Australian Government

Radiation Health and Safety Advisory Council

14 December 2007

Dr John Loy PSM
CEO of ARPANSA
Australian Radiation Protection and Nuclear Safety Agency
PO Box 655
MIRANDA NSW 1490

Dear Dr Loy,

ISSUES RELATING TO THE SAFETY AND DEVELOPMENT OF NUCLEAR POWER PLANTS

This correspondence follows your request of 10 August 2007 for Council to provide advice on a matter of 'major concern to the community' in relation to radiation protection and nuclear safety. The request covered issues relating to the safety of nuclear power plants. Council is pleased to provide this advice under Section 20 (b) of the Australian Radiation Protection and Nuclear Safety (ARPANS) Act 1998. This section relates specifically to the 'Functions of Council'. Your request notes also that the safety of spent fuel management and radioactive waste management is similarly a matter of debate and interest. This will be addressed by Council in a separate document to be developed in the second quarter of 2008.

In this advice, Council will comment on a range of issues that would need consideration as part of the debate as to whether Australia should embrace nuclear power as a component of its future electricity generation technologies.

In undertaking the review of material and preparing advice, Council focussed on the global nuclear safety regime, current international views of the challenges in nuclear safety, the leadership and management that would be necessary to assure nuclear safety, emerging challenges and issues in relation to the engagement of the community in a dialogue regarding Australia's participation in nuclear fuel cycle activities.

It is not the role of Council or the object of this advice to take a position on the prospect of a nuclear power industry in Australia or advocate on behalf of any particular group or groups in relation to this issue. The purpose is to provide an overview of relevant material that could contribute to this debate.

Council called on the expertise of its members, sought the advice of the Nuclear Safety Committee constituted under the ARPANS Act, engaged in dialogue with Dr Sam Harbison, former Chief Inspector of Nuclear Installations in the UK and member of the International Nuclear Safety Group (INSAG), and held discussions with ARPANSA staff. Appendix A lists documents reviewed by Council in the course of considering its response to your request.

DRIVERS FOR CONSIDERATION OF NUCLEAR POWER

Clearly the decision whether Australia will participate further in nuclear fuel cycle activities is one for government and the community jointly. Australia has abundant energy sources and so energy security is unlikely to be a major driver for considering nuclear power. The major factors influencing such considerations are likely to be:

- The safety of nuclear power plants and the potential for severe accidents.
- The environment and, in particular, discussions around climate change and the "right" energy mix for Australia with a view to dramatic reduction in CO_2 emissions.
- The relative cost and efficiency of nuclear power in comparison to other sources of power.
- Development of the national economy, in particular the realisation that Australia is a major energy exporter.
- The perception that there is a "nuclear renaissance" internationally and questions about Australia's potential role in it.
- Proliferation, environmental impacts of nuclear waste, and the perceived inter-generational burden of a nuclear power industry.

As this paper concentrates on the safety of nuclear power plants, it does not canvass the relative strength or weakness of any of the issues in the current debate around the impetus for considering nuclear power.

UNDERSTANDING RADIATION

Council considers that any discussion on issues relating to nuclear power plant safety should be based on a proper understanding of the nature of ionizing radiation and the hazards it presents to human beings and the earth's environment. There are many sources of information on ionizing radiation, but for those not working in this field, advice is needed on where to locate such information. This should be provided through government agencies such as ARPANSA and State/Territory regulatory bodies, be easily accessible and in plain English to assist persons seeking to understand more fully the nature, uses and effects of radiation.

As you are aware, radiation can be classified as "ionizing" and "non-ionizing". As non-ionizing radiation includes heat, light, radio waves and micro waves, it is not relevant to the subject of this letter. Ionizing radiation is produced by the decay of natural and artificial radioactive materials and by devices such as X-ray machines. It travels as waves or particles and has enough energy to ionize atoms and so change the chemical composition of matter. While it is well established that high doses of radiation cause cancer, there is scientific debate about the effects of low doses of radiation. The international approach, however, is to assume that there is no threshold below which effects do not occur, and that there is a linear relationship between dose and response. Australians are exposed to ionizing radiation from a variety of natural and artificially manufactured sources. The radiation dose from ionizing radiation is measured in units of sieverts (Sv), or, more commonly, millisieverts (mSv), with 1 mSv being 1/1000 Sv.

