successful, the claimant must be able to establish not only that he has been damaged, but also that the damage arose from the defendant's negligence. This last part is the tricky part, because the classical defence is to show there has been no negligence. It would be claimed that either all reasonable steps had been taken or that someone else was to blame. There is no doubt that this would happen. If it did not, the crown lawyers would be in breach of their ethical duty to their client.

In the USA, this is what the Presidential Commission on Catastrophic Accidents had to say in 1988 on the effectiveness of common law in nuclear accidents, and I am quoting from the OECD report, *Liability and compensation for nuclear damage*:

“The Commission expressed the belief that applying the common law principles of actions for damages would result in an outright denial of recovery or a difficult and protracted process.” That is quite unambiguous. Other nations have recognised this too and responded, through conventions or other means, by waiving the requirement to prove negligence. They did this through legislation based on certain conventions in which the plant operator was declared absolutely liable. This removed fault from the basis of liability, just leaving causation. The citizens of Britain, USA, Canada, Japan, Germany, France and the Netherlands all enjoy this concession.

Given that the Australian government is looking for public support for the project, and given that the EIS tells us that the worst accident would have trivial consequences and hence a close to zero pay-out, one would think there would be a rush to offer this concession to Australian citizens. But, no, the government has refused to offer absolute liability. As a consequence, Australians seeking compensation would have to prove negligence. Recall that the American commission said that this may amount to outright denial of recovery. You might ask: why would the government take such an extraordinarily negative position on this matter? I tried to pursue this in Canberra, with conflicting responses from two ministries. Finally I think I have a clue. It comes from a letter I received from Senator Minchin's head of science and technology policy, Dr Tucker, which says:

“You have raised the issue of absolute liability. I understand this means the liability irrespective of intention or negligence. It is apparent that the issue of absolute liability has financial implications well beyond the risks associated with research reactor operations at Lucas Heights. I am informed that the Commonwealth, as a matter of financial policy, does not accept such liability.”

What does this mean? I think that the lawyers and advisers in Canberra are not familiar with the concept of absolute liability and are worried and suspicious that if this is offered to the nuclear industry others will want it too. My response to this is that the lawyers in North America, Japan, Britain and other places have managed to negotiate this hurdle. Their world has not fallen in. Perhaps our people need a little shove from this committee.

Now I come to the worst part of the liability story and that is the deception part. A not so well known aspect of the nuclear liability problem is that no reactor vendor around the world would build a reactor here or anywhere else without receiving indemnity. The government's response was to produce the so-called deed of indemnity, which we heard about earlier, which indemnifies ANSTO and its officers and agents against loss. There is nothing wrong with this and the vendor was satisfied but then someone had the idea of misrepresenting the deed of indemnity as being something that it is not. ANSTO said in its submission to the parliamentary works committee: The deed therefore ensures residents are adequately protected in terms of nuclear compensation claims.

And Senator Minchin said in a letter dated 18 February 1999, which justifies the absence of absolute indemnity, that the same ends will be achieved by alternative means. He then went on to describe these means as being the deed of indemnity. This invites us to believe that offering the assurance that ANSTO will pay its bills provides adequate compensation protection to residents and somehow this is equivalent to waiving the legal obligation to prove negligence in a court of law.

I do not know whether you would believe this but I cannot. I seek the committee's support in influencing the government to offer absolute liability then the deed of indemnity can go back to being what it truly is and that is just a means of indemnifying INVAP. The residents could then enjoy the degree of protection offered to their overseas counterparts and this at no cost to the government.

Second Supplementary Submission On Reactor Operating Licence Application

LIABILITY AND INSURANCE

Bearing in mind ARPANSA's overarching statutory responsibility to protect people from the harmful effects of radiation, the new reactor should not be licensed because of the various unresolved issues relating to emergency planning and liability.

Prof. Jim Falk, one of the panelists at the ARPANSA forum held in Sydney in December 2005, notes in his report:

"The 1988 US Presidential Commission on Catastrophic Accidents emphasised the potential injustice caused by such a situation [requiring victims to demonstrate causality and negligence], and a number of countries including the US and UK have now legislated to allow, under certain conventions, that the plant operator would be absolutely liable in the event of an accident,

removing the need to prove negligence, but leaving the need to prove damage and causation. Given its own assessment that there is negligible risk to the population beyond the site boundary it would seem appropriate to require that ANSTO guarantees that it will accept absolute liability to the general public in the event of an accident or other event arising from the facility (any payments which may be required as a result continuing to be underwritten by the Commonwealth Government).“

WASTE MANAGEMENT AND DISPOSAL

The reactor operating licence must be rejected because of the failure to resolve waste management issues.

Prof. Falk notes that the current plans cannot be taken to constitute clear and definite means being available for the ultimate disposal of radioactive waste and spent fuel for various reasons including:

- * uncertainties surrounding the long-term availability of reprocessing options.
- * major doubts as to whether the plan to impose a dump and/or storage facility in the NT will reach fruition. Prof. Falk states: “Even the location and suitability of the interim storage facility remains unspecified and unproved. There is opposition by the government of the Northern Territory to the proposal. Previous experience gives reason to suggest that there may be many obstacles to possible authorisation of one of these sites. But none of them may in the end be able or appropriate to be licensed. A successful outcome cannot simply be assumed.” In short, even in relation to the interim storage facility it is not clear that there has been substantial and evident progress in relation to the development of the Store. For example, features of the design have not been settled and cannot be until a site is selected ...”
- * lack of progress on final disposal of long-lived intermediate-level waste (LLILW). Prof. Falk states: “No such plan has been forthcoming, except a notional proposition based on disposal of wastes several metres underground. ... No supporting detail has been given, no site has yet been selected and approved, and no supporting evidence has been provided of the long-term capacity of that site with whatever designed facilities are imagined, to hold the waste safely over the many thousands of years required.”

