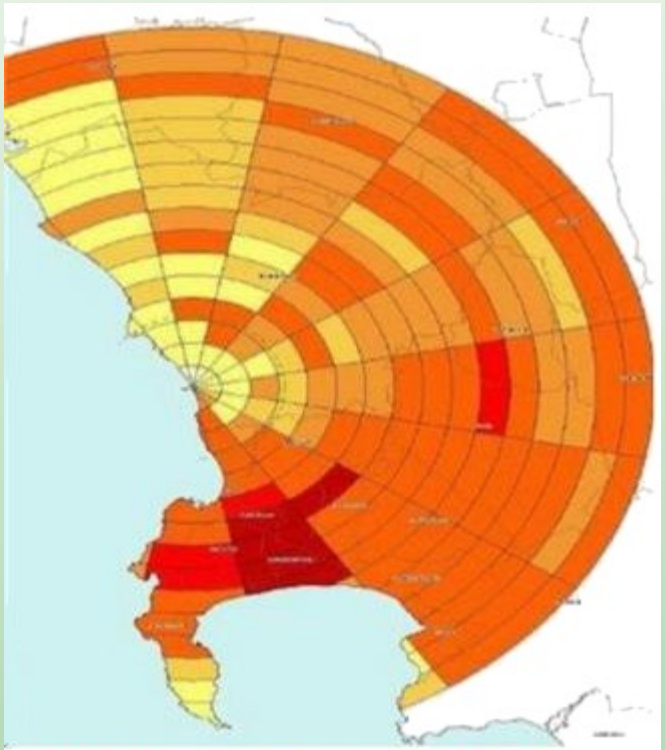
Koeberg and Nuclear Safety



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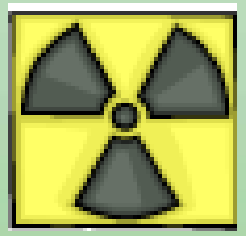


Nuclear

WHEN CONTROLLED NUCLEAR FISSION takes place, a large amount of heat is generated. This heat, in the form of steam or heated gas, is used to drive the turbine, which drives the generator, producing electricity.

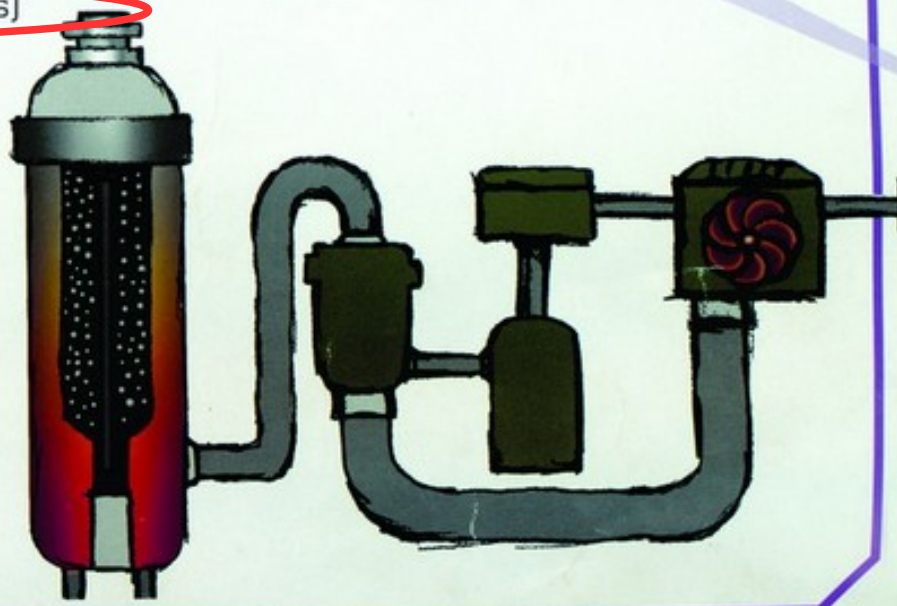
Nuclear is a leading option around the world today, because it generates enormous amounts of energy cleanly, reliably, safely and affordably. South Africa is at the forefront of cutting edge nuclear technology with its Pebble Bed Modular Reactor (PBMR).

