



Radiation in the scrap metal recycling industry



National Nuclear Regulator, South Africa

14 September 2011

Killarney Club, Houghton Johannesburg

Preamble

- Today the increasing national and international trade and transport of radioactively contaminated scrap metals is of great and growing concern among Governments, regulators and industry leaders alike.
- While the recycling of scrap metals is an economically and environmentally viable argument, the health and environmental risks of radioactive contamination are very real and a cause of concern.
- Therefore, the monitoring and control of contaminated radioactively scrap metals have become important issues that need to be tackled both national and international level.

Objectives of the workshop

- To foster the exchange of experiences gained in recent years in the monitoring, control and management of radioactive contaminated scrap material
- To provide methods for the prevention of the inadvertent diversion of the radioactive sources into the scrap metal streams;
- To promote good practices to prevent inadvertent diversion of radioactive material.



Talk Outline

1. Overview of SA legislation for the Regulation of the Nuclear industry.
2. South African Nuclear Governance framework
3. History of NORM Regulation
4. Regulatory Control of Scrap Metal
3. Regulatory Challenges
4. National & International Participations



SA Nuclear Governance Framework

The Ministry for Energy responsible for the governance of Nuclear industry and related matters.

Legislation

- ✚ Nuclear Energy Act 1999, Act 46 of 1999
- ✚ *National Nuclear Regulator Act, Act 47 of 1999.*
- ✚ National Radioactive Waste Management Policy and Strategy 2005.
- ✚ National Radioactive Waste Disposal Institute Act, 2008 (Act No. 53 of 2008) was recently assented to on 5 January 2009



SA Nuclear Governance Framework (Cont)...

- + Department of Health (DoH) Directorate:
Radiation Control
 - + Hazardous Substances Act, 1973 (Act No. 15 OF 1973)
- + DoH issues licences for:
 - + Group III hazardous substances (electronic product generating X-rays, other ionising beams, electrons, neutrons or other particle radiation or non-ionising radiation); and
 - + Group IV hazardous substances (radioactive material not at nuclear installation, which does not form part of or is used or intended to be used in the nuclear fuel cycle, and which is used or intended to be used for medical, scientific, agricultural, commercial or industrial purposes e.g. fabricated sources, medical isotopes).



SA Nuclear Governance Framework (Cont...)

- Department of Health (Radiation Control Division)-Radioactive sources
 - Radioactive sources in database
 - Orphan radioactive sources
- Cooperative agreement with the NNRA

Government Responsibilities

Legislation and Regulation

- Nuclear sector in South Africa is mainly governed by:
 - Nuclear Energy Act, Act 46 of 1999
 - The promotional aspects of nuclear activities
 - National Nuclear Regulator Act, Act 47 of 1999
 - Provide for the protection of persons, property, and environment against nuclear damage
 - National Radioactive Waste Disposal Institute Act (Act 53 of 2008)
 - Provides for the establishment of a National Radioactive Waste Disposal Institute in order to manage radioactive waste disposal on a national basis
 - Radioactive Waste Management Policy and Strategy for the RSA was published in 2005.
- All above under Department of Energy*
- Hazardous Substances Act, Act 15 of 1973 - *Department of Health*
 - Group III hazardous substances (e.g. electronic product generating X-rays); and
 - Group IV hazardous substances (radioactive sources).



Regulatory Responsibilities

National Nuclear Regulator

- The NNR is mandated as competent authority in terms of National Nuclear Regulator Act (Act No 47 of 1999) for ensuring that individuals, society and environment are adequately protected against radiological hazards associated with the use nuclear technology
- Key object of the NNR are among others:
 - Establish nuclear and radiation Safety Standards and Regulatory Practices
 - Exercise regulatory control over nuclear installations, vessels and any other action capable of causing nuclear damage, to which the NNRA Act applies;
 - Provide assurance of compliance; through granting of nuclear authorization ;and
 - Ensure that provisions for nuclear emergency planning are in place
- In addition, the NNR advises the Minister of Energy on matters falling on the Ministry's purview, fulfill National obligations in respect of International legal instruments concerning nuclear safety
- Act as the National competent authority in connection with the IAEA Regulations for the Safe Transport of Radioactive Material



