The Role of the National Nuclear Regulator in the Regulation of Pressure Equipment used in the South African Nuclear Industry

to the
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OUTLINE

NNR Responsibilities and Mandate

Scope of NNR Authorisation Holders / Current Projects

South African Legislative Framework related to Pressure Equipment for Nuclear Use

NNR Manufacturing Oversight Principles

Notes on SANS 10227

Summary

NNR Responsibilities and Mandate

- The NNR is established in terms of the National Nuclear Regulator Act (Act No 47 of 1999) and its mandate and authority are conferred through sections 5 and 7 of this Act, setting out the NNR's objectives and functions.

- In terms of the above, the NNR is responsible for regulatory control over the safety of nuclear installations in South Africa.

- The NNR's responsibilities embrace all those actions aimed at providing the public with confidence and assurance that the risks arising from the production of nuclear energy remain within acceptable safety limits - setting fundamental safety standards, conducting pro-active safety assessments, determining licence conditions and obtaining assurance of compliance.

Scope of NNR Authorisation Holders / Current Projects 1

- Existing Power Reactors
  - Koeberg Nuclear Power Station (KNPS). 2x900MWe Westinghouse type LWR units operational since 1984.
- Pebble Bed Modular Reactor
  - A Nuclear Installation Licence application was received from the South African Utility Company, Eskom. The Design and Development Phase by PBMR Company is ongoing.
- Prospective New Nuclear Reactors
  - Eskom are exploring the feasibility of constructing new nuclear power plants. Early discussions wrt licensing frameworks has commenced.
- Research Reactor
  - SAFARI I 20 MW ORNL pool type reactor operated by Necsa.

Scope of NNR Authorisation Holders / Current Projects 2

- Fuel Cycle
  - Conversion, Enrichment facilities
  - Fuel Fabrication
- Nuclear Technology
  - RadioIsotope Production
  - Irradiation Facilities
- Waste Management
  - Low/Intermediate Repository at Vaalputs
  - Thabana Storage at Pelindaba
- Mining and Minerals Processing
  - Underground and Surface Mines, Mineral processors, Scrap recyclers
- Nuclear Vessels

South African Legislative Framework related to Pressure Equipment for Nuclear Use - 1

The Vessels under Pressure Regulations of 1996 (VUPR) made under the Occupational Health and Safety Act 85 of 1993 provides regulations for pressurized equipment and is regulated by the Department of Labour. The VUPR require that "no user shall use, require or permit the use of any vessel under pressure unless it has been designed and constructed in accordance with a health and safety standard incorporated into the regulations." (ASME Section III is included as an incorporated standard).

The VUPR is to be replaced by the Pressure Equipment Regulations (PER - Promulgation of Legislation expected 2008). Standards invoked by this Regulation are inter alia:

- SANS 347 Categorisation and Conformity Assessment Criteria
- SANS 10227 Criteria for the Operation of Inspection Authorities
- SANS 17020 Criteria for the Operation of Bodies performing Inspection

