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Dear Mike Kantey

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

RE: REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT FOR PROPOSED ESKOM NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE (NUCLEAR 1)

As the elected Chairperson of the Coalition Against Nuclear Energy, I have been privileged to attend all three of the proposed sites which were examined with regard to the Revised Draft Environmental Impact Report (RDEIR) for Nulcear-1: Koeberg (City of Cape Town), Bantamsklip (Overstrand Municipality), and Thyspunt (Kouga Municipality).

Comment 1:

Although these sites were meant to be examined collectively with regard to the intended purchase of a "nuclear fleet" of six reactors, evidence may be lead that the proponent (namely Eskom), through their surrogate Environmental Practitioner, namely Arcus Gibb, was forced by the failure of Parliament to approve certain amendments to the relevant legislation to propose an allegedly "preferred site", namely Thyspunt.

In no document presented among the 18.6 kg of papers presented before us for final comment in August 2011 is there clear and scientifically testable evidence as to why Thyspunt was preferred over the other two sites, whose very choice in the very first instance in the 1980s may be proven once again to have been more the product of a besieged Apartheid State, than a rational and administratively just one. Indeed, when Mr Reuben Heydenrych of Arcus Gibb was challenged at the Public Meeting at Atlantic Beach in Cape Town on May 2011 as to the matrix which had been developed to determine the suitability of the Thyspunt site over the other two options, he was hard-pressed to provide any mathematical or even scientific, peer-reviewed justification for that matrix at all.

Assuming for the purposes of illustration only, then, that ONLY THYSPUNT, and no other site is worthy of discussion, we may proceed to discover whether the current Revised Draft Environmental Impact Report for Nuclear-1 has any merit as a document fit for the Minister to apply her mind rationally and in an administratively just manner with regard granting her approval for the erection of a 1600 MW nuclear power station ONLY AT THE THYSPUNT SITE and that site alone.

Response 1:

Your comments are noted.

It is made clear in Section 1.2.1 of the Revised Draft EIR that it was Eskom's intention to apply for three nuclear power stations, based on the expected amendment of the EIA Regulations. Should these expected amendments have been carried through, it may have been possible for Eskom to pursue such an Application. It is stating the obvious that this was not possible when the anticipated amendments were not made, as the available options for application are dictated by the law. The Application therefore remains (as it originally was) for a single nuclear power station.

GIBB takes exception to the suggestion in the words "surrogate environmental practitioner". GIBB is an independent consultancy.

The recommendation in favour of Thyspunt is explained in detail in Chapter 10 of the Revised Draft EIR Version 2.

Your reference to the choice of the Thyspunt site through Apartheid era planning refers. Project planning for large construction projects typically includes a pre-feasibility and feasibility assessment prior to detail planning and environmental impact assessment. Considering that the Nuclear Site Investigation Programme (NSIP) was focused on initial identification of potential nuclear power station sites, it should be regarded as an initial feasibility or even pre-feasibility study. It therefore stands to reason that not all impacts would have been investigated in detail and that these impacts can only be investigated in the EIA process or in other processes such as the nuclear licensing process. The socio-economic realities have not changed to such an extent since the NSIP was undertaken, that the major load centres in the Eastern and Western Cape (Port Elizabeth and the Cape Metropole) have changed, and therefore the location of power station sites in each of these regions (close to the Cape Metropole and close to Port Elizabeth) therefore remains as valid today as it was when the NSIP was undertaken.

The freezing and/or re-evaluation of all planning that had been undertaken prior to 1994 would result in an untenable situation as all planning and delivery processes would necessarily have been in limbo for the time it took to review planning priorities in view of the new political dispensation. In the case of the NSIP, planning would have been delayed by many years, since the NSIP process took in excess of a decade to complete. It can be questioned whether the freezing of all power supply planning for a full review of planning undertaken over a period of two decades (and the resultant delay in rolling out of power supply) would be of benefit to South African society. Apartheid era planning did not serve all the people of South Africa, yet planning for the development of a power station does in fact serve the entire population, no matter where it is planned, as it provides for security of supply across the country, whilst a power station in either the Western Cape or Eastern Cape helps to balance power supply and demand across the national grid.

