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***CONCLUSION OF SUBMISSION  
TEACHING AND RESEARCH IN NUCLEAR ENGINEERING AND  
NUCLEAR SCIENCE AND TECHNOLOGY IN AUSTRALIAN  
TERTIARY INSTITUTIONS***

*By*

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***SOME  
CONSEQUENCES OF THE NON-AVAILABILITY OF NUCLEAR  
ENGINEERING COURSES IN AUSTRALIA FROM 1988 ONWARDS***

***WITH COMPLIMENTS FROM LESLIE G KEMENY***

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- (1) *A STEADY FLOW OF STUDENTS in the Graduate Masters and Doctoral categories from Asia and Pacific rim countries has ceased. Opporinnities for joint projects with Indonesia, Canadian or Chinese Universities have been neglected. Possibility for the School of Nuclear Engineering (University of New South Wales) to develop significant self-funding vanishes.*
- (2) *AUSTRALIAN UNDERGRADUATE STUDENTS with an interest in nuclear science and technology now have a predisposition to gravitate into University Departments such as the "History and Philosophy of Science". In them they usually receive a "post-modern " and "socially reconstructed" and scientifically trivialised view of the discipline. Their studies tend to lead them into environmental activism or environmental journalism. In fact "environmental anything" seems to be a key description. for finding a job in most professional pursuits in Australia in 1997. Around nineteen University groups are approved or seeking approval to conduct courses in "environmental engineering" in a country of eighteen million people. For the whole of Europe and a population in excess of three hundred million people, there are two schools of "environmental engineering". Perhaps a little effort and finance redirected to main-stream engineering Schools to help create a decent environment for people to live in and to boost the population to say, fifty million should be encouraged? The present vision of Australia as a quarry and resources base to the world where young people have little option but to enter service industries and professions is a dangerous concept. The economic battles of the new millennium will be fought and won by those communities which possess the skills of the manufacturing and value adding industries. When will Australia's academic community realise this and act upon it?*
- (3) *FACILITIES AT ANSTO AND ASNT LUCAS HEIGHTS NSW which once were available for use by Australian Universities for nuclear energy related investigations have been either decommissioned or scrapped. Typically, the MOATA research reactor, once purchased exclusively for University users is now decommissioned and moth-balled. It is very doubtful whether Australia in 1997 could find enough skilled staff to operate both MOATA and HIFAR, together. The building, commissioning and operational of a replacement for HIFAR will tax this country's scientific resources. Forty years ago, HIFAR was commissioned as the first major research reactor in the Southern hemisphere. Thirty years ago the staff of the Australian Atomic Energy Commission could assess or design and supervise tie construction of a nuclear pouter station and carry colt innovative studies in every aspect of the nuclear fuel cycle including enrichment, fuel fabrication and waste disposal. The School of Nuclear Engineering supervised the theoretical research in many of these areas and operated a major research laboratory into nuclear plant safety within the HIFAR reactor containment.*
- (4) *A TYPICAL MAJOR RESEARCH PROJECT with international implications in many areas including nuclear plant safety, surveillance, instrumentation and control and artificial intelligence -see Enclosures - had to be suspended some ten years ago. The stated reason was "shortage of irradiation facilities" on HIFAR. It is more likely that research projects linked with nuclear energy technology had to be downgraded in priority. Others suffered a similar fate. The innovative nature of the one cited was such that ten years after its suspension it will be completed under a different sponsorship (Personal Papers "A", "B" and "C" supplied only to substantiate the issues). The degree of intellection poverty and academic vandalism occurring in Australia during tile years 1986 to 1996 was considerable. It is clear that nuclear energy vitas an important target.*

- (5) *AT THE LOCAL COMMUNITY LEVEL ignorance of most aspects of nuclear science and technology is very evident when compared with the teaching available and the level of public informed realism in other developed countries. The word "radiation" for instance appears to initiate a neurotic reaction or phobia in many Australians - especially the younger generation. There exists a vast community held ignorance of the fact that planet earth is bathed in radiation from both terrestrial and extra terrestrial sources and that human life is more able to adapt to and sustain radiation fields than, say, the environmental impacts of chemical combustion.*

*On a philosophical level, the fact that all energy sources are essentially derivatives of the fission and fusion reactions taking place in the sun is rarely taught. Young Australians do not, by and large, understand that "solar is nuclear". They worship the former and fear the latter. In fact, the present generation of Australian young people has been labelled by many social commentators as the most fearful and the least likely to take any risk in the nation's history. Typically, after forty years of safe and meritorious operation, the present ANSTO Laboratories at Lucas Heights are still perceived by the rate payers of Sutherland Shire, NSW, only as a source of risk. The community fails to perceive that road transport to their schools and places of work represents a "life shortening risk" far greater than the operation of ANSTO.*

*Indeed their personal transport risks are far greater than the road transport of irradiated HIFAR elements from Lucas Heights to Port Botany. But because of public ignorance of the concept of "relative risk", radical environmental activists enjoy great success in manipulative techniques of "street theatre". They and the media thrive on visual and oral "presentations" which magnify risk, dramatise false consequences and create neuroses and phobias with a possible lifetime legacy of fear of technology and innovation.*

- (6) *ON THE NATIONAL LEVEL AND IN THE "CORRIDORS OF POWER" IN CANBERRA such techniques of cerebral manipulation form the bottom line of national "eco-politics". Consider the little stated but internationally recognised fact that per unit of energy generated, the nuclear fuel cycle is far safer than the hydro-carbon fuel cycle. Also consider the dishonest statements about the potential cost per unit of energy produced from the much flaunted "renewable" energy sources. Most of these have not passed field as opposed to laboratory tests; they have not been subjected to lifetime energy cycle audits; their operation may be subject to severe geographical restrictions. Yet the new energy supply corporations and "sustainable energy development authorities" make public claims and statements which cause academic researchers to blush. Their public image is promoted by Greenpeace and other environmental radicals in a manner which is close to "urban terrorism". Lovingly promoted by the media - especially the ABC - these techniques seem at the present time to be politically encouraged and legally protected.*

*No such protection is provided for nuclear energy technology. In fact, in at least two Australian State energy offices, discussion of uranium and the nuclear energy option is essentially "forbidden". The undersigned has also sighted school text books on energy matters as well as high school examination questions in respect of nuclear energy which are at best misleading and at worst dishonest*

#### **CONCLUSIONS**

**POISED ON THE EDGE OF A NEW MILLENNIUM, AUSTRALIA DESPERATELY NEEDS A FAR-SIGHTED ENERGY POLICY WHICH ACCEPTS DOMESTIC DEVELOPMENTS IN NUCLEAR POWER GENERATION AND THE DEVELOPMENT OF THE NUCLEAR FUEL CYCLE INDUSTRY IN AUSTRALIA FOR GLOBAL REQUIREMENTS....FOR THIS TO HAPPEN RESPONSIBLE NUCLEAR ENERGY EDUCATION AT THE PUBLIC SCHOOL AND TERTIARY LEVELS IS MANDATORY.**