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Our Ref: J27035

21 December 2010

Attention: Dr. Jan van der Velden

Dear Sir

ESKOM ENVIRONMENTAL IMPACT ASSESSMENT (EIA:12/12/20/944) FOR A PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Your correspondence to Ms. Bongi Shinga of ACER (Africa) refers.

Arcus GIBB (Pty) Ltd (GIBB) acknowledges receipt of the above-mentioned letter. We thank you for your valuable comments and your participation in the Eskom Nuclear Power Station (Nuclear-1) Environmental Impact Assessment (EIA) process to date. Your questions and comments concerning the Nuclear-1 have been noted.

Responses to your comments / questions are as follows:

Your comment (1)

I include this bit of trivia in view of the latest developments.

The government has decided to go the "nuclear route" with nuclear power stations, most likely from Europe, and a pressurized water system. I will not criticize this decision, I only criticise the locations, my main concern.

Response (1)

Your comment is noted.

Your comment (2)

Another concern is the government's plan to enrich Uranium locally. This is not just speculation. It is real. This is probably one reason that the USA abstained from voting at the World Bank. I do not think it has anything to do with global warming, but has much to do with a possible repetition of what follows below, besides avoiding criticism from American voters. A good journalist will not reveal the sources of such "leaks," but mine are reliable. Besides that another such leak reached the press.

The total costs of nuclear power should include the decommissioning and I think the budgeting for that is totally unrealistic. (read: Will cost a helluva lot more, unless cutting corners.)

Response (2)

On the enrichment of Uranium locally, South Africa is a signatory to the Nuclear Non-Proliferation Treaty (NPT or NNPT), if there is possibility of enrichment in terms of future localisation as the nuclear

industry grows in South Africa our actions will be guided by the spirit of NPT. In 1991 South Africa signed the Nuclear Non-Proliferation Treaty. In 1993, the country had developed a limited nuclear weapon capability. These weapons were subsequently dismantled before South Africa acceded to the NPT and opened itself up to IAEA (International Atomic Energy Agency) inspection. In 1994 the IAEA completed its work and declared that the country had fully dismantled its nuclear weapons program.

On decommissioning, the EIA will provide guidelines, principles and criteria based on international literature and best practice. The EMP will also contain specific 'in principle' commitments which will ensure responsible decommissioning. In addition associated estimated costs will be provided with respect to the means with which Eskom makes the required financial provision for decommissioning through the operational life of the power station.

In addition decommissioning will be dealt with in the NNR process**.** The National Nuclear Regulator (NNR) makes provision for the establishment of a decommissioning plan for nuclear power stations. The decommissioning plan must be submitted before the nuclear authorisation is granted**.**

Your comment (3)

Best of luck with the collating of all the reports you will have received by now. You have my sympathy while burning the midnight oil.

Response (3)

Thank you for your thoughts and well wishes.

Should you have any queries with respect to the above please do not hesitate to contact Arcus GIBB.

Yours faithfully
For Arcus GIBB (Pty) Ltd

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Jaana-Maria Ball
Nuclear-1 EIA Manager

1.1 Bantamsklip, Nuclear power, Atom Bombs and Apartheid.

Now, in post-apartheid South Africa, it can be revealed that nuclear power stations and the development of atom bombs went hand-in-hand. South Africa got rid of its atom bombs, but the legacy remains. The present government seems hellbent on putting nuclear power plants right here in the south western part of our country, where it is now the most inappropriate place to put it. The question is "Why?"

The answer is: Because P.W. Botha and his Apartheid security advisors decided so decades ago. The new government is just following old plans without thinking.

The development of nuclear power in South Africa can only be understood against the backdrop of the Cold War, which started almost at the end of the 2nd World War until the fall of the Soviet Union - and beyond. Moscow drove communist expansionism and the Western powers seemed unable to stop it. Korea is still in a deadlock since 1953. Eastern European countries became puppets of Moscow, Russian tanks rolled into Prague and Budapest, to brutally suppress uprisings. The USA withdrew from Vietnam in 1975 after receiving a bloody nose. That was a war that was never even formally declared. It just happened. The Russians invaded Afghanistan in 1979 and civil war, again driven by Moscow, was devastating Mozambique and Angola. As conflict spilled over our borders, the previous government realized they may at best contain the conflict, but never win it. Then came the arms embargo in 1975. South Africa stood alone. Apartheid had made South Africa a pariah state, an outcast from the international communities, both East and West. With its back against the wall, drastic action was needed.