Naturally occurring radioactive materials in all soils and rocks cause both external and internal exposure, due to eating foods or breathing dusts and gases that contain small amounts of these materials. Worldwide doses to people from such exposures commonly range from 1 to 10 millisievert per year and in Australia the average dose is about 2 millisievert per year.

There are numerous artificial sources of radiation of which medical sources are by far the most dominant. Over one million Australians get a diagnostic medical procedure each year, resulting in an estimated annual average dose to each Australian citizen of somewhat greater than 0.8 millisievert. The dose from industrial sources is much smaller than that from either background radiation or medical sources. For the nuclear fuel cycle it is estimated that the average worldwide dose is less than one thousandth of that from background radiation. In the year 2000, the average

dose from residual fallout from the atmospheric testing of nuclear weapons in the 1950s and 1960s was estimated to be about one two thousandth of that from background radiation.

Over the last half century our understanding of how to assess and measure exposures to ionizing radiations and the long term effects of such exposures has improved significantly. There are health risks associated with exposure to ionizing radiation, especially the increased risk of cancer. There are now a considerable number of recommendations, standards and guides available to enable users of radiation sources to manage their exposures. The International Commission on Radiological Protection (ICRP) is recognized as the foremost international authority. In its 1990 recommendations, ICRP concluded that "the procedures available to control exposures to ionising radiation are sufficient, if used properly, to ensure that it remains a minor component of the spectrum of risks to which we are all exposed."

AUSTRALIA'S REGULATORY REGIME AND INVOLVEMENT IN INTERNATIONAL RADIATION PROTECTION AND NUCLEAR SAFETY STANDARDS

While Council recognises that the operator has primary responsibility, and must be competent to manage safety, one of the major safety issues discussed in the literature reviewed by Council relevant to nuclear power plant is that of effective and efficient regulation.

Council considers the role of regulation in the assurance of nuclear safety to be critical and now well established. The fundamental objective of nuclear safety regulatory bodies must be to ensure that nuclear facilities are operated at all times in an acceptably safe manner.[1] The principal IAEA standard for the establishment of basic requirements for legal and governmental infrastructure for nuclear safety is GS-R-1[2]. This document covers the development of an appropriate legal framework for establishing a regulatory body and other actions required to achieve effective regulatory control of facilities and activities. In establishing such regulatory bodies, all aspects of safety and protection of the community as a whole need to be clearly spelt out, including the regulator's responsibilities for setting the standards which operators must meet from the initial design stage, through operation to decommissioning.

Australia has a complex regulatory environment including nine jurisdictions with regulatory systems covering radiation protection and/or nuclear matters. In some cases State legislation prohibits various nuclear activities in the jurisdiction. ARPANSA regulates Commonwealth entities and currently regulates Australia's only reactor, the OPAL research reactor operated by the Australian Nuclear Science and Technology Organisation (ANSTO). In addition to State and Territory regulatory bodies, there are a range of other Commonwealth Departments involved in various aspects of nuclear fuel cycle activities, including the Australian Safeguards and Non-proliferation Office, the Department of Education, Science and Training, the Department of Industry, Tourism and Resources, Customs, the Department of Environment and Water Resources, and the Office of the Supervising Scientist.

Such a complex system would not be appropriate for managing an expanded nuclear industry, should Australia proceed in this direction. Council considers significant change would be necessary to the current regulatory system in the event of such a decision.

Council notes that Australia is a signatory to two key conventions that are relevant to radiation protection and nuclear safety. These are the Convention on Nuclear Safety which came into force in 1996 and the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management which came into force in 2001. Each convention has been signed and ratified by Australia with the International Atomic Energy Agency (IAEA) being the secretariat

[1] NEA (2002) *Improving Versus Maintaining Safety*, OECD, Paris

[2] IAEA Legal and Governmental infrastructure for nuclear, radiation, radioactive waste and transport safety, GS-R-1, 2000

for each Convention. The Agency works with its Member States, including Australia, and multiple partners worldwide to promote the safe use of nuclear installations and sources of radiation. Should Australia commence a nuclear power program, it would need to ratify the relevant international convention on liability for nuclear damage.