Your reference to the matrix used for selection of the preferred site refers.

Every discipline has different method and approaches to evaluating data and information. In the field of environmental management, the assessment and evaluation of environmental impacts has developed over the last three decades and includes a number of criteria that are applied almost universally in EIAs. These criteria typically include nature (is the impact negative or positive?), extent (or scale), duration, intensity (degree of change), consequence (seriousness), reversibility, probability (how certain is it that the impact will occur?) and significance (overall importance of the potential impact).

Although there is general agreement about the nature of the criteria for assessment and there are local and international guidelines on this, there is no single agreed method. It is up to the discretion of the environmental assessment practitioner (EAP) to apply his or her mind to determine the most appropriate combination of criteria, as well as any requirements that the environmental authority might have regarding the criteria. In the case of the Nuclear-1 EIA the EAP sought assistance from other senior EAPs, namely Mr. Neal Carter and Mr. Reuben Heydenrych, as well as an advisor on EIA process, Mr. Sean O'Beirne.

Furthermore, based on comments received from the DEA during the review of the RDEIR Version 1, The National Department of Environmental Affairs requested the EAP to review the impact assessment methodology used in the Revised Draft Environmental Impact Report (Version 1), so as to simplify the criteria for assessment of significance and identification of a preferred site. In response, an approach has been developed that identifies and describes key decision-making issues contained in the individual specialist studies. This updated assessment no longer utilises the ranking / scoring system for the sites, but rather considers the residual risks associated with the proposed Nuclear power station at the proposed sites. These decision-making issues apply to both the acceptability of the proposed Nuclear Power Station as well as to the preferred site. Please refer to Chapter 10 for the updated assessment approach.

Comment 2:

The True Environmental Impacts of a Pressurised Water Reactor (PWR)

Given the history of the technology being considered – namely, the Pressurised Water (PWR) – it would seem logical to study its nearest equivalent in "Generation II" format: the existing Koeberg Nuclear Power Station, 28 km north of Cape Town. Here the exact same proponent, namely Eskom, has been operating a power station of similar design to the one hinted at as "Generation III+". Moreover, evidence can very easily be led that the technology held uppermost in mind by the proponents (even to the point of being mentioned by name both in the Integrated Resource Plan 2010 and in the current Revised Draft Environmental Impact Report on several occasions) is the European Pressurised Reactor (EPR) offered by France's AREVA, and which is currently in the process of being built in Finland.

Although vague and unsubstantiated claims have been made of the "safety" of this new, untested technology, Eskom itself has already declined to purchase this technology at its Board Meeting of December 2008 on the grounds of its unaffordable price. Rumour has it that the bid has been "reopened" for China and South Korea to get a look in, but – as far as this irrelevant and mischievous RDEIR is concerned – a globally unprecedented step has been taken by the proponent through its surrogate Environmental Practitioner to introduce by legislative sleight-of-hand an "envelope of criteria" which somehow, miraculously, makes the necessity for scientific rigour to be posted to a distant address, there to fall foul of the local sorting department.

Response 2:

The EPR is one of a number of Generation III technologies available commercially but it is not the only one enveloped by the consistent data set for the Nuclear-1 EIA.

In 2009, Eskom abandoned the procurement process due to funding constraints particularly in the context of the global financial crisis. At that stage Government supported this decision to ensure that Eskom does not over-extend its balance sheet and that Eskom's ability to provide the economy with competitively priced energy is not jeopardized. The procurement process will now be led by Government

We request you to refrain from your reference to GIBB as a "surrogate environmental practitioner".

Your reference to the "envelope of environmental criteria" refers.

It may be appropriate to explain the envelope of criteria in colloquial terms, as has been done in most public meetings held 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 efficiency, type of tyres and wheels, fuel tank size, CO₂ 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 is not 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 would not qualify for consideration.

In this respect, 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, it is not necessary to know the brand name of the technology.

