



National
**Nuclear
Regulator**

Vision for participating in concrete harvesting initiative to support independent research on qualification of concrete for long term operation of nuclear facilities in South Africa

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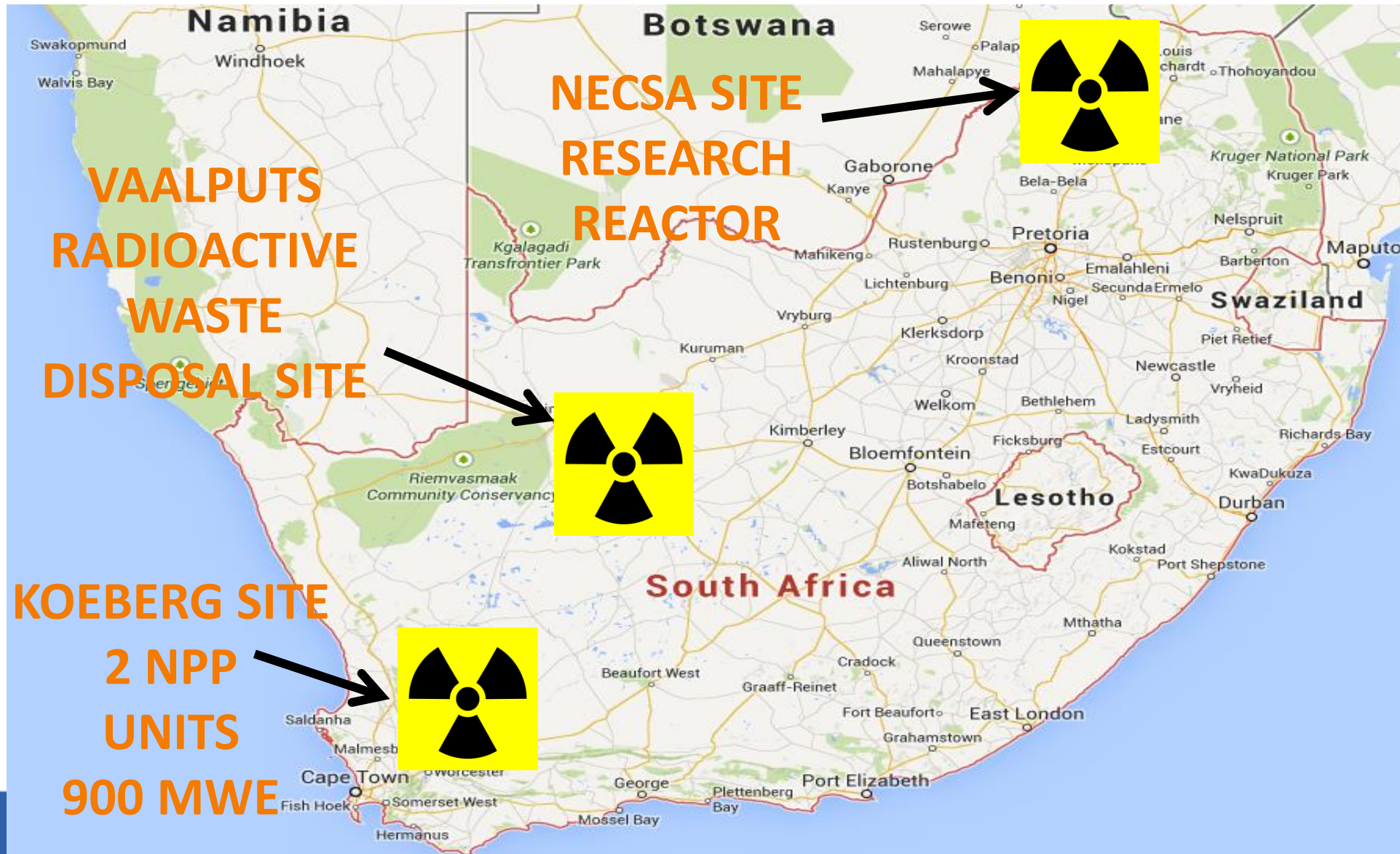
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PRESENTATION OUTLINE

