



NATIONAL NUCLEAR REGULATOR
For the protection of persons, property and the environment against nuclear damage.

NRC REGULATORY INFORMATION CONFERENCE
RADIATION PROTECTION COMPUTER CODE PROGRAM COLLABORATION

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NNR BACKGROUND
(Legislative mandate)

- NNR established through NNR Act 47 of 1999
- Mandated to establish and enforce national standards in the areas of radiological health, safety and environmental protection
- Regulatory control over the safety of nuclear installations, radioactive waste, irradiated nuclear fuel, and the mining and processing of radioactive ores and minerals through the issuance of nuclear authorisations
- Applicant required to submit safety assessment demonstrating safety and compliance to the requirements and regulations
- Granting of authorisations following review of safety assessment
- Assurance of compliance with regulatory standards and authorisation conditions





NRR BACKGROUND (Regulatory Framework)

- **Regulatory Standards**
 - Regulations and Requirements Documents
 - Guidance
 - Position Papers & Regulatory Research
- **Authorisations**
 - Nuclear Installation License
 - Certificate Of Registration
 - Certificate Of Exemption
 - Nuclear Vessel License
- **Self-Assessment, revising the Regulatory Framework**
- **Development of Suite of Regulations and Guides, General and Technology/Area Specific**





NRR BACKGROUND (Regulatory Philosophy)

- Application of graded approach with respect to the performance of independent verification analyses
- Safety Case for each stage of authorisation
- Review and assessment methodologies
- Degree of or need for independent verification analyses considers the following factors:
 - novel vs proven technology, complexity, risk, and pedigree of the application;
 - in support of research, authorisation and compliance assurance
 - additional confidence in the submissions by the licensee/holder
 - technical basis for regulatory decision making





NRR BACKGROUND (Codes and Evaluation Models)

- Main areas includes accident analysis, calculation of occupational doses and doses to the public during normal operations
- Specifically available to NNR are thermal hydraulic analyses (CATHARE, MELCOR), probabilistic assessment (RISKSPECTRUM, MAA, PC COSYMA), workers and public dose assessment, surface water transport, ground water codes (RESRAD), consequence assessment (PC COSYMA), radiation doses following releases (GENII, PC CREAM, AERMOD) and transport (RADTRAN)
- Verification and validation requirements can be obtained in Requirements Document- 0016 "Requirements for authorisation submissions involving computer software and evaluation models for safety calculations"





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RP PROGRAMS / PROJECT

- RP Codes and Models expected for all operators for worker and public safety assessments
- Centralised Review and Assessment function
- Limited number of RP codes available in-house
- Limited capacity for use of RP codes (outsourced)
- Review of codes/models assumptions where no codes available





RP PROGRAMS / PROJECT
(Main NNR Codes used in RP Programs)

- PC Cosyma for the environmental dispersion of fission products, level 3 PSA and emergency planning technical basis
- PC-CREAM for routine discharge calculations (airborne and waterborne)
- RESRAD for site-specific residual radioactive material guidelines, and radiation dose and excess cancer risk
- FRAMES 1.7/GENII 2.06 for calculating radiation doses following chronic and acute releases via air, water, or biological pathways
- INTERRAS for assessment of dose projections and need for protective actions in the event of a nuclear accident
- RADTRAN for modeling exposures to workers and the public for normal and accidents during transport of RAM





RP PROGRAMS / PROJECT
(NNR Codes used in RP Programs)

Codes/Models	NPP	RR	NORM	Waste	Transport
Genii	x	x			
RESRAD			x		
Hotspot	x	x			
INTERRAS	x	x			
PC Cosyma	x	x			
PC Cream	x	x			
AERMOD			x		
Spreadsheets				x	
RadTraN	x	x			x



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- EMERGENCY RESPONSE CODES**
- Currently making use of operators systems and codes for preparation of regulatory emergency exercises
 - Used INTERRAS in the past for emergency exercises
 - Project to upgrade Regulatory Emergency Response Centre - acquiring a system of codes capable to verify protective actions recommended by the licensee to the local disaster management centre for implementation
 - Currently evaluating proposals from potential suppliers
 - IAEA EPREV mission in February 2014 encouraged continuation of the RERC upgrade project, including the use of models/codes
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FUTURE COLLABORATION ON RP CODES

- Exchange of information, experience feedback and code/model improvements in the form of technical reports, experimental data, visits, joint meetings, establishment of user working groups similar to CSARP agreement
- Execution of joint programs and projects such as review, testing and benchmarking of codes
- Training courses
- Skills transfer through temporary assignment of personnel
- Exchange of information on regulatory standards for codes





FUTURE COLLABORATION ON RP CODES

The following AREAS where codes/models are used could be considered in future for collaboration:

- Assessment of occupational radiation exposures (also control room)
- Site boundary doses (modifications/accidents)
- Decontamination and Decommissioning dose assessments
- Off-site consequences and need for protective actions during nuclear accidents
- Evaluation of routine discharges
- Public dose assessments





CONCLUDING REMARKS

- Important that regulatory decisions are informed by independent analyses where required
- International collaboration in radiation protection codes will translate not only in cost benefits but also credibility and efficiencies in regulatory decisions
- South Africa in on the verge of making decisions on the construction of new NPP's
- As such the NNR will have to expand and improve the current tools used in RP programs





THANK YOU