Comment 3:

When one is therefore obliged to fall back on hard evidence from the Koeberg Nuclear Power Station (KNPS), a number of environmental impacts become self-evident, but I shall merely touch on a small selection.

Ever since the first reactor was switched on at KNPS, Eskom's own Environmental Science Laboratory at Koeberg has been obliged by law to report first to the old Council for Nuclear Safety and later to the National Nuclear Regulator (NNR). Having studied all of these reports in fine detail from 1982 (before start-up) to 2002, I can honestly say that the two problematic, long-lived radioactive isotopes that accumulate in the environment over 200 years are Strontium-90 and Cesium-137, which may be released through airborne emissions and liquid effluents.

In 2010 Professor Chris Busby and colleagues published *The Health Effects of Exposure to Low Doses of Ionizing Radiation* (Regulators' Edition), on behalf of the European Committee on Radiation Risk. In their Executive Summary on page 241, they state at Point 6:

The Committee argues that recent discoveries in biology, genetics and cancer research suggest that the ICRP target model of cellular DNA is not a good basis for the analysis of risk and that such physical models of radiation action cannot take precedence over epidemiological studies of exposed populations.

What is been said here is that the existing models propagated by the International Atomic Energy Agency (the IAEA) are insufficient to actively describe the risks posed by ionising radiation emanating from civilian nuclear power stations. Only a thorough health assessment of all citizens living within 50 km of such stations will suffice.

Yet, in Appendix E24, the specialist blithely glosses over this kind of scientific and testable evidence in favour of rhetoric and obfuscatory blather. Dissection of his theoretical corpse will therefore be left to another occasion, should it prove necessary to do so.

Response 3:

Your comment is noted. We need to point out that whilst some "Site Safety Reports" prepared as part of the authorisation process for nuclear licensing have been included as appendices in this draft EIA Report (Appendices E24, E26 and E27), radiological issues was not be assessed in detail in the RDEIR Version 1 since qualitative assessment of radiological safety is the mandate of the NNR. It is therefore important to note that The Emergency Response (Appendix E26) and Site Access Control Report (Appendix E27) and Human Health Risk Assessment (Appendix E24), which have been prepared on a high level,, are appended to this EIR for information only. Further details on these reports will be prepared as part of the NNR nuclear licensing process, as their findings will be evaluated by the NNR

However, in recognition of requirements in the NEMA, associated legislation such as the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000) and other legal precedents that require the consideration of all relevant socio-economic factors in an EIA process, an assessment of radiological impacts of the proposed power station is included in the current version of the EIR. Although this approach of including an assessment of the radiological impacts of the proposed power station results in a risk of duplication between the EIA and the NNR licensing processes, the risk to the EIA in terms of possible appeals, based on the exclusion of substantive issues such as health issues from the EIA process, is regarded as greater than the risk of duplication. The current version of the EIR therefore departs substantially from the approach in the previous versions of the EIR in terms of the consideration of radiological impacts.

In this context, it must be mentioned that the approaches of the EIA process and the NNR licensing process differ substantially. The focus of the EIA process is to assess the potential impacts of radiological releases (including normal operational releases and upset conditions). However, the focus of the NNR licensing process is to demonstrate beyond reasonable doubt that defence-in-depth

measures (multiple, redundant, and independent layers of safety systems) employed in the proposed power station design and operation are sufficient to reduce the probability of a failure leading to core meltdown or a failure of reactor containment to acceptable and highly-unlikely levels. Thus, the EIA process focuses on the consequences of radioactive releases. The NNR licensing process also focuses on consequences but is also designed to reduce the probability of such releases. Please refer to Appendix E32 of the RDEIR Version 2 for the Radiological Impact Assessment report.

As responded before to CANE and to other interested and affected parties, the exact source of radiation (i.e. the isotopes that give rise to radiation) is not material to health effects. Rather, the effective cumulative dose of radiation from all possible sources determines whether or not health effects can be expected to occur. To isolate specific isotopes of Strontium-90 and Cesium-137 is therefore immaterial to the questions of whether or not health impacts could be expected.