Technologies associated with the nuclear fuel cycle, especially enrichment, are sensitive for nuclear proliferation. However, it should be noted that nuclear power reactors require enrichment levels of only a few percent U^{235} while nuclear weapons require very high levels of enrichment. On the other hand, a by-product of burning uranium fuel in a nuclear reactor is plutonium, which has been used in nuclear weapons

Australia has ratified the Nuclear Non-Proliferation Treaty and is therefore committed not to develop nuclear weapons and to prevent the spread of nuclear weapons technology. Any fuel used in a prospective Australian nuclear power plant would be managed under the Australian safeguards regime regulated by the Australian Safeguards and Non-proliferation Office (ASNO). Increasingly, security systems and procedures have become critically important. Council notes Australia has access to state of the art security systems and procedures that maintain accountability and protect against the loss of nuclear materials. Australia has operated a small scale nuclear facility in Sydney for around fifty years. Its record in regard to control of nuclear materials is good. The public expects and has a right to this level of control and accountability.

Council notes that Australia plays a prominent role in international developments in radiation protection and nuclear safety. Council sees involvement in the work of the IAEA by ARPANSA staff, the Radiation Health Committee (RHC) and Nuclear Safety Committee (NSC), constituted under the ARPANS Act, as important in shaping the outcomes of international documents used by the nuclear industry and in radiation protection generally. While the CEO of ARPANSA is a member of the Commission on Safety Standards (CSS), Council understands that ARPANSA officers take part in the different safety advisory committees tasked with developing standards in line with best practice. Apart from Australian use of such standards, this involvement provides a worthwhile opportunity for utilization of Australian expertise in documents that have become core elements of standards used by the international nuclear and radiation industry.

Australia also adopts international standards and has given a commitment to the IAEA to work towards implementing the guidance in the IAEA's Code of Conduct on the Safety and Security of Radioactive Sources. The Code of Conduct has effectively become the international set of norms for the security of radioactive sources. Council has previously advised ARPANSA on the safety and security of radioactive sources and is pleased to see this important Code of Conduct adopted within Australia. Australia has also notified the IAEA that it will act in accordance with the IAEA's Guidance on the Import and Export of Radioactive Sources. This guidance addresses the potentially vulnerable area of international transfer and sets out procedures for ensuring that sources are transferred in a secure manner to authorised recipients.

Council would also like to highlight that in addition to the IAEA two other organisations have had a major role in the development of radiation protection standards. They are the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the International Commission on Radiological Protection (ICRP). An indicator of Australia's involvement is that an ARPANSA officer is the current chair of the UNSCEAR and a member of Committee 4 of the ICRP.

Whilst Australia is not a country that currently has an expanded role in the nuclear fuel cycle it has been an active participant in the key fora for the development of the international system of radiation protection and nuclear safety for some time. Council sees this involvement as being an essential component of our role in contributing to global nuclear safety.

To assist member states in assessing the adequacy of their current regulatory regime, the IAEA provides an integrated regulatory review service (IRRS). Council notes that the CEO of ARPANSA

recently invited the IAEA to undertake such an IRRS mission to Australia and that the Chairs of Council, the RHC and the NSC met with the delegation to discuss the role of these bodies within the current legislative framework. Council appreciates the value of such independent expert reviews of regulatory agency operations as they provide an important verification of regulatory agency performance in meeting local and international best practice, as well as giving local regulatory agency staff a valuable learning opportunity. Council would encourage such reviews to be undertaken periodically. The final report of the IRRS Australian mission is available on the ARPANSA web site.

NUCLEAR POWER – REALITIES AND PERCEPTIONS OVER THE FIRST 50 YEARS

In understanding current sensitivities and long standing domestic objections to the development of a nuclear power industry it is worth considering the history of the nuclear industry and some of the many factors involved in attaining 'nuclear safety'. These include the initial design, operator responsibilities, training, appropriate maintenance and competency of the plant owners to manage safety.

Historically, the nuclear industry arose from military uses of nuclear technology and was shrouded in secrecy as a result. Safety systems for nuclear industries were usually managed within a national "Atomic Energy Commission" style body, which as well as supporting the safe use of nuclear technology had a joint role in the development and promotion of such technologies. Over time it was recognised that this merging of roles did not provide an appropriate assurance of nuclear safety and in the majority of countries this potential conflict of interest has been addressed with safety oversight being assigned to a separate and independent safety regulator.

