5 August 2015

Our Ref: J31314
Your Ref: Email received 03 August 2011

Email: cgainer@saol.com

GIBB ENGINEERING & SCIENCE

People • Expertise • Excellence

Cape Town

14 Kloof Street
Cape Town 8001
PO Box 3965
Cape Town 8000

Tel: +27 21 469 9100
Fax: +27 21 424 5571
Web: www.gibb.co.za

Dear Ms Gainer

RE: ESKOM EIA CONCERNS FOR THE PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE (DEA Ref. No: 12/12/20/944)

Comment 1:

There are a number of concerns with the DEIR which I would like to raise:

The EIAR fails to consider the economic impacts that the construction of the NPS will have on broader South Africa (rather than the economic impacts on the local communities that was submitted by the EAP).

Response 1:

Your comment is noted. Although the Environmental Impact Assessment for the Nuclear-1 Power Station is a site-specific assessment tool, the Economic Report (Appendix E17 of the Revised Draft EIR Version 1 – Section 3.3) prepared by Conningarth Economists and Imani Development (SA) (Pty) Ltd nevertheless conducts a macroeconomic equilibrium analysis in order to quantify the macroeconomic impact associated with the possible construction and operation of the Nuclear-1 Power Station.

The report acknowledges that, as the nuclear power station is such a large capital investment (equivalent to that of six times the capital investment in the Gautrain), the economic ripple effects will go far beyond its direct boundaries. We refer the author to section 3.3 of the report for an expanded discussion.

Comment 2:

The EIAR fails to assess worst-case scenario impacts, a particularly important point in light of what has happened at Fukushima.

Response 2:

Thank you for your comment. It is acknowledged that the incident at Fukushima as a result of this natural disaster has highlighted many important safety factors in terms of the future of nuclear energy and is indeed a stark reminder of the unpredictability of the natural environment. However it is also well known that South Africa is located on a vastly more stable tectonic environment than that of Japan, which is situated close to a major subduction zone within the Pacific Ocean.

Nevertheless, the Revised Draft EIR Version 2 will include an analysis of "Beyond Design Basis Accident" scenarios like Fukushima to assess the implications for Nuclear-1. This assessment will consider the differences in technology between Fukushima Daiichi, which is based on a late 1960's design, and the Generation III nuclear power generation technology to be used for Nuclear-1. Based on the newer nuclear technology, the probability and consequence of meltdown incidents, such as happened at Fukushima, is greatly reduced, if not eliminated, if the same events were to take place at a Generation III nuclear power station.

ADDITIONAL COMMENTS FROM INDEPENDNT NUCLEAR SPECIALIST

In terms of each of the above; TMI whilst causing some reactor core damage had only minor actual radiological consequences. However significant lessons have been learned from the event. Similarly Chernobyl whilst having significant off site impact occurred due to a unique combination of reactor design (of a type no longer considered for commercial application) and a particular combination of operational circumstances underpinned by a poor safety culture. Apart from the proposed technology for any reactors in South Africa being not capable of exhibiting the sort of reactor kinetic behaviour, displayed at Chernobyl, the industry as a whole has learned significant lessons from the event - particularly in terms of Safety Culture which has since become an embedded characteristic of nuclear operators worldwide. With respect to Fukushima this was due to a unique combination of external events and a reactor design neither of which would specifically feature in the South African context - not withstanding this industry has undertaken stress tests of all facilities against the type of challenges a Fukushima type event would pose and where necessary and as far as reasonably practicable implemented necessary changes. Over and above this reactor operators are required to make appropriate provisions in terms of mitigating beyond design base events and to provide the necessary decision making tools to assist even in the remote event of such occurrences in the form of for example severe accident management guides.

Comment 3:

It does not consider the impacts and costs of waste and its disposal, and additionally, there is no long term solution for the waste.

Response 3:

Your comment is noted. The nature and impacts of construction waste is discussed and assessed in Chapters 3, 5, 9 and 10 of the Revised Draft EIR Version 1 and in its associated Specialist Studies (Appendix E). The nature and impact of radiological waste is described and assessed in Chapters 3, 9 and 10 of the Revised Draft EIR Version 1 and in the Nuclear Waste Assessment (Appendix E29)

Issues of radioactive waste management are important and integral to the debate surrounding nuclear energy and as stated the only alternative currently available in South Africa is long-term storage of the spent fuel in the nuclear power station. It should be noted that the radioactive waste management practices envisaged for Nuclear-1 are consistent with the IAEA guidelines for a Radioactive Waste Management Programme for nuclear power stations, from generation to disposal. Nuclear Power Station strives to minimise production of all solid, liquid and gaseous radioactive waste, both in terms of volume and activity content, as required for new reactor designs. This is being done through appropriate processing, conditioning, handling and storage systems. In addition, production of radioactive waste is minimised by applying latest technology and best practices for radiological zoning, provision of active drainage and ventilation, appropriate finishes and handling of solid radioactive waste. Where possible, the Nuclear-1 power station will reuse or recycle materials.

All forms of radioactive wastes are strictly controlled and numerous specialised systems and management practices are in place to prevent uncontrolled contact with these substances. These controls and practices differ for the different forms of radioactive waste. South Africa still has to formally release a strategy for the long-term management of HLW, including spent fuel. Until such time, all spent fuel is stored temporarily either in spent fuel pools (wet storage), or in dry cask storage facilities (dry storage). This allows the shorter-lived isotopes to decay before further handling, a management strategy that is acceptable from a safety perspective. It must be noted however that as per the Department of Energy's Media Statement on Nuclear Procurement Process Update as released on 14 July 2015 strategies are complete to develop an approach for South Africa to deal with Spent Fuel/High Level Waste disposal.