The public dose limit (1 mSv per annum) is a legal limit applied internationally for the protection of human health from exposure to ionizing radiation. This is regulated in South Africa by Regulation 388 of April 2006 under the NNR Act, 1999 (Act No. 47 of 1999). Koeberg Nuclear Power Station maintains all radiation exposures to the public as low as reasonably achievable, well below this dose limit.

Both Strontium-90 and Cesium-137 isotopes were detected in environmental samples which were collected in the vicinity of the Koeberg Nuclear Power Station before 1984 (before start-up of the Koeberg Nuclear Power Station). Operation of the Koeberg Nuclear Power Station has not increased the levels of Strontium-90 in the environment and the Strontium-90 activity is decreasing in the environment with time.

Response from Nuclear Specialist:

I agree with the response above. In addition radiological protection standards and practices are based on the best consensus scientific evidence.

Comment 4:

As to the marine impacts, I refer the interested reader to the submission of my learned colleague and marine biologist, Katja Vinding Petersen, but would like particular attention to be drawn to the precise impact on filter feeders, such as black mussels and abalone, as attested by the data from Koeberg Nuclear Power Station. For the “specialist” Professor Charles Griffiths to suggest at Slide 5 of his presentation to the Key Stakeholder Workshop held at St Francis on May 2010 that there is **no effluent** to the marine environment is a sad reflection on the state of scientific inquiry at a proud and noble institution with a long history of academic distinction. *O tempore, o mores!*

Furthermore, the recorded data from the Koeberg Nuclear Power Station show measurable impacts on edible and potable marine and agricultural foodstuffs, such as wheat, barley, fruit, dairy and meat products, none of which is reflected in the current DREIR, rendering it fatally flawed. Given the massive dairy industry surrounding Thyspunt, as well as the nearby presence of the Gamtoos River Valley Fruitgrowers Association, it would seem logical to take the cumulative negative impact of Strontium-90 and Cesium-137 on the farmlands of the South-Western (sic) into consideration at the very least.

Assuming, then, that human beings also are part and parcel of the landscape, as well as of the sea-going variety of anthropods, one would expect a thoroughgoing analysis of those projected impacts on human health, however miniscule, so that a proper “assessment” may be made.

Alas! This is not the case with Appendix E24, as has already been mentioned above, but we will reserve comment until another day, since one feels that the various, previous submissions, public comments and other evidence are more than sufficient to claim that “all remedies have been exhausted”. We would also refer the reader to the current submission by Greenpeace, which we heartily endorse.

Response 4:

Your reference to presentation of the marine impact assessment provided at the 2010 Key Stakeholder Workshop refers. The correct statement made in this presentation is that “*Release of radio-isotopes into the sea is not considered a threat, as cooling water never comes into contact with the reactor.*”

This is borne out by the more than two decades worth of monitoring of radiation in marine organisms near the Koeberg Nuclear Power Station. As indicated in the Marine Biology Assessment (Appendix E15 of the Revised Draft EIR, the following conclusions can be drawn from this monitoring:

“West Coast rock lobster, sediment and seawater samples have been found to be free of non-naturally occurring radionuclides (Alard 2005). Activation and fission products have, however, been detected in abalone, black mussel, fish and White sand mussel (Alard 2005). The levels detected at the KNPS have been below the levels at which further investigations or compulsory reporting to the NNR is required (Alard 2005). Importantly, due to radionuclides having been recorded in very few individual organisms at KNPS, the low concentrations at which they have been recorded and the fact that compounds at equivalent levels of radioactivity have previously been recorded in these species under natural conditions, these findings are not considered indicative of any significant effect resulting from the power station on the surrounding marine environment (Griffiths and Robinson 2005).”

Your claim of “*measurable impacts on edible and potable marine and agricultural foodstuffs ...*” refers. Kindly provide a scientifically verifiable motivation for this statement. It is also to be noted, as stated in the quotation from the Marine Ecology Assessment, that the presence of radioactivity in foodstuffs *per se* does not imply that there are actual health impacts: a distinction needs to be made between the presence of radioactivity (meaning the capability of isotopes in the environment to emit radiation) and the impact (i.e. a change in a person’s health status, which may be expected only if the radioactivity results in a dose which exceeds a certain threshold). The fact that some radioactivity in foods can be detected and measured (in units of Becquerel) is not necessarily an indication of potential health impacts. Only if the radioactivity results in a radiation dose which exceeds a certain threshold it may be regarded as a cause for concern.