Advantages

• It is safe. Unlike old nuclear power stations a core 'meltdown' is not possible. PBMR is a completely different design • PBMR is a modular design, which means you can add extra plants when you need more power for an area, almost like Lego • Plants can be built close to where power is needed, saving high costs of power lines • One Pebble will produce as much electricity as 7.6 tons of coal, without polluting the atmosphere • It is quick to build (24 months) • It is versatile, and has other applications such as desalination. It also generates heat that can be used in industrial processes • Skills development, job creation and foreign revenues for South Africa when our technology is exported • Environmentally friendly – it generates clean, safe energy without polluting the air or water • South Africa is rich in Uranium – the core of nuclear fuel

Disadvantages

• Negative public perception, based on inaccurate, outdated information



(Dis)Information

“A nuclear power plant is infinitely safer than eating because 300 people choke to death on food every year.”

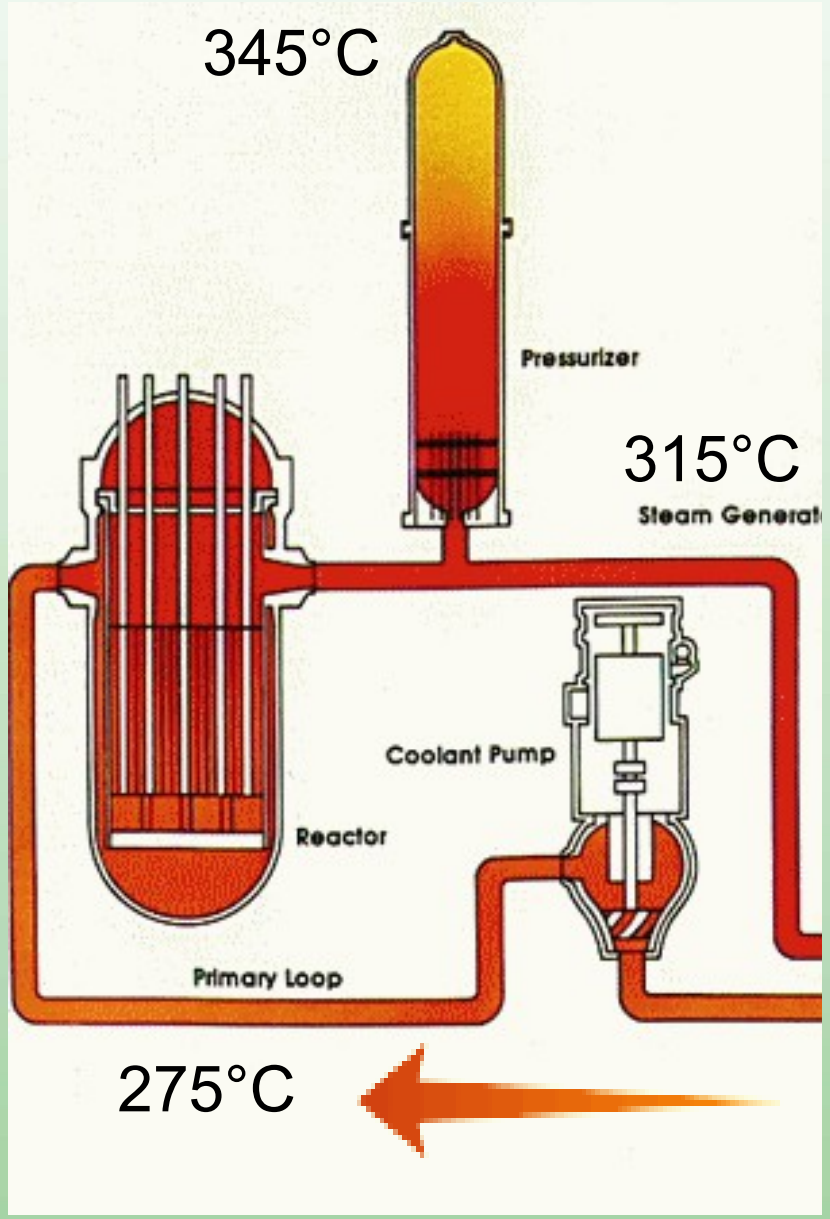
Dixie Lee Ray. Washington governor and Atomic Energy Commission chairwoman
1977