Prof. Falk states: “For these reasons it cannot be said that ANSTO, as applicant, has demonstrated sufficient progress towards a settled proposal for the Interim Store let alone that there is a clear and definite means available for the ultimate disposal of radioactive waste and spent fuel.”

Prof. Falk states: “At this point there is thus much that needs to be filled in in relation to assuring the panel and public that the wastes from the OPAL reactor will be disposed of in a way that will ensure the environment and public are unaffected over the thousands of years necessary. It is therefore appropriate to recommend that ARPANSA’s Regulatory Branch’s earlier stated requirement [clear and definite means available for the ultimate disposal of radioactive waste and spent fuel] be enforced, but taking into account also the proposals now on the table. This leads to the conclusion that no operating licence should be granted for the OPAL reactor until such time as the applicant provides convincing evidence that a clear and definite means is available for the

ultimate disposal of radioactive waste and spent fuel produced from the reactor (including the outcomes of conditioning, reprocessing and eventual decommissioning), and that there is a settled and approved selection of the site and design for any interim store which is to be utilised as a step in this process.”

In issuing earlier licences to prepare a site for the reactor and to construct it, ARPANSA CEO John Loy justified his decision in part on progress made towards dumping waste in South Australia and the plan to co-locate LLILW with the dump. Dr. Loy’s confidence proved to be unfounded.

Is there any reason to believe the current plan to impose the waste on the NT will reach fruition? The short answer is no. There is widespread opposition to the nuclear dump imposition in the NT, including from the NT government, and the NT Parliament which has legislated in an attempt to prevent the imposition of a nuclear dump. *In fact the NT opposition is far more advanced than it was at a comparable stage in the battle over nuclear dumping in SA.*

The government sees its draconian legislation - the Commonwealth Radioactive Waste Management Act 2005 - as proof of its intention to dump nuclear waste in the NT regardless of the obstacles. But in strengthening its hand legally, the federal government has elevated the level of public and political opposition to the dump. Moreover, there is of course no certainty that the CRWMA 2005 will not be repealed given that most or all non-government parties opposed it last year in the federal parliament.

NET BENEFIT

Prof. Falk notes in his report that: “Given the failure of the applicant to seriously even address the issue of net benefit it seems reasonable to conclude that no operating licence may be approved for OPAL until the applicant demonstrates clearly by means of a comparison of costs and benefits, including opportunity costs, and a full accounting of subsidies and externalities, that the operation of the OPAL reactor will provide net benefit.”

Presumably the ANSTO/ARPANSA response is that net benefit has been adequately addressed previously. But a thorough reading of the relevant documentation reveals that:

- * ANSTO routinely glosses over the issue of net benefit, claiming it has been adequately addressed in previous reports though it has not.
- * ANSTO’s treatment of net benefit has been unscientific, biased, circular and altogether unsatisfactory.

ARPANSA has a statutory requirement to address net benefit and it is hoped that ARPANSA will now take this issue seriously instead of the superficial approach adopted in the reactor construction licence documentation.

Net benefit is dealt with in detail in previous submissions by Friends of the Earth and in literature referenced in those submissions.

CONCLUSIONS

Friends of the Earth supports the conclusions of Prof. Falk, which are quoted here:

“A licence to operate the OPAL nuclear research reactor should NOT be granted until:

(i) it has been clearly demonstrated (including through disclosure of contingencies considered) that the chances of a serious accident are remote. Any information withheld in this process for security reasons should be demonstrated by an appropriate process of independent external review to be consistent with international best practice and predicated on maximising the capacity for an open and informed assessment to be made of risk to the environment and human health from serious reactor accidents.

(ii) an emergency response plan is made available to the emergency services and public, and has been approved after open public review, which makes clear what would be done outside as well as inside the site boundary as an effective response in the case of significant accidents – however unlikely these are judged to be by ANSTO – including an extreme case which vents a significant quantity (say 20%) of the core contents to the atmosphere.

(iii) in relation to hostile acts the list of contingencies considered and the calculations and trains of argument assessing the building’s vulnerability are at least in broad terms (sufficient to be consistent with international best practice) made public and subject to open review.

(iv) consistent with its own assessment that there is negligible risk to the population beyond the site boundary ANSTO guarantees that it will accept absolute liability to the general public in the event of an accident or other event arising from the facility (any payments which may be required as a result continuing to be underwritten by the Commonwealth Government).

(v) the applicant provides convincing evidence that a clear and definite means is available for the ultimate disposal of radioactive waste and spent fuel produced from the reactor (including the outcomes of conditioning, reprocessing and eventual decommissioning), and that there is a settled and approved selection of the site and design for any interim store which is to be utilised as a step in this process.

(vi) a process has been established to allow the application to be reviewed in the context of international best practice in radiation protection and nuclear safety, that process is complete and any deficiencies revealed have been addressed.

(vii) the applicant demonstrates clearly by means of a comparison of costs and benefits, including opportunity costs, and a full accounting of subsidies and externalities, that the operation of the OPAL reactor will provide net benefit.”

(Prof. Falk’s report is on the internet at: <<http://www.arpansa.gov.au/pubs/rrrp/forum/falk.pdf>>.)