The decision was made to manufacture atom bombs as the only effective defense or at least a deterrent. Almost from the beginning, nuclear power stations and the development of atom bombs became inextricably linked.

Whatever one's stance is now or whatever side of the political divide you were or are on, it cannot be denied that white South Africa had every reason to feel threatened. One can now reason that the bombs would have been unnecessary, had the previous government innitiated political change in the 50's and early 60's as, in British Prime Minister Harold Macmillen's words "The winds of change are blowing over Africa." And that change did not turn out well in all of post colonial Africa. Would South Africa have been any different? It seems Botswana did well, but not the rest. Nice debating point, but no one will ever know for sure. The African states had little reason to love their former colonial masters. Whatever the case, the apartheid regime chose to dig in its heels. Apartheid drove white and non-white further apart.

As is now known, there was a lot of internal disagreement in the cabinet at the time and when F.W. de Klerk became head of state, he secretly ordered the nuclear bomb manufacturing to be stopped. The fact that South Africa indeed had nuclear weapons was only acknowledged by President de Klerk March 24 1993, four years after he ordered bomb building to be stopped in 1998. .

Let us go back to the situation in the mid seventies.

From the mid to late sixties, the situation in Sub-Saharan became more unstable and even worse during the seventies. Peace and democracy seemed out of reach. Fear gripped the southernmost country of the continent as the situation to the North seemingly worsened.

There are limitations to conventional warfare. South Africa was no match for what Moscow could supply. Cubans poured into Angola. Unrest increased on our borders. The only answer was to get atomic weapons, as well as devices to deliver them to distant enemy cities. A tall order, as very few countries had that capability at the time. Certainly none in Africa

The ultimate would be to have an atom bomb that could be dropped on Moscow - where most of the trouble was hatched. South Africa could already, theoretically, drop a bomb on Nairobi, when the rocket research stopped in 1993. At least one missile, launched from the Missile Testing Range at Bredasdorp, could travel that distance. It has been estimated that, had the research continued, the South Africans would have a missile capable to drop an atom bomb on Moscow, by 1996. That would make Moscow think twice before pushing its luck. But the Berlin wall collapsed in November 1989 and politics overtook further developments.

South Africa would also later be able to later launch its own satellite into space. Sadly,, that completed satellite is now only a display item at the Air Force Museum at Swartkops. South Africa was forced by the USA in a rather unfriendly way, to demolish its entire missile program, even for peaceful purposes. A good example of how paranoid and mixed-up American foreign policy really is. The result is that most of the scientists working on that missile program, are now working for countries hostile to the USA.

Perhaps the only good that came out of all of this is that South Africa is now the world's 3rd largest exporter of nuclear isotopes for medical and industrial use, So the bombs found a peaceful use after all.

The Technical part.

Most of us know the model of an atom. It has a nucleus, consisting of protons with a positive electrical charge, neutrons with no electrical charge and a little cloud of electrons, with a negative electrical charge, orbiting around it. When we talk about ''nuclear'', it only concerns the nucleus of the atom and what happens to it. The electrons play no part in nuclear reactions at all. Elements are things like Hydrogen, Oxygen, Iron and Uranium, according to the number of protons in the nucleus. Some elements have different isotopes. That means, although they have the same number of protons, they have different numbers of neutrons in the nucleus. So, Uranium 238 has 3 more neutrons than Uranium 235. That means: U235 and U238 are the same element, with the same number of protons and electrons, but are 2 different isotopes of the very same element, Uranium. Elementary, my dear Watson.

Some isotopes are called: ''stable'', that means they stay the same over millions of years, but others are ''unstable''. Unstable isotopes tend to spontaneously break up or lose some of its neutrons, This usually happens with some sort of release of energy in the form of radiation. These isotopes are therefore called ''radio-active''. Since there are uncountable billions and billions of atoms in one gram of an unstable element, and they break up one atom at a time at random, that means at any time now or in the distant future, there is no danger of them all breaking up at once with lots of release of radiation and energy. There are just too many of them for the chances of that to happen. They decay gradually.