“Nuclear power is absolutely safe.” *

Cloette Lewiner, President of European Nuclear Society
1993

“Nuclear power is safe. It doesn’t contain pollutants.”

Bill Richardson, US Energy Secretary
World Environment News
1998



Pressurised Water Reactor (PWR)

150 x atmosphere

~75 cubic metres/sec

Why?

When?

Made in the 1970's

Made in the 1970's

Design issues

Every accident results in new safety feature

Koeberg pre-dates all major accidents

Retrofitting is expensive

E.g. airbags all round, TCS, computerised engine control ...
A balance between economics and safety. Who decides?

Analogue controls

Replacement parts?
Change to digital?

Corecatchers

Required in France

Age, wear and tear

Marine environment

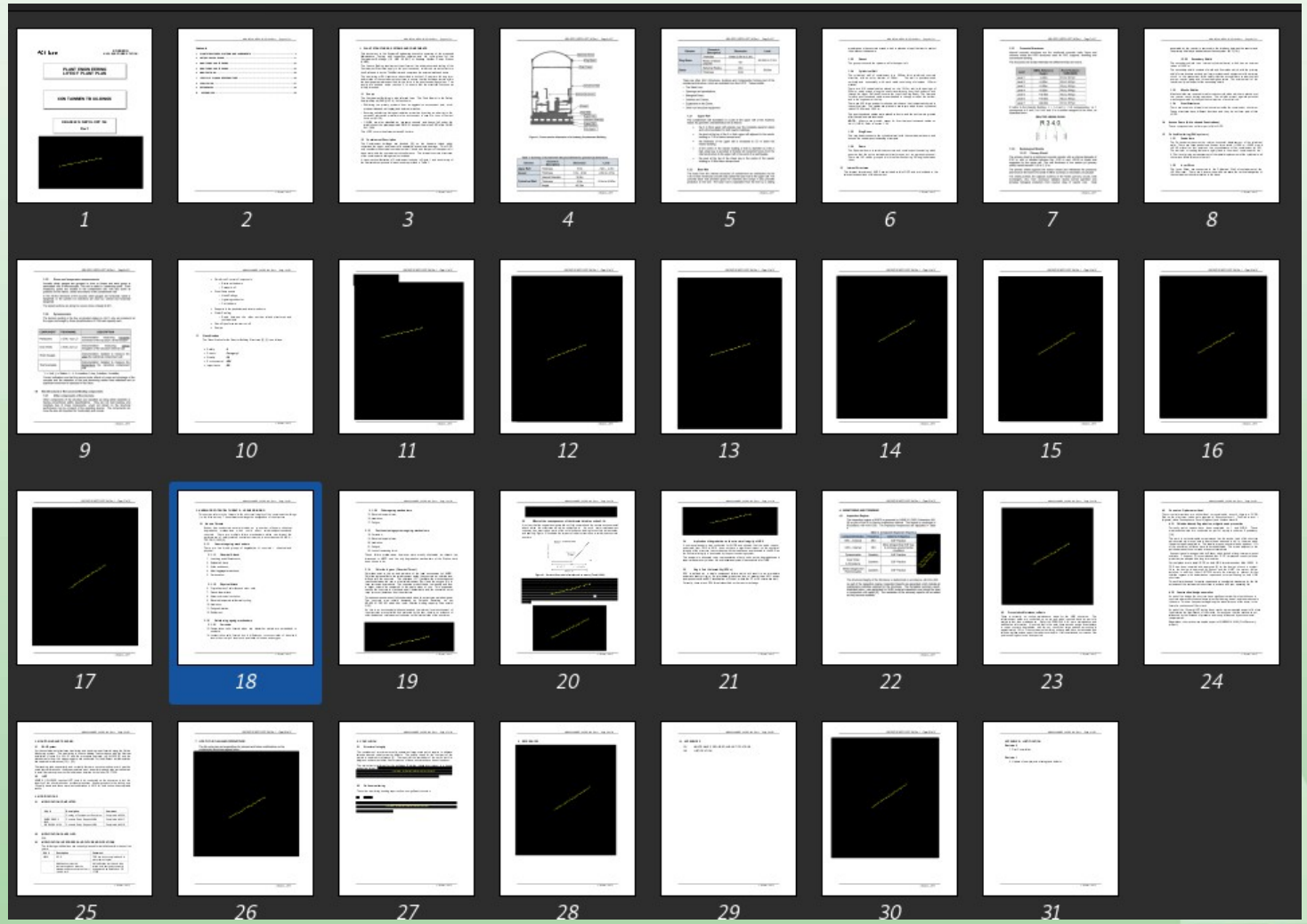
Shaving gov contracts did not start in 1994