A comparison could be drawn with other forms of radiation to illustrate this point. Radiation in the visible spectrum (sunlight) cannot be said to be a health risk under all circumstances and to argue that no one must be exposed to sunlight at any time because sunlight is a major cause of cancer would be unreasonable. It is only in circumstances where people are exposed to it for too long periods without sun protection (i.e. if they receive too high doses of sunlight) that the risk of skin cancer becomes significant. Similarly, it cannot be argued that any radiation in the environment will necessarily result in health impacts. It would only result in health impacts if a certain dose threshold is exceeded.

With regards to the issue of Strontium-90 and Cesium-137, please refer to Response 3.

Response from Nuclear Specialist:

The penultimate paragraph is not strictly the basis for radiation protection standards - it assumes a linear no threshold risk model for late effects (i.e. stochastic) but also accepts that below a certain de-minimis level these potential risks are so low as to be of no concern and therefore societally acceptable.

Comment 5:

A Skyscraper Without Toilets: the Avoidance of the High-Level Waste Problem

It is estimated that around 200 000 tonnes of spent fuel has accumulated worldwide since nuclear power production began in the 1950s. The world’s stockpiles of spent fuel and high-level waste are currently stored either on-site at the reactors themselves, or in off-site storage facilities. Countries such as Finland and the US have sited areas for the final disposal of their spent fuel in deep, underground repositories. However, as yet, no civilian spent fuel wastes are in a final repository.

Now, one of the man-made elements that never existed in such dangerous above-ground concentrations before World War II is plutonium-239, an atom of the naturally occurring Uranium-238, which has absorbed one extra neutron and is therefore highly unstable. It is a prolific alpha-emitter and the bad news is that its half-life is 24 000 years. This means that it takes 24 000 years to reduce its mass by decay to one half of the original. If you start with 10 grams of plutonium today, therefore,

you will still have 5 grams of plutonium 24 000 years from now. If Neanderthal Man had invented nuclear power we would still be dealing with the waste today. As Nobel Prize-winning chemist Hannes Alfvén put it, we cannot determine the exact effect of man-made radioactivity on the environment because we do not have enough experience over such a long period of time. To speak of background radioactivity, then, is a complete and dangerous obfuscation, designed to lull us into a false sense of security or to engineer our “perceptions” not by lying but by making us look in the wrong direction for the truth.

We thus need to examine very closely the existing policy on radioactive waste management and then determine whether the existing nuclear industry has shown any competence in carrying out policy in the last ten years of democratic rule.

South African National Radioactive Waste Policy

On 15 May 1997 Sapa reported that then Mineral and Energy Affairs Minister Penuell Maduna had said that a new deep geological nuclear waste dump had to be constructed early in the Twenty-First Century, most likely at Vaalputs in the Northern Cape. Writing in the *Saturday Argus* of 31 May 1997, Paul Olivier also noted that there was growing concern that South Africa could become a dumping ground for high-level radioactive waste from around the world. At that time Marlene Laros of the Wildlife and Environmental Society of South Africa said that WESSA would keep a close watch on waste imported from abroad. “While nuclear energy supporters highlight the safety of Vaalputs, we believe the long-term environmental costs have never been considered,” she said.

Then Springbok Town Council secretary Jaco Victor had also said that the council would insist that a feasibility study of the project to determine the viability of Vaalputs as a high-level storage area would have to take the community’s opinion into account. Vaalputs could have a detrimental effect on the growth of the town and for tourism in general in Namaqualand, Mr Victor said. “We do not have a problem with the way the site is managed at the moment, but when the study is being done for storing high-level nuclear waste the community will have to be consulted.”