Disposal of radioactive waste at an authorised facility is being done according to an approved disposal concept, defined and developed with due consideration of the nature of the waste to be disposed of and the natural environmental system, collectively referred to as the disposal system. The disposal system developed for this purpose makes provision for the containment of radionuclides until such time that any releases from the waste no longer pose radiological risks to human health and the environment. The safety assessment process used as basis for this purpose considers both intentional (as part of the design criteria) and unintentional (natural or human induced conditions) releases of radionuclides. Unintentional releases include consideration of unintentional human or animal intrusion conditions, which might lead to direct access and external exposure to radiation.

Once released into the environment, radionuclides might migrate through the environmental system along three principle pathways: atmospheric, groundwater and surface water. Due to the physical nature of L&ILW and HLW disposal concepts, migration along the atmospheric pathway is highly unlikely. The principle environmental pathway of concern is thus the groundwater pathway, with the surface water pathway of secondary concern as an extension of the groundwater pathway. Disposal systems are designed so that releases to groundwater or surface water are highly unlikely as further explained in Chapter 10 of this EIR.

ADDITIONAL COMMENTS FROM INDEPENDNT NUCLEAR SPECIALIST

In addition to the given response it must be noted that IAEA requirements are informed by an extensive Body of Knowledge and where necessary derived from extensive scientific discourse and expert opinion from a variety of sources a range of complementary scientific publications and international Standards, Requirements and Best Practices which are evolutionary in nature and informed by international experience. It is therefore natural to expect standards to evolve over time - and it is unwise to be absolutist in these matters however any practices at any particular time must be based on the prevailing standards noting that the fundamental safety objective of the IAEA enshrines a common purpose that any designer operator or regulator is ultimately bound by and where necessary and guided by principles such as ALARP additional measures are considered for adoption.

Comment 4:

It does not adequately assess project alternatives (such as renewable energy) and a no-go option.

Response 4:

GIBB confirms that it is a legal requirement in terms of the National Environmental Management Act to assess feasible alternatives, which is defined to mean *different means of meeting the general purpose and requirements of the activity* – in the case of this EIA, the activity is the construction and operation of a Nuclear Power Station at either the Duynefontein, Bantamsklip or Thyspunt sites to provide base load electricity generation. As such Chapters 5, 9 and 10 of the Revised Draft EIR Version 1 discusses alternatives which include:

- Location of the power station;
- Nuclear plant types;
- Layout of the nuclear plant;
- Fresh water supply and utilisation of abstracted groundwater;
- Management of brine;
- Intake of sea water;
- Outlet of water and chemical effluent;
- Management of spoil material;
- Access to the proposed sites; and
- The no-development alternative.

The choice of technologies, described in Chapter 5 of the Revised Draft EIR and the implications or alternative technologies such as wind generation to addressing South Africa's energy requirements is provided for information but does not fall within the ambit of this Environmental Impact Assessment (EIA). It falls within the ambit of strategic government initiatives such as the Integrated Resources Plan 2010. The IRP and process was subject to an extensive public participation process. Carrying out such a debate during the EIA process would be duplication. .

This EIA and application for environmental authorisation is therefore not a strategic assessment of South Africa's energy requirements or the make-up of The future energy mix proposed to address these requirements. The EIA is also not an investigation into the pros and cons of the use of nuclear power vs. renewable/ alternative energy. The EIA is a tool used to assess the possible positive or negative impact that the proposed project may have on a specific receiving environment, which in this case includes the Duynefontein, Bantamsklip and Thyspunt sites.

Comment 5:

There is no final project design, making any assessment of the actual impacts impossible.

Response 5:

Your comment is noted. We assume that you are referring to design detail in terms of the reactor type/manufacturer to be used as you have not defined the lack of design detail in your statement above.

It is common practice in EIA processes, especially for installation of industrial plants, to consider the performance of the systems and type of technology proposed to be installed, without referring to specific suppliers or manufacturers of this technology, of which there may be a range available in the market. As long as the inputs and outputs of the proposed technology are known and the environmental impacts can be predicted or deduced from these inputs and outputs with reasonable certainty, it is not necessary to know the brand name of the technology and makes the assessment of impacts very possible.

As has been done in other issues and response reports, it may be appropriate to explain the envelope of criteria in colloquial terms, as has been done in public meetings during the Nuclear-1 EIA process. If the envelope of criteria is compared to the specifications for buying a vehicle, this envelope may contain requirements with respect to top speed, fuel type, fuel efficiency, catalytic convertor performance, type of tyres and wheels, fuel tank size, effective range, CO_2 emission limits, cruise control, numbers and positions of airbags and a number of other safety systems such as ABS and EBD. The only thing that isn't specified is the brand of vehicle. Providing such a list of criteria would ensure that only a luxury vehicle with certain characteristics could qualify, but that a base model (entry-level vehicle) would not qualify. Similarly, if a vendor proposes a power station design that fails to comply with the criteria established in the Consistent Dataset, that design will not qualify for consideration.

Assuming that an authorisation is granted by the DEA, a power station design that deviates significantly from that specified in the Consistent Dataset in the Nuclear-1 EIR (Appendix C of the Revised Draft EIR) would render the design incapable of meeting the requirements of the EIR and the authorisation. Hence such a non-confirming design could not be considered for construction.

<u>Comment 6</u>

In light of these concerns, I suggest that these revisions be added to the report so that decision-makers have all the relevant information to make their decision.

<u>Response 6:</u>

Your comments have been noted and revisions to the report will be made available where deemed necessary. Your comments will be added to the Revised Draft EIR Version 2 and Final EIR, which will be placed before the Competent Authority for decision-making.

Yours faithfully
For GIBB (Pty) Ltd

____
The Nuclear-1 EIA Team