



Deposition to Ground

Resuspension and Inhalation

Produc

Dose reduction initiatives at the Koeberg Nuclear Power Station

2012 ISOE ALARA Symposium

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Presentation overview

- Introduction
- Overview of Koeberg
- Koeberg Dose Reduction Plan
- Koeberg Results
- Conclusion
- Questions





Introduction (1)



 Eskom Holdings SOC Limited generates 95% of the electricity in South Africa.

Sources of energy	GWh	%
Coal-fired (13)	220 219	92.7
Hydroelectric (6)	1 960	0.8
Pumped storage (2)	2 953	1.2
Gas / liquid fuel turbine (4)	197	0.08
Nuclear (1)	12 099	5
Wind energy (1)	2	0.0008
Total production	237 430	
Installed capacity (MW)	44145	
Peak demand (MW)	36664	
Reserve margin (MW)	7481	17



Introduction (2)

- South Africa will need 40 000MW new generation capacity by 2025.
- Fully secured the funding for Medupi Power Station and Kusile Power Station – \$3.5 Billion.

Capacity projects funnel

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Mpumalanga New coal **Peaking & renewables** Transmission **Return-to-service (RTS)** refurbishment The state and a state of Komati (1 000 MW) Medupi (4 764 MW) Ankerlig (1 338.3MW) Arnot capacity increase 765kV projects (300 MW) Camden (1 520 MW) Kusile (4 800 MW) Gourikwa (746 MW) **Central projects** Matla refurbishment Grootvlei (1 200 MW) Ingula (1 352 MW) Northern projects Kriel refurbishment Sere (100 MW) Cape projects Duvha refurbishment 3720 MW ~ 4 700 km 9 564 MW 3 536.3 MW 300 MW

3720 N 2012/01/30

Introduction (3)

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- The South African Government has approved the Integrated Resource Plan (IRP) 2010, which outlines South Africa's power supply requirements until 2030 on 6 May 2011.
- The document states that nuclear energy should be expanded in South Africa from 5% to 20% by 2030. This allows for 15000 MW to added to the Grid via new nuclear power generation by 2030.
- New nuclear siting regulations were promulgated during 2011 and compilation of a site safety report for location of the next nuclear power station is in progress.



Koeberg Nuclear Power Station Overview (1)

- Koeberg Nuclear Power Station is located
- Roeberg Nuclear Power Station is located approximately 30km from Cape Town.
- Two Unit Pressurised Water Reactor, 900 MW per unit. Construction started in 1976 and first criticality achieved in 1984.
- Refuelling outages every 12 to 18 months.

50L -

Eskom

Melkbosstrand

Brakkefontein

Bloubergstrand

Milnerton

Bothasig

Melkbosstrand

ape Town

Koeberg Nuclear Power Station Overview (2)

- Nuclear safety at the Koeberg Nuclear Power Station is improved and enhanced continuously.
- The Core Damage Frequency for the Koeberg Nuclear Power Station are at present lower than the requirements set for new nuclear plants.
- The commitment to continuous safety improvements have helped with public and Government approval of the IRP(2010).
- However, some modifications have resulted in longer refuelling outages, high volume work and additional dose. 2012/01/30



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Koeberg Dose Reduction Plan (1)





Koeberg Dose Reduction Plan (2)



Implemented Discipline Specific ALARA Training.	Evaluated the source term and implemented the EPRI recommendations
Appointed Dose Champions in the 13 highest dose Line Groups to work with the ALARA Team.	Implemented a Self Access Dosimetry System.
Assigned dose reduction accountability to Line Groups to meet RP Targets.	Concluded the fuel risk analyses for zinc injection.
Integrated the ALARA Team fully with Modification, Work Control and Outage Management Programs.	Implemented a revised Plant Shielding Plan and removed Hotspots.
Evaluated the scaffold programme and implemented EPRI recommendations.	Implemented a new RP Organisation.

Koeberg Results (1)





117

Outage

118

Koeberg Results (2)





Unit 2 Cold Leg Dose Rates on Tube Plate (CT) EPRI pnt. 9





U 2 Average SG Piping Dose rates



Koeberg Results (3)





Koeberg Results (4)



Koeberg Nuclear Power Station 12 Month Average Collective Radiation Exposure



Koeberg Results (5)



Koeberg Nuclear Power Station 18 Month Average Collective Radiation Exposure



Koeberg Results (6)



Koeberg Nuclear Power Station 36 Month Collective Radiation Exposure



Conclusion



"Personnel dose during outages and on-line periods at Koeberg Nuclear Power Station has been reduced using an integrated approach that includes improved shielding, source term reduction, effective work planning, work optimisation, and work group ownership of dose. As a result, collective radiation exposure is currently at 690 personmillisievert per unit which is a reduction from 970 person-millisievert in 2008."

... WANO Peer Review Strength Statement December 2011



Thank you all for your professional support and help with the initial success in reducing the Collective Radiation Exposure at the Koeberg Nuclear Power Station and helping with keeping the nuclear power option alive in South Africa with continuous improvements in nuclear and radiological safety.



Questions