But the more unstable they are, the faster it takes for one gram of that element to break up, or ''decay.'' The time it takes for one half of the atoms to break up, is called the ''half - life'' of that atom. This may vary from minutes to centuries. Then it will take the same time for the other half to break up, leaving only a quarter of the original gram to further decay, every time using the same time to half its numbers. And so on.

Scientists figured out ways to hurry up the process that will cause all of the atoms of the unstable isotope of Uranium, (U235) break up in a very short time, with the release of a helluva lot of energy and radiation. That is called a nuclear explosion or atom bomb. Or simply the A-bomb. They eliminated the natural half-life. This splitting of the atom is called ''fission''. And the bombs are also called 'Fission bombs.''

Scientists have also figured out another way to hurry up the breakdown of radio-active isotopes, but in a slower controlled sort of way with a much smaller, but longer lasting release of energy. That is the basic principle of a nuclear reactor. It is almost an atom bomb slowed down millions of times. But if

that slowed down reaction is not controlled extremely well, the reactor can overheat and cause a "meltdown". This is what happened at Chernobyl. Thousands of people died because of direct radiation near the site and thousands more later, because of the radio-active particles that were released into the atmosphere and inhaled by the unlucky victims. Something similar occurred to a lesser degree at Three Mile Island in the USA. **Incidentally, the same company, Babcock, that built Three Mile Island also built Mossgas.**

The only person who kept track of the real number of fatalities of Chernobyl, "committed suicide". If that tells you something.

Proponents of nuclear energy argue that Chernobyl was started up before completion and the protective concrete and steel containment cover over the reactor was never built. Others point out that it was built as much for generating electricity as making Plutonium, another unstable element, to build atom bombs with. It was also said that Chernobyl was a bad design and it was also due to human error and badly trained staff being overly tired, did stupid things. All of which is true. Nonetheless, more than 2 dozen nuclear accidents occurred in the western world alone, so nothing is completely safe or perfect.

To build atom bombs, you need Highly Enriched Uranium. Natural Uranium ore is only slightly radio-active as it contains a mixture of two forms of Uranium, the "isotopes", U238 and U235. Most of it is the isotope, Uranium 238, which is stable and unuseable. The unstable, or radio-active isotope is Uranium235, which is only a small% in the ore and it is U235 what is needed. It needs to be separated to an extent from the rest. This process is called "enrichment". The more U235 vs. U238 in the resulting mixture, the more it is "enriched" and the more unstable it is. In other words, the more radio-active the mixture, the more useful it is. uranium enrichment is extremely difficult and expensive. South Africa did succeed to find a secret, unique process for enriching Uranium.

More history.

The best way to secretly enrich Uranium, is to have a nuclear reactor as a cover for your activities. The country only has to say it is enriching for peaceful purposes, as North Korea and Pakistan did and Iran is doing now. Both North Korea and Pakistan now have nuclear bombs, bombs that they denied they were developing. It is the lust for political power that drove most nuclear research, not electrical power.

South Africa already had a small nuclear reactor as far back as 1965, for peaceful research purposes. But there is evidence that some elements in the South African government even then had plans to join the nuclear arms race, even though the reactor was acquired from the USA under the "Atoms For Peace" program. Interestingly, this reactor ran on Highly Enriched Uranium - that usually means, "Weapons Grade Uranium" - which was supplied by the USA. Weapons need to be lightweight to be delivered by aeroplane or rocket, so the uranium needs to be highly enriched - up to 90 % for a big bang. Reactor fuel needs only to be enriched up to about 10%, because there is no real weight restriction. The more enriched the fuel, the more unstable it is, so the more radio-active it is and the more difficult and dangerous it is to handle.

At the time, as these things go, in the murky world of politics and weapon procurement, then, as now, the amount of covert actions, secrecy, espionage and counter-espionage and deception was enormous. Prime Minister John Vorster announced publicly in 1970 that South Africa had developed its own unique way of enriching uranium. The message was clear: think twice before you mess with us. But, he assured everyone, that the enriched uranium would only be used for peaceful purposes. However, the USA did not like, nor support this development and stopped supplying highly enriched Uranium to South Africa for the small reactor it already had. The USA did not really believe South Africa could achieve that capability. The USA optimistically hoped that South Africa's nuclear program would just fizzle out with an arms embargo. However, it had the opposite effect than intended. Instead of halting the nuclear research, it just spurred the South Africans on to do the

impossible: make atom bombs with only a fraction of the money and other resources of any country that had atom bombs.