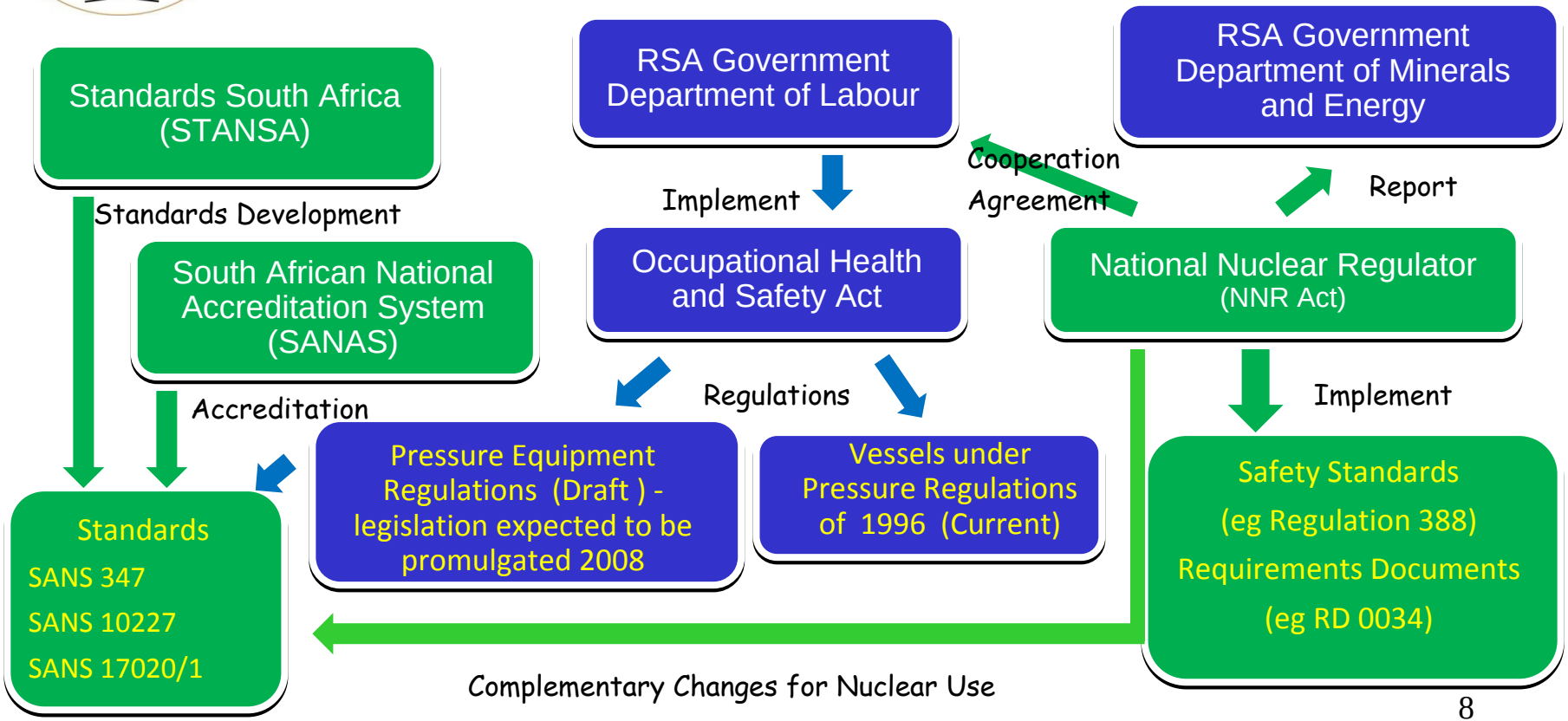
South African Legislative Framework related to Pressure Equipment for Nuclear Use - 2

The National Nuclear Regulator Act (NNRA) that provides for the establishment of the Regulator as an independent body inter-alia states that one of the objects of the NNR is to " exercise regulatory control related to safety over the siting, construction, operation, manufacture of component parts ,……and closure of nuclear installations.

The Requirements Documents (LDs/RDs) stipulate specific NNR requirements to ensure that the nuclear installation's design, construction commissioning and operation is in accordance with internationally accepted standards and practices.

The NNR activities are aligned to the **nuclear risk posed by an installation** (and the specific components). As in other areas, in terms of oversight of pressurised equipment the NNR approach provides a graded but comprehensive review of activities of the owners, designers, suppliers and constructors with the main focus being safety.

South African Legislative Framework related to Pressure Equipment for Nuclear Use - 3



South African Legislative Framework related to Pressure Equipment for Nuclear Use - 4

A Cooperative Governance Agreement was signed by DOL and NNR detailing the functions of each party. The intent is to minimise the areas of overlap and to work towards more efficient implementation of the Regulations.

Occupational Health and Safety Act and regulations apply to nuclear power plants for both nuclear and conventional (BOP) plant. NNR Requirements do not replace requirements that stem from the Occupational Health and Safety Act.

The NNR as part of its role will be responsible for oversight of In Service Inspection. The Licensee is required to implement an ISI Programme as a condition of the licence. All requirements from the OH&SA needs to be implemented

South African Legislative Framework related to Pressure Equipment for Nuclear Use - 5

A classification system and the link to the determination of the respective codes and standards to be used for the design, manufacturing, inspection and assembling of the Systems, Structures and Components (SSC) must fulfill the requirements of the NNR. An appropriate safety classification is presumed in place as the basis for the process of supplier qualification and QA of the SSC. This includes the safety, quality and load (e.g. seismic and environmental) classifications..

