

05 August 2015



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Dear Ms Abrahams

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

**Support for the Legal Resource Centre submission, prepared on behalf of Earthlife Africa and associated organizations, on the Nuclear-1 EIA**

**Comment 1:**

The Commission for Gender Equality (CGE) is an independent state institution established in terms of Chapter 9 of the Constitution, Act number 108 of 1996 of the Republic of South Africa. The Constitutional mandate of the CGE is to promote respect for, protect and attain gender equality, and to make recommendations on any legislation or policy affecting the status of women

As part of its work under the theme Gender and Poverty, the CGE has made a number of interventions in the fields of energy and climate change. As part of this work, the CGE expresses its concern over the gendered effects of nuclear radiation. It recognizes that women are disproportionately sensitive to the effects of radiation, as compared to men, and has thus identified the planned expansion of nuclear energy under the Integrated Resource Plan II as a gender equality issue.

Because women are generally smaller than men, with lower body mass and a higher proportion of fatty tissue, they are more susceptible to what has been considered "safe" radiation levels. We note that the results of a 1991 longitudinal study of over 25 000 Canadian women which seemed to demonstrate that women who has regular mammograms were 52 % more likely to suffer breast cancer than women who did not. A follow-up study at the University of Oxford designed to dispel this conclusion instead increased the uncertainty.

<http://jnci.oxfordjournals.org/content/84/11/832.extract>

While research continues on this matter, the precautionary principle which should guide policy-making indicates that we need to be cautious even in our exposure to "safe" radiation levels.

We note further that:

"Ionizing radiation has long been regarded as the most established environmental risk factor for breast cancer. Ionising radiation from the nuclear industry affects women especially, because the breast tissue is particularly susceptible to it."

<http://www.dianuke.org/nuclear-power-and-women/>

This concern is doubly of relevance where nuclear power has failed to be contained to low levels, as in the cases of Three Mile Island, Chernobyl and Fukushima reactors. Thus the CGE further notes that:

"It was found that women's critical organ doses and effective doses (as defined by the International Commission on Radiological Protection 60 [ICRP 60] are about 25% higher than those for men across all these studies."

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1469927/>

Lastly, it is matter of deepest concern to us that the effect of all forms of radiation on pregnant women and girl-children in the womb are devastating. It is most alarming to note a number of studies demonstrating that: "After exposure to nuclear radiation events, women may be more likely to give birth to boys than to girls.... "proof that the low-dose radiation that no one wants to have an effect has an effect," [head researcher] Scherb said. "And this effect is rather large in absolute numbers."

<http://news.discovery.com/human/nuclear-radiation-exposure-gender-110607.html>

Cf. also <http://www.dailymail.co.uk/sciencetech/article-1394553/Is-U-S-heading-baby-boy-boom-Japan-disaster-Study-finds-nuclear-radiation-results-millions-fewer-female-births-worldwide.html>

In view of the gravity of these findings, the CGE is of the opinion that the planned expansion of nuclear energy should follow the precautionary principle, and only act when science can clearly demonstrate that there is no risk. The concept of "low" risk is clearly not applicable to a form of activity such as nuclear fusion. It is the mandate of the CGE to monitor government. Over fourteen years of monitoring, we have come across human error every day in our line of work. This observation has been strengthened by our own recent monitoring of the Nuclear-1 EIA process in Thyspunt during May-June, 2011. Our conclusion is that any form of energy which relies for its safety on the absence of human error is simply not implementable.

At the very least, the people who experience the highest risk should be empowered to make their own choices, and consulted to the fullest in the development of government policy. It is the duty of the CGE to uphold the Constitution. The law of South Africa provides for the rights of women and other historically disadvantaged groups to be correctly informed and extensively consulted on matters affecting the environment. The law further provides that administrative action must be reasonable, just, and transparent.

In any administrative action, the law must be observed to the letter. It is our position that, in view of the seriousness of the risks to be faced, the findings of current research, and the potential price to be paid by women and those yet unborn, these legal provisions gain added weight. For this reason we support the submission made by the Legal Resource Centre, on behalf of Earthlife Africa and associated organizations, concerning the recently conducted Nuclear-1 EIA.