Brian Hambleton-Jones, then senior manager nuclear waste management of the Atomic Energy Corporation (AEC - later the Nuclear Corporation of South Africa, or NECSA), said that a national policy for radioactive waste under the Council for Nuclear Safety (CNS) was currently being developed (later replaced by the National Nuclear Regulator, or NNR). Hambleton-Jones stated that the planning would include talks between national stakeholders such as the nuclear industry, mining, the building industry, the medical fraternity, trade unions, civic groups, NGOs and government departments such as the Department of Environmental Affairs and Tourism, and the Department of Water Affairs and Forestry.

No such talks ever took place that I am aware of. CNS spokesman Tienie Fourie had told *Saturday Argus* that the council had been given a mandate to draft such a policy during the previous year, and that “the way we are doing it is to meet with all interested parties and to discuss issues during workshops”. At no stage, however, in the intervening eight years, however, has any NGO, CBO or trade union been consulted, let alone the Namaqua community.

After much restructuring and legislation with regard to the nuclear industry, in a briefing was given by NECSA and the NNR to the Minerals and Energy Portfolio Committee of Parliament on 16 May 2001. Mr M. Damane, Acting Chief Executive Officer of NECSA stated that it was his organisation that had the statutory responsibility for exercising control over the management of radioactive waste, while the NNR exercised an oversight function (The Parliamentary Monitoring Group <http://www.pmg.org.za/>) Mr Damane had reiterated that the Department had “finalised the nuclear waste policy but that it still has to follow process”.

Mr Tseliso Maqhubela, Chief Director: Nuclear at the Department of Minerals and Energy had further noted that the issue of waste management policy was urgent but that “they also acknowledged the fact that they had a capacity problem”. In the year 2000 a team of specialists from NECSA, ESKOM and the NNR had been formed to develop a draft policy document.

The Draft Radioactive Waste Management Policy was finally released in 2003, two years after the first (aborted) Environmental Impact Assessment was conducted on the new Pebble Bed Modular Reactor (PBMR). In this Draft Policy Document, three options were mooted for spent fuel management: deep

burial, above-ground storage and reprocessing to remove the weapons-grade plutonium. Mr Maqubela later ruled out the possibility of importing nuclear waste and of reprocessing locally (*Cape Times* 27 May 2005).

Since then, no tangible policy for spent fuel as such has seen the light of day, which in the light of recent events at Fukushima is unacceptable.

Response 5:

Your statements about background radiation refer. Should you have a body of verifiable and peer-reviewed scientific evidence to support your claim that background radiation does not exist, kindly supply this. Reference to background radiation is in no way meant to divert attention from the risks of nuclear waste. However, there is a commonly held and incorrect perception (unsupported by academic and scientific literature on radiation) that human-made radiation is the only radiation that exists and that no natural radiation existed prior to the advent of nuclear science.

Neither the EIA team nor Eskom deny the existence of Plutonium-239 in nuclear fuel or the length of its half-life. The question of importance, however, is whether it can be responsibly managed so that radiation is contained and does not result in an impact on human health. Given the safeguards that are applied to management of nuclear fuel, it can be used safely without health impacts.

Your statements regarding the Vaalputs nuclear waste disposal site refer. Should the site be considered for the disposal of High-Level Waste (HLW) then appropriate applications in terms of the EIA legislation and the National Nuclear Regulator legislations would need to be made. In terms of such applications, consultation with all relevant interested and affected parties would be required.

Your statements about the development of a policy for nuclear waste management are noted. The Nuclear-1 EIA team cannot speak for the development of nuclear waste management policy in the past.

The disposal of nuclear waste is the remit of the National Radioactive Waste Disposal Institute (NRWDI), which has been established by the National Radioactive Waste Disposal Institute Act, 2008 (Act No. 53 of 2008). It is the policy of the Department of Energy to establish a central interim spent fuel store (under the auspices of the NRWDI) for South Africa by 2025. Therefore spent fuel would be shipped to this store from the power station.

The question on Fukushima waste is not clear. Are you referring to the spent fuel that will be cooled in spent fuel pools or the high level dry waste? Please can you rephrase your comment?