South Africa never confirmed, nor denied that it had atom bombs, but kept the world guessing - and worried. Until much later.

The excuse was that nuclear research would be used for "peaceful purposes" only. In those years, "peaceful" may even have included (as unbelievable as it may sound today) using small nuclear explosions instead of dynamite in engineering projects. The Americans contemplated using it to enlarge the Panama Canal and blasting a harbour in Alaska to construct a military base close to Russia. The Americans dropped the idea, but the Russians did use nuclear explosions to make a canal or canals, but this remains shrouded in mystery. With South Africa's rich mineral deposits and raw materials, nuclear bombs for mining were a possibility, but most believed that the South Africans did not have the technical ability to construct them.

But to be sure, the arch enemies, the USA and Soviet Union, later even joined forces to spy on South Africa, exchanging satellite pictures. A potential nuclear test site being built in the Kalahari, nearly got South Africa in a big war. The site got close to being bombed, but South Africa got wind of it (perhaps tipped off by the USA) and hastely cancelled the test and demolished the site. The public of course, never even suspected anything. However, South Africa kept the Koeberg Reactor going, so nobody really knew what "we" were up to.

The process goes in full swing

In the P.W. Botha era, there was the "total onslaught" and "swart gevaar" - mostly from the North, Within our borders, it lead to the chasm between black and white growing larger,. along with animosity and fear - the scourge of apartheid - leading to extremist groups on both sides. The scaremongering may have done more harm than good, even with 50 000 Cuban troops in Angola. The plans for an invasion and a possible war had to be drawn up and implemented with ever greater haste.

Conventional wisdom dictates in such a scenario that the defensive and offensive military bases should be as far North as possible, but not so close to the border to be vulnerable to a surprise cross-border attack. These were built and "Boetie gaan border toe."

But one will keep your secret weapon manufacturing as far away from the enemy to the North as possible and hidden where nobody will suspect it. It was already known that the nuclear facilities were near Pretoria, so no use shifting that. Just let the nuclear facilities blend in with with other industrial sites, camouflaged as something else. And so the history of nuclear power and atom bombs are twisted into the very fabric of this country. Just as is happening in all other countries aspiring to be part of the nuclear bomb elite.

The furthest away from the Swart Gevaar, and "the closest to home" was right here in the Western Cape. So the new development for secret misssile technology was hidden away in a chemical factory, Somchem, in Somerset West. The missile engine factory was hidden in the mountains that is now the Kogelberg Biosphere Reserve and other technology was developed at Houw-teq close to Grabouw. Hermanus was not spared either.

The first missile testing range was built at St., Lucia, Northern Natal, right in the middle of a high priority conservation area, despite the objections of "the Greens". Because the earth rotates westwards, it is best to place missile launching sites on the East coast and as close as possible to the equator. That is why Cape Kennedy/Canaveral is on the coast of Florida in USA and the Europeans launch theirs from French Guyana in central America. But now there was a problem. Things were not going well in Mozambique and that was too close to the secret missile testing. So then in 1983 the missile launching site went as far South as possible as well. And where is better than the Agulhas plain near Bredasdorp? This missile test range is still used today.

To be economical, one must have your power plant and fuel as close as possible to the place where it is used. It was convenient to have big power stations close to the coalmines in eastern Transvaal and the high tension wires were relatively short to the mines and industries around Johannesburg. Cape Town is far south and a lot of power is lost in transmission due to resistance in the long cables. So, to build Koeberg nuclear power station near Cape Town was logical and economically justified. There is no coal in the Cape and the nuclear fuel is manufactured near Pretoria where such a manufacturing plant was well known and how would anybody know how much Uranium is actually enriched and to what degree? Security was so tight, that neither the USA nor the Soviets ever found out.

Uranium ore is plentiful in South Africa. So weapons grade enriched Uranium - a mixture of up to about 90 % U235 and 10 % U238 - was manufactured next to reactor grade Uranium at only 3.5 % to 10% enriched. Nuclear fuel is concentrated so only a truckload or two poses no transport problem. So South Africa enriched its own uranium to about 3.5 % to be used in Koeberg, and quite legally so, in the eyes of the world. What the world did not know, was that a large amount of weapons grade Uranium was manufactured as well, at the same enrichment facilities.