No specific design codes and standards have been developed for application in the RSA. Therefore international codes and standards shall be applied."

The NNR confers a Nuclear Installation licence on the basis of its assessment of a coherent safety argument. The plant physical design and construction is one aspect of this safety argument. Clearly the pedigree of the Code or Standard used, the scope of its successful previous application and the controls placed within the code plays a large part in its acceptability for use. The Code however is a minimum basis for design and construction. Augmented measures may be required to ensure that the NNR licensing criteria are met.

South African Legislative Framework related to Pressure Equipment for Nuclear Use - 6

In principle, any design code or standard that is accepted for application at nuclear facilities internationally can be proposed for design and construction of the SSC of a nuclear installation with due regard to their Safety Classification.

Codes and standards must be justified in terms the application and must applied consistently, without omission of conditions or embedded requirements. Compliance with the National Legislation and Applicable Regulations is required.

The ASME III Code and RCCM are listed in Annex A of SANS 247 as approved Health and Safety Standards (for Nuclear Use)

NNR Manufacturing Oversight Principles 1

The NNR Regulates the Licence holder or Licence Applicant. (The Licensee/Applicant and its constructor responsible for design, construction and operation of the facility are required to develop, implement and maintain a design fulfilling the NNR licensing requirements.

It is the responsibility of the Licensee/Applicant to ensure that it complies with Quality and Safety Management requirements by implementing an Integrated Management System as defined in RD-0034.

Two of the Level 1 overall requirements are;

- "The Licensee must establish a supplier qualification process based on and graded according to an accepted safety and quality classification system of the product to be delivered by the supplier".
- All suppliers of products important to nuclear safety must have a current quality management system appropriate to the scope of supply….

NNR Manufacturing Oversight Principles 2

NNR Actions

Compliance assurance monitoring activities against ASME NCA Requirements
(Certification of the Design Specification , Certification of the Design Report , Authorised Inspection Agency (AIA), Authorised Nuclear Inspector, etc.)

Verification whether the design specifications provided by Licensee consider all appropriate national (NNR) and international (e.g. ASME) requirements

Acceptance of Design Specification depending on SSC Safety and Quality Classification

Independent assessment (either spot check or detailed review) of Design Reports, Drawings, Calculations

NNR Manufacturing Oversight Principles 3

NNR Actions

During Product / SSC Qualification:

- Verification of Quality Plans / Manufacturing and Test Plans
- Verification of Design Specifications
- Independent Process Audits at Suppliers and Sub-Suppliers if necessary
- Review fabrication plans, accept hold and witness points with NNR participation
- Participation at hold and witness points

Notes on SANS 10227 1

Both the PER and SANS 347 require the interventions of an Approved Inspection Authority (AIA) with respect to conformity assessment of pressure equipment.

SANS 10227 of 2007 is the standard that provides the criteria for the operation of inspection authorities performing inspection in terms of the PER.

The AIA is the authorised Representative of the Chief Inspector of the Department of Labour.

The Chief Inspector of the Department of Labour shall only approve Inspection authorities after the Inspection Authorities have been accredited by SANAS. (Additional Requirements on Inspection Authorities may be imposed prior to approval)

Notes on SANS 10227 2

The Scope of Activity of the Approved Inspection Authority is limited to inter alia

- The applicable Regulations (i.e PER, Mines and Works Regulations)
- The applicable Health and Safety Standard with which the function(s) comply
- Manufacturing or In-service Inspection (or both)

The NNR has provided to SANAS a list of requirements for qualification of Authorised Nuclear Inspectors and Authorised Nuclear Supervisors, which the NNR requires to be satisfied in terms of the accreditation of Approved Inspection Authorities in South Africa, who apply to work in accordance with ASME Section III. The requirements are based on ASME QAI-1:2003.

Summary

The RSA Department of Labour is responsible for the Regulation of Pressure Equipment from a Health and Safety Perspective.

The NNR has a responsibility for Pressure Equipment oversight in respect of the nuclear /radiation risk such equipment poses to the public and environment.

Perspectives and Insights on the Regulatory Oversight from the NNR and Department of Labour has been presented. The NNR have the view that the approach provides a graded but comprehensive review of activities of the owners, designers, suppliers and constructors in the South African Nuclear Industry with the main focus being Safety.

Thank you for your attention