The original notion of "secret operations" has had a long term deleterious effect on the trust that is an essential component of any government-stakeholder relationship. The current nuclear industry is now much more open, and the global nuclear safety regime is moving designers, operators and regulators to a multinational approach with transparency in their activities.

The concept of risk and the comparison of risks associated with different human activities are vital ingredients in any discussions about alternative energy sources. All human activities carry risks but society does not always focus on the most important ones. It can be concerned about risks that are small, while ignoring larger risks, and a risk that is acceptable in one circumstance may be unacceptable elsewhere. The tolerability of a risk is very dependent on the situation and context. While there is a tendency to focus on accident causation, operational risks and associated health impacts also play an important part in determining the level of risk that may be acceptable. The concept of risk in relation to nuclear power is explored in the document "The Tolerability of Risk from Nuclear Power Stations" published by the UK Health and Safety Executive in 1992. The document notes that "tolerability does not mean acceptability" and "the question of whether to deliberately undertake major risks and regulate them societally can only be resolved in the way we settle all other matters that involve redistribution of big benefits and costs – by public discussion and through representative and legal processes."

It is difficult to make unambiguous comparisons, but available studies make it clear that the overall risk of nuclear power generation is very much less than the risk of coal-fired power, both in terms of the risks to workers and the impacts on the broader community. Nevertheless, the risk of emissions from nuclear power plants during normal operation and accidents engenders fear amongst many members of the public. This public concern exists in countries that have established nuclear industries but may be even more prevalent in countries, such as Australia, that have not had a nuclear power industry. The most common public concerns tend to be related to releases of radioactivity from nuclear power plants, the risk of catastrophic accidents, the potential for proliferation of nuclear weapons, and the management of radioactive waste.

From the establishment of the first nuclear power plants until the present day there has only been one nuclear power plant accident which resulted in early fatalities due to radiation exposure, namely the Chernobyl accident. The Chernobyl accident occurred in 1986 and is the world's worst nuclear accident. This accident was caused by flaws in the reactor design and errors made during operation in the lead-up to the accident. This accident led to 28 fatalities of emergency workers from acute radiation syndrome within a few days or weeks. In the period since the accident there have been 19 additional fatalities among the 134 emergency workers who were diagnosed with radiation syndrome, 236,000 residents from around the site were permanently evacuated, and approximately 4000 cases of thyroid cancer were diagnosed among people who were children at the time of the accident, 15 of whom have died. Estimates have been made in an attempt to predict the expected number of fatal cancers resulting from the accident however there is great uncertainty surrounding these numbers due to uncertainties in doses, dose distributions and radiation risks at low doses. It is likely that the number of fatal cancers resulting from the accident may increase for some decades to come. There is considerable literature on the Chernobyl accident.

There have been some other well published accidents that are infamous, especially Windscale (UK 1957) and Three Mile Island (US 1979). Windscale involved a graphite/uranium fire in the reactor core and resulted in offsite release of radioactivity. However, Windscale was a reactor used to produce military materials and not electricity and its design would never have been used for electricity generation. Three Mile Island involved the failure of a valve in the reactor condensation system that was then compounded by operator actions, due to a lack of understanding of the cause of the consequential effects. This event also resulted in a minor offsite release of radioactivity.

Lessons learned from these accidents, in common with accidents in other industries, included the need for constant vigilance with respect to design and operational deficiencies, the requirement for operators to be appropriately trained, the importance of emergency planning, the role of probabilistic safety assessment in the analysis of potential failures and the timely dissemination of industry information. Improved knowledge of nuclear science and engineering since the time of these accidents has lead to technological and cultural advances in the industry and in doing so has greatly improved safety. Council acknowledges the potential of any accidents of the types mentioned above to undermine the confidence of all stakeholders in the global nuclear industry, especially the general public. Council also recognizes that all abnormal nuclear events need to be properly investigated and that such investigations should make, implement and monitor recommendations to engender confidence in the continued operation of similar plants.