- Introduction and Background**
- Safety Related Concrete Structures and Components**
- Research Issues**
- Recommendations and Conclusions**
- Way Forward/Next steps**

INTRODUCTION AND BACKGROUND – Nuclear Sites which may benefit from concrete harvesting initiative in South Africa



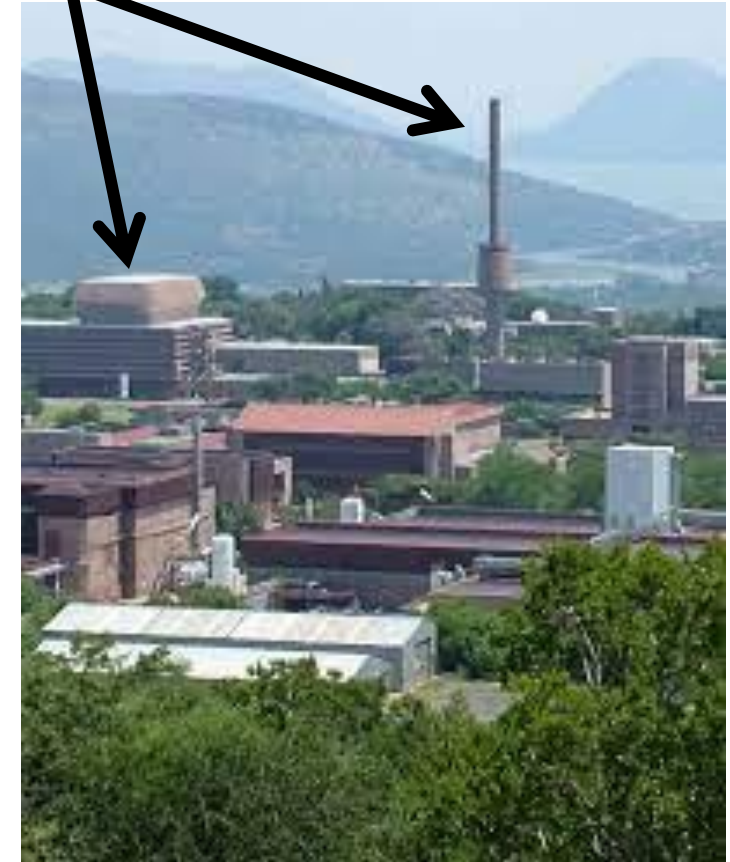
SAFETY RELATED CONCRETE STRUCTURES AND COMPONENTS



KNPP
Containment
buildings concrete
1984 – Unit 1
1985 – Unit 2



Safari Research Reactor - 1
Confinement
building and gaseous waste release stack
concrete
1965



Vaalputs waste repository
-Experimental Trench A1
(buried concrete drums)
1986



RESEARCH ISSUES

Investigate changes in material properties due to:

1. Ageing/time
2. Ambient temperature
3. Irradiation damage
4. Chloride-induced concrete corrosion
5. Carbonation
6. Alkali-Silica Reactivity (ASR)
7. Implementation of mitigation measures such as “impressed current cathodic protection”
8. Other i.e. biological attack, boron, stress, etc.

RECOMMENDATIONS AND CONCLUSIONS

- Visual inspections conducted over the years show that there are significant differences in the durability performance of concrete between structures located at coastal nuclear sites and inland nuclear sites
- The differences have never been investigated and expressed in quantitative terms through the conduct of rigorous and high-quality “nuclear research”.
- Differences may be due to different exposure conditions, the design of the concrete itself, implementation of maintenance/mitigation measures and or unknown ageing phenomena.
- It is necessary to conduct research to understand the durability performance of concrete taking into account the extend operational design life of nuclear facilities according to current practices i.e. 40-60 and 60-80 yrs of operation.
- Participating in the concrete harvesting initiative will allow South Africa to benefit from information sharing or joint harvested concrete research among interested countries and organizations.

WAY FORWARD

1. Identify national needs/site specific research issues.
2. National position on participation (Regulator + Operators).
3. Implementation plan.
4. Funding requirements.
5. Collaboration with qualifying academic research institutions and national labs.
6. Develop and agree protocols for information sharing.



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