Comment 6:

The difficulties of managing spent fuel, vitrification technology and underground deposition

Given the volatility of spent fuel, the high-levels of radioactivity and the corrosive nature of the chemical compounds, it is understandable that few proven solutions have been put forward in the last sixty years of nuclear weapons and nuclear fuel production.

Much was made in the 1970s of the use of vitrification technology, whereby the waste would be mixed with glass and boron (a neutron absorber) to create borosilicate glass. During an experiment with borosilicate glass, conducted by the State University of Pennsylvania in 1978, it was discovered that glassified waste was extremely vulnerable under the kind of high temperature and pressure to be found underground in deep geological strata. The glass actually shattered into pieces after only two weeks ("Nuclear Fuel Cycle in Japan" Japanese Federation of Bar Associations, cyclostyle, April, 1992, p.21) It was also noted in the United States that - even if the leak were to occur in granite rock strata - a geological phenomenon known as "creep" would occur, whereby radioactivity would advance through the fine crystal lattice of solid rock formations over time and eventually make its way into underground water supplies. If long-lived radionuclides were stored underground in Namaqualand,

therefore, they would pose a direct threat to the community, whose agrarian economy is directly dependent on underground water sources.

Response 6:

Your comment is noted. It is not contested that the management of spent nuclear fuel requires controlled and well managed processes. It is a highly technical task that requires skilled operators, as with the rest of the nuclear fuel cycle. However, you have noted only selected alternative methods that were investigated for the storage of spent fuel but have neglected to mention a range of other safe technologies that are for the safe storage of spent nuclear fuel. Current treatment and management of used fuel (spent fuel) are through interim storage at the reactor site (wet and dry), reprocessing (in France/Japan) and direct geological disposal (Finland and Sweden). These are global practises and comply with regulatory requirements with the prime objective of protecting people and the environment. If Vaalputs is to be considered as a possible site for used fuel, the EIA and NNR licensing process will have to be carried out in future.

Comment 7:

A short history of “incidents” at Pelindaba and Vaalputs

On March 3 1996 a report by journalist Newton Kanhema in the *Sunday Independent* newspaper revealed that a “nuclear occurrence” had taken place outside Pelindaba in the North-West Province at a location with the unfortunate name of “Radiation Hill”. Radiation Hill has been used by the then Atomic Energy Corporation (now NECSA) as a disposal site for radioactive waste and was, up until the establishment of a waste storage facility at Vaalputs in the Northern Cape, the only national storage facility for radioactive waste. It is situated only 2 km away from Flora Park, a residential area, and a mere 10 km away from the densely populated Atteridgeville township. The report revealed the presence of background radiation 100 times greater than the required safety limit.

In 1990 condenser tubes of the research reactor at Pelindaba had leaked into that part of the plant where the product and the waste are separated. Some of the contents of the nuclear condenser had then reacted with the coolant. Most of the condensers had then been removed decontaminated and their tube-bundles replaced, but for one condenser, whose reactivity was so uncontrollable that it was impossible to dismantle without causing a serious nuclear crisis. The AEC reported that all the openings to the condenser had been sealed before it was buried at Radiation Hill.

During the early part of 1995, the AEC discovered the possibility that the stored condenser contained more uranium hexafluoride than had previously been thought and decided to retrieve and decontaminate the condenser. Excavation began in April 1995 at trench 7 on Radiation Hill, but was stopped shortly afterwards because the AEC had not acquired the proper authority and due to the depth of the trench some undisclosed safety problems occurred.

In an interview with Newton Kanhema, Bennie Masomola, one of those employed to work on the excavation said that they had started to work on Radiation Hill in January 1995. They had been told that they would be digging up waste and doing other clean-up jobs. They were also told to look for three condensers and were issued with a pick axe, a shovel, a pair of boots, an overall, and a paper mask to cover their mouths and noses.

Very soon we unearthed mountains and mountains of drums, many of them were rusty and full of cracks. I remember the dust and the smell, and when I went home the smell would still hang around me. It was very bad. As we dug deeper, we were covered with blue, red and green dust, said Masomola. An AEC senior manager glibly admitted: Look we screwed up, made several mistakes, infringed on many of our license conditions and no waste disposal records were kept for Radiation Hill.