THE GLOBAL NUCLEAR SAFETY REGIME

It is no longer possible for countries to live in isolation. Recent major industrial accidents and security threats have heightened the need for vigilance. Through news media there is increased immediate access to what is happening globally and a resulting fear may be engendered in the minds of those who are quickly made aware of such events. The importance of global compliance with safety systems is critical. Therefore, Council considers the status of the global nuclear safety regime of prime importance even though Australia is currently not a generator of nuclear power.

The role and work of the IAEA is essential in ensuring global nuclear safety. Council therefore sees it important that there be an understanding of work conducted through the auspices of the agency.

In 1957 the IAEA was formed to support the benefits of peaceful applications of nuclear technology. This task was later expanded to the role of overseeing the Nuclear Non Proliferation Treaty (NPT) that supported the use of peaceful applications of nuclear technology by those countries that committed not to either transfer nuclear weapons technology or to develop a new nuclear weapons programme.

In 1985 the International Nuclear Safety Advisory Group (INSAG) was established to provide advice to the Director General of the IAEA. INSAG was reconstituted as the International Nuclear Safety Group in 2003. The subtle change was intended to indicate that INSAG should seek to serve the international community as a whole, and not be limited to advising the IAEA. INSAG has produced a number of authoritative publications in regard to nuclear safety including safety objectives for nuclear power plants and principles that should be applied to these objectives. These objectives are important in regard to achieving international best practice in nuclear safety.

The global nuclear safety regime as it is today is a product of development spanning the fifty or so years during which nuclear energy has been used for peaceful purposes. At the outset of the burgeoning nuclear power industry different countries diverged in their approaches to harnessing nuclear energy and their efforts to maintain safety tended to be focused on the direct engineering challenges that each technology presented. Detailed analysis of accidents such as Chernobyl in the Soviet Union and Three Mile Island in the US shifted interest towards human factors, the study of human behaviour/performance and its interface with engineered systems. The term "safety culture" had its origins in the analyses of the Chernobyl accident.

The IAEA defines safety culture as follows:

> "Safety culture is that assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance".

Safety culture is now seen as an essential prerequisite to the safe operation of nuclear facilities. Its primary goal is to establish safe operation of a nuclear plant and then to carefully review the performance of the operation so that lessons can be learnt and continuous improvement implemented through safety management systems. The important aspect of safety culture is to review all causes of a non-conformance/failure of engineered systems, operational instructions and management procedures and implement changes so that risks are maintained as low as reasonably achievable. People may have differences of opinion on what is reasonably achievable.

Virtually all countries operating nuclear reactors have established independent nuclear regulators and there is an effective level of co-operation between these regulators. Council sees this co-operation as essential due to the global implications of any major accidents and not dependent on whether or not Australia decides against or in favour of nuclear power.

It is also important to recognise that nuclear and radiation safety are no longer seen as a national matter by individual countries. The international nuclear community comes together under many auspices to disseminate and discuss experiences relating to safety management and collaborate on nuclear safety matters including the agreement of standards and guidelines to be applied by Member States.

The International Atomic Energy Agency (IAEA) provides a framework for joint efforts to build and strengthen an international safety and security regime. The IAEA framework includes binding international conventions; international peer reviews to evaluate national operations, capabilities, and infrastructures, and advisory international standards, codes, and guides. IAEA has established a wide ranging programme to provide Member States with guidance on many aspects of safety associated with nuclear power plants. These take the form of the Safety Standards Series documents, developed by international committees drawing from the accumulated experience of the Member States. Council considers this to be a sound system with documents in three categories: Safety Fundamentals, Safety Requirements, and Safety Guides[3].

[3] Additional information on the system of IAEA Safety Standards is available from the IAEA web site at http://www-ns.iaea.org/standards/

Council notes these safety standards create a framework for regulatory harmonisation among those countries that have a nuclear power program. They establish the framework for international best practice in radiation protection and nuclear safety and must be applied in any consideration for a nuclear power industry.

Other international bodies such as UNSCEAR and the ICRP provide authoritative scientific analysis and recommendations on radiation protection and nuclear safety matters. UNSCEAR analyses the scientific literature and data and reports its findings to the United Nations General Assembly, the scientific community and to the public. UNSCEAR's scientific consensus provides the basis for the ICRP to formulate its recommendations on radiation protection.