Design lifetime for engineers

Aseismic raft, artificial neoprene deterioration

Concrete, rebar, elctro-chemical effects

The Koeberg Cracks



#KoebergCracks

#KoebergCracks

4.3 Current vs. Optimum or Ideal

The current interventions are neither ideal nor sustainable; as such there is a CURA Risk on the structures (which gets reported at Executive Level). The Risk is level I (highest), with a Consequence Level 6 (highest), and likelihood level B

4.3.1 Chloride Induced Degradation, mitigation and prevention

Currently, patch repairs have been completed on 1 and 2HRX. These maintenance works are conducted as part of a project under an Equivalency [18].

The work is not sustainable nor permanent, as the anode (part of the structure which corrodes) 'moves' next to where the anode used to be, i.e. the area which the patch repair is applied to. The repairs are non-structural and only about 11% of the structures' surfaces have been rehabilitated. The areas adjacent to the patched areas will now corrode at an accelerated rate.

4.3.2 Construction/design anomalies

As part of the design, the structure has a significant variability in the thickness in concrete where the cylindrical dome joins the thick ring beam, and then reduces to the dome. This has caused cracking along the circumference of the dome, in the form of a continuous ±110m crack.

Nuclear waste

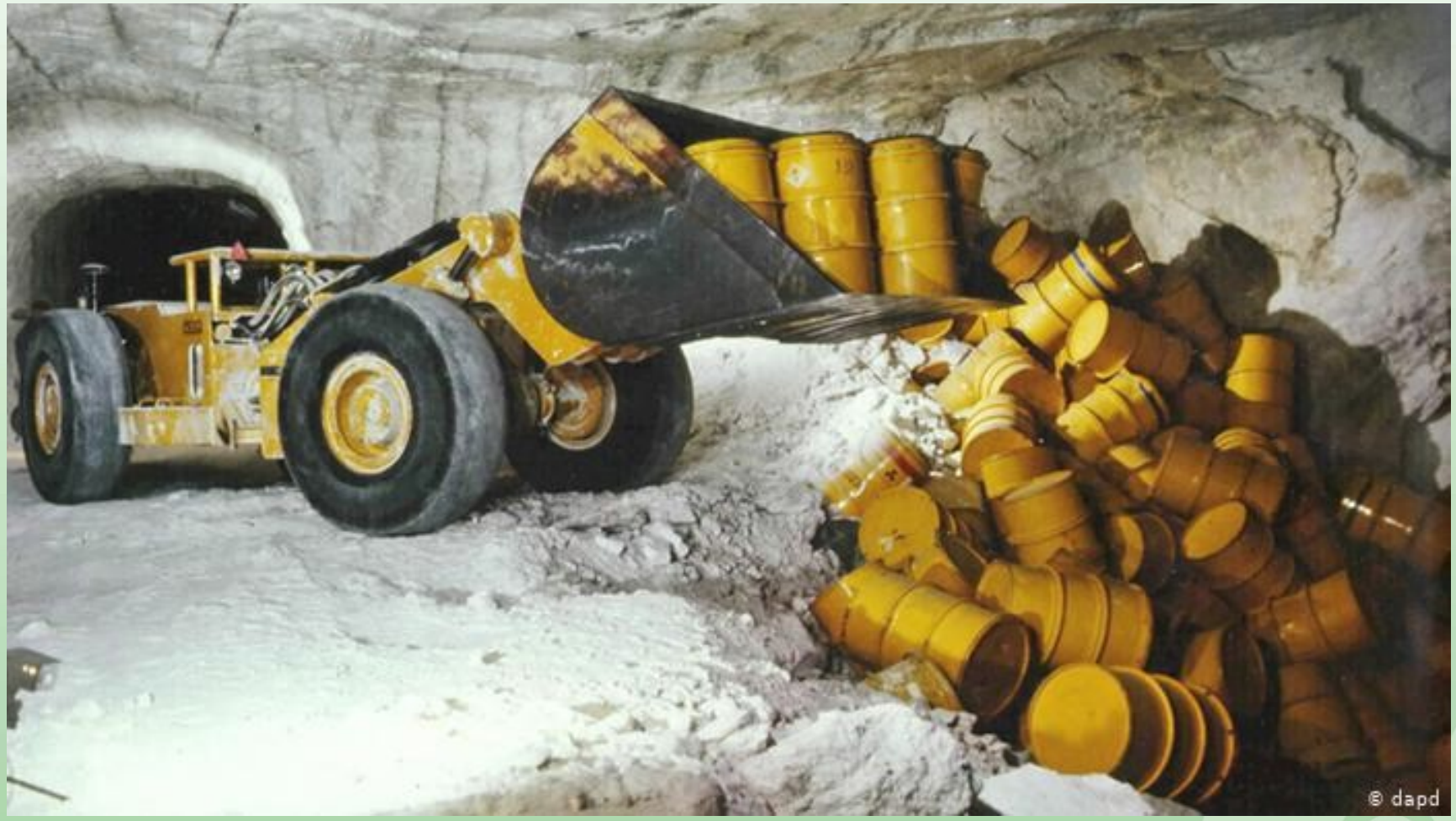
1st principle: if you don't know how to dispose of it, stop making it.

Intergenerational ethics

Unknown cost

Future discounted value trick

NRWDI disaster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An independent Regulator...

MISSION REPORT