However, with a growing population, more power stations became necessary. The transport of coal is expensive, so the coal-fired power stations near Cape Town were eventually shut down, as being uneconomical. At least one coal-fired power station at Newcastle, Natal, right next to a coal mine, was dismantled and the essential machinery sold to Germany, at the turn of the millenium, even with power shortages looming. This gives one a clue of how ignorant the current government actually is about energy and related matters.

The Apartheid Connection.

Now it becomes interesting. Koeberg is too far from Port Elizabeth and East London, not to mention Durban and Richards Bay to be really that economical, due to electricity lost in long transmission lines. So why build one here at Bantamsklip, which is also far too far? Or even at Thyspunt, near Cape St. Francis? Or at Duynefontein, next to Koeberg, the three preferential sites?

Well, if one put it further East, it would be too close to where Nelson Mandela and other "terrorists" came from. And here the securocrats' paranoia is showing in a 1984 report: The: "nuclear investigation report western cape 011538# P1 - 48." This report states "is not advisable to route 3 lines parallel from a security point of view." The ANC or PAC "terrorists" were trying to disrupt the economy by blowing up power lines at the time, remember? To have one main power line out of action could be managed by feeding from elsewhere in the grid. With all 3 gone, it could be extremely disruptive. Not good in war-like situation.

Durban and Pietermaritzburg are rapidly growing cities. Neither have coal fired power stations and all its electricity comes the former eastern Transvaal. Richards Bay is also developing fast and huge electricity-hungry Aluminium smelters were planned there, with one already operational. So why not put a nuclear power station there? This is now anyone's guess. Could the proximity to Mozambique still be a factor? Or the surrounding "swart gevaar"? Unlikely. Very unlikely. So what is it?

Or could it be that the old plans from before 1994 are still on the drawing boards and in the back of the minds of the old planners. And so the new planners just took over the old blueprints? Being new in the game, the new role players, some too young to remember, simply went on with the old plans, drawn up in the P.W. Botha era without questioning the reasons for the plan. It could very well be. As the French say, "There is nothing as permanent as a temporary arrangement". Judging by the plans for the Aluminium smelters that were approved and then had to be cancelled again, one has reason to question the judgement of the ministry of energy affairs and the department of trade and industry.

The Thyspunt site, although also in an ecological sensitive area, is close to East London and Port Elizabeth. P.E. the bigger city, is the one furthest from the power station. This does not really make sense. The area between the two cities was surveyed and found geologically unsuitable for a huge

structure like a nuclear power station. But one would expect it to be further up the coast, closer to Durban and Richards Bay. Especially since Eskom sells Electricity to an Aluminium smelter all the way up in Mozambique. MozaI buys electricity at half of the price that it costs Eskom to produce the power, if one has to believe the latest newspaper reports.

The Paradigm

It seems very likely that Eskom got stuck in the mindset of the "old guard", most of whom have since retired. But the new ones who took over the reigns, just went on unquestiongly with that mindset - that paradigm - that nuclear power stations should be in the old Cape Province, just like old P.W. Botha and his securocrats decided. Due to this, the Western Cape and lately the western side of the Eastern Cape must carry the burden of having nuclear power-plants in our midst. With all the negative effects and no benefit.

Will the top hierarchy wizen up that they are following P.W. Botha's policy? Unlikely. They are far too busy fighting each other for positions, big salaries and retirement bonuses. The leadership at Eskom, these last few years, has been so unstable that no big plan was formalized, except to build more power plants. Realizing that going nuclear would be too costly and will take far too long to build, they decided to go the old coal route; cheaper and faster. That was until the World Bank told Eskom they will not get a cent, until Eskom includes renewable energy in its long term planning. In their haste to get going, the board members of Eskom forgot all about their promises about renewable energy until the rude - or is that "inconvenient" - awakening by the World Bank.

It is unclear exactly how the World Bank thinks about nuclear, given the costs, but greenhouse gas power stations are a no-no to the moneylenders. Their mindset is more towards renewable sources such as wind and solar generated electricity.

So, in summary, let us not call it the "Bantamsklip" or "Thyspunt" Power Stations." Just call them after the Big Boss, "Die Groot Krokodil" who wanted it that way: **The P.W. Botha Power Stations.** That is what they really are.

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