NATIONAL INFRASTRUCTURE FOR NUCLEAR POWER GENERATION

There is a broad range of technical/policy information that has been developed internationally to guide consideration of nuclear power plant projects. INSAG (Aug 2006 letter) and IAEA TECDOC 1555[4] have highlighted the importance of an established infrastructure in any country that is contemplating adding nuclear power to their energy mix, particularly to provide for the necessary stability in decision making for what will be a long term process with special responsibilities. The INSAG letter states that "The necessary infrastructure to start and maintain a successful nuclear program includes legal and regulatory capability, educated manpower, research skills, access to industrial capacities, and financial strength".

Council notes the importance of TECDOC 1555, which comprehensively reviews the considerations at each stage of implementation of a nuclear power plant project. It lists the range of international instruments for Member States to consider adopting prior to beginning a nuclear power project, along with infrastructure, planning and project management considerations at each stage of the development process.

Technical expertise would have to be developed in environmental impact assessment well in advance of site selection so that criteria for a suitable site could be clearly set out. Technical expertise would also have to be developed to assess reactor designs from an engineering and proliferation point of view, well before applications were received. The assessment would have to include the reactor design for normal operation and also for its ability to not fail catastrophically in emergency situations. Global efforts to get design certification for the leading contender plants is now well underway and is likely to have a strong influence on decision making of countries developing nuclear power programs. Council points to the need to build skills in these areas. It would not be possible to rely on employment of overseas professionals as has occurred in the past. The ageing and retirement of a significant proportion of the pool of current skilled professionals will leave a gap in the knowledge base needed to progress implementation of a nuclear power program. This is an issue of international concern and one which was also highlighted in the INSAG letter of Aug 2006 and previous letters.

Using countries like Finland and Sweden as a bench mark it is possible to get some idea of the size and scope of a nuclear regulatory agency that might be needed in Australia. These countries have been selected as they are medium sized developed countries with several nuclear power plants. Both countries have established waste disposal programs as well. These countries both employ 250 to 300 people in nuclear regulation and radiation regulation agencies. Similar numbers are employed in various aspects of nuclear fuel cycle regulation. However, it should be noted that these countries have well established and mature agencies regulating stable nuclear power plants that have been in operation for many years.

[4] IAEA Managing the First Nuclear Power Project, TECDOC 1555, May 2007

To set up and develop competence and regulatory planning to oversee the introduction of nuclear power or other associated nuclear fuel cycle facilities in Australia would be a challenging undertaking, requiring significant human and financial resources in which many considerations would be intertwined, including safeguards arrangements, licensing, inspection and enforcement, international liaison, and decommissioning.

COMMUNITY PARTICIPATION

There are significant public concerns about the safety of activities associated with the nuclear fuel cycle. Historically these fears stem from the use of nuclear weapons, fallout from nuclear weapons testing, the operation of nuclear reactors and catastrophic reactor failures, and the secrecy surrounding such events. These concerns can be grouped into five different areas of perceived impact arising from the nuclear fuel cycle:

- Exposures to radiation from environmental contamination arising from uranium mining.
- Exposure of people living in the vicinity of a nuclear power plant during routine operations.
- Exposure to radiation from reprocessing spent fuel and the disposal of radioactive waste.
- Risks due to a catastrophic reactor failure.
- Proliferation of nuclear weapons.

The manner in which these matters are addressed is of fundamental importance. The public communication strategy of the industry, the government and the regulator must be clearly articulated and demonstrated over time to be transparent and effective. Council believes strongly in agencies developing and making public policies that are readily available and clearly stipulate consultation processes and full engagement of the community in regulatory decision making. The challenge of building public confidence must not be underestimated.

INSAG has published a report entitled Stakeholder Involvement in Nuclear Issues[5]. In his foreword the Chairman of INSAG notes:

> "The expectations of stakeholders of a right to participation in energy decisions are something that the nuclear community must address. Decisions regarding the siting and construction of nuclear power plants are no longer the domain of a closed community of technical experts and utility executives. Today the concerns and expectations of all manner of persons and organisations – from the local farmer to the international financial institution must be recognised."

The report identifies the stakeholders as being national regulatory authorities, nuclear power plant designers and operators, public interest organisations and individuals, the media and local and national populations. Not only do these groups have an expectation that there will be an opportunity for full and effective participation, there must as a corollary be full and open engagement in the processes of decision making in language that is fully understood by all the participants.