ON

THE INTEGRATED NUCLEAR INFRASTRUCTURE REVIEW

(INIR)

Considering that the Minister of Energy is also in charge of the promotion of nuclear energy and, given the structure, the designation of the Board members and the process to approve the NNR's budget, the INIR team is of the view that there is no adequate separation between the regulatory functions and the promotional activities, thus calling into question the effective independence of the NNR.

The INIR team noted that the NNRA does not explicitly provide for Fundamental Safety Principles including that the prime

IAEA
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KOEBERG ROW

Fired National Nuclear Regulator board member takes Minister Gwede Mantashe to court

By Sasha Planting

19 Apr 2022

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6

Peter Becker is seeking declaratory relief that the minister's decision to discharge him as a board member was unlawful and unconstitutional, and wants an order reviewing and setting aside this decision.

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From left: Minister of Mineral Resources and Energy Gwede Mantashe. (Photo: Gallo Images / Daily Maverick / Victoria O'Regan) | Fired board member of the National Nuclear Regulator Peter Becker. (Photo: Tamsin Metelerkamp)

Peter Becker, formerly a member of the board of the National Nuclear Regulator, has served papers on the minister of mineral resources and energy, the National Nuclear Regulator and the chairman of that body to challenge his dismissal in February this year.

Becker is seeking declaratory relief that the minister's decision to discharge him was unlawful