### **Response 1:**

Your comment is noted. As an organ of government, the Commission for Gender Equality has a responsibility to base its opinions on peer reviewed, objective scientific data. Some of the above-mentioned websites, however, provides no scientifically verifiable facts to support its claims and is based largely on the opinion of the authors. Also please refer to Appendix E32 where the potential radiological impacts on the public and the environment at the three proposed sites, Thyspunt, Bantamsklip, and Duynefontein, were investigated as part of an assessment of the feasibility of each of the sites. The investigation included the following aspects:

- 1) Nuclear power plant radiological discharges to the environment during normal operation and public dose.
- 2) Nuclear power plant accidents and radiological risk to the public.
- 3) Radiological risk to non-human biota.
- 4) Background radiation at the three sites.

The results of the investigations into these four aspects provide responses to four possible questions that interested and affected parties may have regarding nuclear safety.

- 1) *What is the radiological health risk by living next to one of the sites?*

South African radiological safety regulations specify an annual effective dose limit of 1 milli-Sievert (mSv) to a member of the public from all authorised actions involving nuclear and radioactive material. To ensure that the limit is not exceeded and protective measures are applied to achieve a dose as low as reasonable achievable (ALARA), a dose constraint is also specified for individual sources such as a NPP. In South Africa, the dose constraint is 0.25 mSv per year. The dose constraint value is representative of an extremely low health risk when compared to normal operational discharges of noxious materials from many other industrial activities. The dose constraint is also a small fraction of the natural background radiological dose of 2.4 mSv per year, the global average.

An assessment of operational radioactive discharges from representative GEN III nuclear power plants was carried out by considering specific characteristics of each site and using conservative assumptions. The regulatory dose constraint of 0.250 mSv per year to a member of the public can be met at each of the three sites.

2) *What is the risk of a nuclear accident?*

The majority of NPPs operating today were built in the nineteen seventies and eighties. NPP accidents at Three Mile Island, Chernobyl, and Fukushima resulted in serious questions about nuclear safety and the future of nuclear power plants. An overview is provided of the nuclear safety criteria applicable to accidents and some of the safety assessment methodologies. The safety features of GEN III reactors and the fundamental objective to practically eliminate large releases of radioactivity in the event of a severe accident that involves reactor fuel damage are discussed. It is concluded that GEN III NPP designs should meet the regulatory risk criteria. An assessment of a specific NPP design selected for a site will have to provide the final nuclear safety case before NPP operation will be allowed by the National Nuclear Regulator.

3) *What are the radiological risks to non-human biota?*

The radiological protection of non-human species has evolved considerably over recent years. Where radiological protection used to focus on human protection based on the assumption that, if humans are protected, non-humans living in the same environment would be sufficiently protected, the explicit consideration of Radiological Protection of the Environment is now recommended by the International Commission on Radiological Protection (ICRP). A screening assessment was performed of the radiation dose rates to a set of reference animals and plants from radioactive discharges during normal operation of a NPP. The dose rates are less than the reference value of 10 microgray per hour ( $\mu\text{Gy/h}$ ), a value well below any dose rate where measurable effects in organisms would be detected.

Much research is carried out to determine the effects nuclear accidents on non-human biota. The United Nation Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) produced an authoritative Fukushima report in which radiological exposures of selected non-human biota were estimated. UNSCEAR concluded that the possibility of effects on non-human biota in both the terrestrial and aquatic (freshwater and marine) environments was geographically constrained and that, in areas outside the constrained area, the potential for effects on biota may be considered insignificant.

4) *What are the current ionising radiation and radioactivity levels at the sites' environments?*

Background radiation surveys were carried over a period of approximately one year at each of the sites. The results indicate that the radiation dose to people living at the coastal areas near the three sites is lower than global average dose of approximately 2.4 mSv per year. One of the objectives of the surveys was to identify any radioactivity anomalies that may exist in the regions where the sites are located.

High terrestrial radioactivity of natural origin was detected at a location west of the Thyspunt site. The radioactivity results of marine biota confirmed international findings on the naturally occurring radionuclide polonium-210 and its potential high dose contribution to humans when compared to other radionuclides. Artificial radionuclides, for example Cs-137, were detected at all three sites. Globally, the presence of Cs-137 is attributed to historic events such as atmospheric atomic weapons tests.

The results of the prospective radiological assessments for the three sites presented in this report confirm environmental impacts of low significance and low cumulative effects.

We take note of your support for the submission of the Legal Resources Centre.

Yours faithfully  
for GIBB (Pty) Ltd

A handwritten signature in black ink, appearing to be a stylized 'S' or 'G' followed by a flourish.

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The Nuclear-1 EIA Team