Transparency and openness are key ingredients in public confidence building and these must be clearly stated objectives of public information programs which should be measurable. The community should be provided with sufficient information to allow them to participate in the debate on major issues for decision. The independence and credibility of the regulatory body is critical and must be established through its accountability procedures. The challenge is to ensure that the regulatory body has the required technical expertise, while being seen by the community as

[5] INSAG-20, IAEA Vienna 2006

independent. To develop public trust, the regulatory body must be committed to engaging the community and maintaining a dialogue.

CONCLUSION

In preparing this advice, Council has attempted to highlight key areas of importance in considering development and ensuring the safety of nuclear power plants and has discussed areas where Australia currently has significant involvement internationally. Council considers it crucial that radiation and nuclear experts in this country are involved in the process of developing international standards aimed at ensuring the continued safe operation of radiation facilities and nuclear plant.

There exists a plethora of information which is readily accessible on various aspects of radiation and nuclear matters. Of particular note are the IAEA's Safety Standards documents, the Recommendations of the ICRP and the reports and letters of INSAG. While some reports/documents are now over 10 years old they still remain relevant.

Council is greatly encouraged by the ongoing efforts to improve and strengthen the global nuclear safety regime. Today's priority is to ensure state of the art technology with inherently safe systems requiring less human intervention and with significant attention to security.

The challenge for any expanded participation in the nuclear fuel cycle is to ensure that the appropriate legislative and regulatory infrastructure is prepared in advance of any such development. In order for any stages of the nuclear fuel cycle to proceed, transparent regulatory oversight of the highest order is required to provide public assurance that the facility is being operated safely. Regulation must be effective. At the same time, regulation can be regarded as a cost and so needs to be carried out efficiently, otherwise it may lead to delay, uncertainty and unexpected additional expenditure to meet stipulated requirements. Council notes that Australia has a complex regulatory system and considers that significant change would be needed to manage an expanded nuclear industry, should it be decided to proceed in this direction. Council further notes that there is a wealth of international literature available to guide policy and decision makers in this task, especially some of the publications of the Organisation for Economic Co-operation and Development/Nuclear Energy Agency.

The credibility of the Regulator and the open and transparent manner in which regulation is developed and enforced are paramount in ensuring that the community can trust the plant operator. The importance of management systems and leadership in achieving safety must not be underestimated. The community has a right to expect transparency, strong leadership and sound management in all aspects of regulation, operation and security.

There are many challenges in deciding whether nuclear power is or isn't appropriate for this country. While it is apparent that nuclear power is accepted as a means of electricity generation in many parts of the world, no approach in Australia will survive the test of community acceptability if safety and security are not assured.

Council looks forward to discussing this advice with you in due course.

Yours sincerely

Sylvia Kidziak AM
Chairperson

Attach: Appendix A

APPENDIX A

DOCUMENTS REVIEWED BY COUNCIL

In preparing its advice Council considered the following documents:

- AEN NEA, Building Measuring and Improving Public Confidence in the Nuclear Regulator, Conference Proceedings, Ottawa Canada 18-20 May 2004
- Department of Prime Minister and Cabinet, Uranium Mining, Processing and Nuclear Energy – Opportunities for Australia, December 2006
- Health & Safety Executive, The Tolerability of Risk from Nuclear Power Stations, Revised 1992
- IAEA, Legal and Governmental infrastructure for nuclear, radiation, radioactive waste and transport safety, GS-R-1, Vienna 2000
- IAEA, Report of the third meeting of the contracting parties to the Convention on Nuclear Safety in April 2005, Vienna
- IAEA, Managing the First Nuclear Power Project, TECDOC 1555, May 2007, Vienna
- International Nuclear Safety Group (INSAG), *Strengthening the Global Safety Regime* INSAG-21, Vienna 2006
- International Nuclear Safety Group (INSAG), Letters from the Chair of INSAG to the Director General of the IAEA on current and emerging safety issues of 2005 and 2006
- International Nuclear Safety Group (INSAG), Stakeholder Involvement in Nuclear Issues, INSAG-20, Vienna 2006
- International Nuclear Safety Group (INSAG), Letter to Director General, IAEA, August 2007