Nuclear Fuel Cycle Royal Commission
Level 5, 50 Grenfell Street
Adelaide SA 5001

18 March 2016

SUBMISSION ON TENTATIVE FINDINGS

Electricity Generation Section

The report by WSP and partners starts at the assumption that the technologies in current use around the world will continue in the next one to two decades. That is that PWRs and BWRs will be the reactor technology of choice in the foreseeable future. While proven technology is desirable for any new installations, the report overlooks the possibility of using technology that has been proven in other parts of the world, viz USA, UK, Germany and more recently China, with success. Looking backwards also limits the capability to accurately forecast the potential technologies that could be used in Australia when the time comes for implementation. For a StarCore facility, that is scheduled to be available from 2021 with an NOAK reactor.

There are two areas in particular that StarCore would like to be given more emphasis in the final report:

- Safety and Human Intervention (Clauses 38-42)
- A compelling Business Case for Australian Mining Industry

Inherent Safety of HTGRs
The Tentative Findings and the supporting documentation emphasise the need for human interaction and as a result, the inability to achieve 100% safety. This assumes current technologies such as BWR and LWR reactor technologies will continue to be used. That in turn, indicates that the consultants advising the NFCRC are not up to date with Gen IV technologies, such as that offered by StarCore, nor with other technologies that have undergone considerable recent development.

Dr David Poole, StarCore's Technical Director, is Canada's representative on the IAEA's INPRO Committee. The IAEA has characterized HTGR technology – ie StarCore's prismatic bed reactor, as "inherently safe" (TechDoc 1674). At an IAEA conference in 2013 in Vienna, which Dr. Poole attended as Canada's representative, the working group agreed unanimously that the top level design requirements should be changed to allow HTGR plants to be fully automated and to have the usual "exclusion zone" - the area around a reactor prohibited to the general public - reduced to zero.

Thus these inherently safe plants do not have to be "controlled" in the usual sense of the word. They are fully automated and load following to match the output demanded by the local communities, who only have to manage the electricity and heat output use. Thus, fully automated in this sense *does not* mean by some mechanical or electronic means that

requires human intervention or control. Inherently safe means that the physics of the fuel design is self-limiting and that the reactor will default to a thermal stasis without human intervention. This is not a theoretical concept and has actually been demonstrated on an operating plant in China when the coolant gas was deliberately shut off.

StarCore also monitors all plant operations by triple redundant satellite links at a central facility and can shut them down remotely if needed.

This therefore means that inherent safety (without human intervention) is for all practical purposes, possible. Whist 100% safety cannot be guaranteed, the new technologies such as StarCore's can get much closer than previously envisaged and without human intervention. This is something that StarCore believes requires more emphasis In the NFCRC's final report. We believe this should be of interest to the public and policy makers.

Furthermore, is this not some futuristic concept that requires excess development. It is applicable now and working in other operations.

We believe that the absence of mention of such inherent safety in The Tentative Findings has the potential to reinforce fears in the minds of the public that are unfounded.

Furthermore, experts in the molecular pathology of cancer have, given the benefit of the passage of time since the Chernobyl and Fukushima accidents, reported that the risks from radiation from those accidents have been very much overestimated. For example, Dr Geraldine Thomas from Imperial College, London, as reported in World Nuclear News 11 March 2016. (http://www.world-nuclear-news.org/V-Time-to-look-again-at-radiation-safety-1103161.html).

Again, the lack of the Findings inclusion of these views, which are also reported in the UNSCEAR reports on the accidents, helps to maintain the views of those opposed to nuclear power in the absence of credible alternative information.

Compelling Business Case for the Australia Mining Industry

The second issue is that scenarios assumed by the consultants have missed a vitally important area. That is small SMRs sized for typical mining projects in off-grid applications, and smaller than the SMR's assumed in the consultant's analysis. The sizes chosen for the analyses are typically too large for this market, notwithstanding that one of the models chosen (BWXT's mPower – based on old BWR) has been virtually withdrawn from development.

Why is this important?

- Gen IV Technology chosen by StarCore for remote, off-grid operation is nherently safe;
- There is a compelling business case for the remote mining industry projects;
- No up-front capital is required by mining company customers;
- No water supplies are required for cooling the reactor or for raising steam - ideal for remote installation;
- May provide a low profile approach to Australia entering the nuclear energy field;

- Although the SANFCRC has recommended beginning to plan now, the pessimism around the potential start timeframe is unlikely to convince people to do so and therefore effectively precludes economic benefits flowing to the mining industry, which consequently means potential loss of competitiveness.

StarCore understands that a few micro reactors in remote areas will not solve South Australia's immediate power problems. It can, however, provide a low key entry to nuclear power in Australia and still meet the criteria set out in the Tentative Findings for an nth of a kind (NOAK) commercial reactor, licensed in Canada from 2021. Thus this is not futuristic and provides sufficient time for planning - if we start now.

A complacent start (to planning) due to an indifferent recommendation of a long time frame for implementation may unduly extend the time for the economic benefits of the nuclear approach to accrue to the mining industry and remote areas of the country.

The ultimate barrier to nuclear power in Australia is the legislation prohibiting it, notwithstanding the importance of its social acceptance. Due to the propensity for inaction by politicians of all persuasions, it is preferable to limit the numbers of ways in which they can make excuses to maintain the status quo.

Ultimately, in the words of Gareth Evans, the Chancellor of the Australian National University and former Foreign Minister of Australia, we just need "to grow up a bit".

While this expresses the writer's sentiments, it would be nice to see an even more positive endorsement, in the final report, of the need to get on with the planning for nuclear power, even if that may be from small beginnings.

StarCore Directors and officers are available at any time to answer questions or queries on any of the issues raised in this submission.

Your Sincerely,

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