In late 1995, the CNS decided to conduct an investigation into the activities at Radiation Hill. The council uncovered a series of violations and contraventions of the AEC’s nuclear licence. The investigation concluded that a number of drums containing radioactive waste had been excavated by a mechanical digger, and then dropped, rupturing and damaging some of them. Pieces of yellow cake (uranium) could be seen lying around as well as a bottled liquid, including a bottle marked C14 (for Carbon-14).

In 1997 the AEC issued a statement by Brian Hambleton-Jones, Senior Manager: Nuclear Waste Management of the AEC, with regard to some cracks which had appeared in some drums of intermediate level radioactive waste (ILW) delivered to Vaalputs in the Northern Cape from Koeberg Nuclear Power Station in May 1997. High values of Cesium-137 radioactivity were found in the vicinity of the drums.

According to Namaqualand workers Gert Joseph, Samuel van der Westhuizen, Jan Gouws, Dirk Links and Petrus Stewe, one of the containers had been accidentally dropped by the overhead crane on to another container below and they had been contracted as casual labourers to clean up the mess without benefit of training, overalls, masks, dosimeters or any other form of protection.

What these brief descriptions reveal is a blatant disregard for safety standards and occupational health on the part of the existing nuclear authorities and a tremendous reluctance to be generous with the facts.

Response 7:

Your comments are noted.

Comment 8:

It follows, therefore, that the Coalition Against Nuclear Energy has absolutely no faith in the current Draft (Revised) Environmental Impact Report for Nuclwar-1 (*sic*) whatsoever and supports the August 2011 submissions elsewhere of Greenpeace Africa, Janda Macdonald, Earthlife Africa (both branches), The Dyer Island Conservation Trust, the Thyspunt Alliance, and the Koeberg Alert Alliance, to name a few.

All of these submissions by these worthy organisations, who enjoy the full support of their relevant communities and have been ably supported by first-rate academic research and legal counsel, deserve to be read diligently and carefully – without adulteration or amendment by the proponent and their paid consultants – by the relevant case officer, the Deputy Director-General, the Director-General and the current Minister of the Environment, the Honourable Ms Edna Molewa, MP.

In the old language of successful challenges to the Apartheid ministers, they need severally and collectively to “apply their minds” to the submissions mentioned above and to come to a Record of Decision unhindered by ANC Policy, National Energy Policy, Cabinet decisions, international pressure, secret agreements with foreign governments, or lurid and paid advertising by Eskom, masquerading before unsuspecting taxpayers and domestic electricity users as “a warning” at the bottom of *Isidingo* screens.

Using the elegant mathematical and scientifically attested tool of “Ockham’s Razor” the Minister must ask herself whether the current Draft (Revised) Environment Impact Report (and no other document, yet to be revealed in court by discovery and an application under PAIA) – that this document confirms **in every single respect** with the stringent requirements of the National Environment Management Act, read together with Section 24 of our noble Constitution.

Response 8:

Your comment is noted.

Comment 9:

I am more than pleased to say that I am very grateful to the members of the African National Congress and those parties in Opposition who were instrumental in drawing up our Constitution. It has been tested many times since 1995 and never found wanting.

Let us hope and pray that the current Minister of Environment is not asked to defend her Record of Decision in that august court for a singular oversight in the 18.6 kg of documents which the exhausted public has been asked to peruse. I am not even sure that the Treasury would find enough gold in its

vaults to match the funds that would be required to conduct an exhaustive enquiry into the merits or otherwise of the matter in question.

Consider the time and effort which both the IAPs and the State would have to spend in examining and debating the merits.

Consider the invoices, the bills, and the expenses claims of the legal counsel, the expert witnesses and the research teams employed to both attack and defend the matter.

Then Consider Your Verdict, Madam Minister, and make your Record of Decision known before the blessed peace of Christmas descends.

Response 9:

Your comment is noted.

Yours faithfully
for GIBB (Pty) Ltd

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

The Nuclear-1 EIA Team