Regulatory Responsibilities

Facilities regulated by the NNR

- **Koeberg Nuclear Power Station**
- **Necsa, Pelindaba site**
- **Necsa, Vaalputs National Radioactive Waste Repository**
- **Mining and mineral processing facilities**
- **Vessels propelled by nuclear power or having on board radioactive material**



Regulatory Responsibilities

Nuclear Authorisation issued by the NNR

- Nuclear Installation Licences-NIL
- Nuclear vessels licences-NVL
- Certificate of Registration-COR
- Certificate of Exemption-COE



Holder/licences Responsibilities

General obligation

As a principle the South African Regulatory framework requires that the primary responsibility for ensuring radiological protection of the health and safety of the workers, members of the public as well protection of the environment rest entirely with the holders or applicants for a nuclear authorisation and extends in an unbroken chain through management to the workers of that facility.





NNR Act 47 of 1999

- Section 20 (3) states, “No person may engage in any action described in section 2(1)(c) other than any action contemplated in subsection (1) or (2), except under the authority of a certificate of registration or a certificate of exemption”
- And section 2 (1) (c) states, “any action which is capable of causing nuclear damage”



NNR Act 47 of 1999...

Action is defined as:

- (a) The use, possession, production, storage, enrichment, processing, reprocessing, conveying or disposal of, or causing to be conveyed, radioactive material;
- (b) any action, the performance of which may result in persons accumulating a radiation dose from exposure to ionising radiation; or
- (c) any other action involving radioactive material



Background on NORM

- Naturally occurring radionuclides are present in most materials, such as uranium/gold ores, phosphate rocks, mineral sands, oil and gas, etc.
- In some materials the levels of naturally occurring radionuclides are significantly high to the extent that regulatory control is required for radiation protection purposes.
- However, in other materials the levels of naturally occurring radionuclides are very low, such that regulatory control is not necessary.
- Regulation of NORM presents a range of new challenges for both regulators and operators.
- South African National Nuclear Regulator and its operators are no exception to this.



What is NORM

Definition of NORM for the purposes of the Standards and Regulation:

Material (irrespective of whether processed or not)

- that contains no significant amounts of radionuclides other than naturally occurring radionuclides
- is designated in national law or by a regulatory body as being subject to regulatory control because of its radioactivity

Note:

- Regulatory control as a practice includes the option of exemption
- Regulatory control may also mean control of an existing exposure situations,



History of NORM Regulation in SA

- ✦ 1940's Uranium production commences.
- ✦ Around 150 000 tones of uranium have been produced from South African gold mines since 1950s, with SA being the fourth largest producer in the world
- ✦ 1950's Investigation concluded that no control is needed for Radiation hazards in Uranium.
- ✦ 1970's proposal by Atomic Energy Corporation to control radiation hazard under Nuclear installation Act. Chamber of Mines challenged the legality.
- ✦ 1980's Regulatory Mechanisms were investigated
- ✦ 1982 Nuclear Energy Act made explicit provision for the regulation for licensing facilities
- ✦ 1988 Council for Nuclear Safety (now NNR) was established
- ✦ 1990 Council for Nuclear safety(Now NNR) started to authorizing the Uranium and Gold mine industry under the Nuclear Energy Act



NORM Activities

- Prospecting, mining and processing of uranium, thorium, gold, copper, heavy minerals, phosphate rock and fertilizers production;
- Clearance of sites contaminated with NORM residue;
- Recycling of scrap material (i.e. ferrous and non-ferrous metals, plastic, stainless steel, etc) that is contaminated with NORM residues;
- Conducting tests in laboratories on small quantities of NORM samples for verification of proposed and existing actions, (including samples from prospecting activities).
- Some service providers authorised to cleanup identified sites contaminated with NORM residue.



TYPES OF AUTHORISATIONS FOR NORM

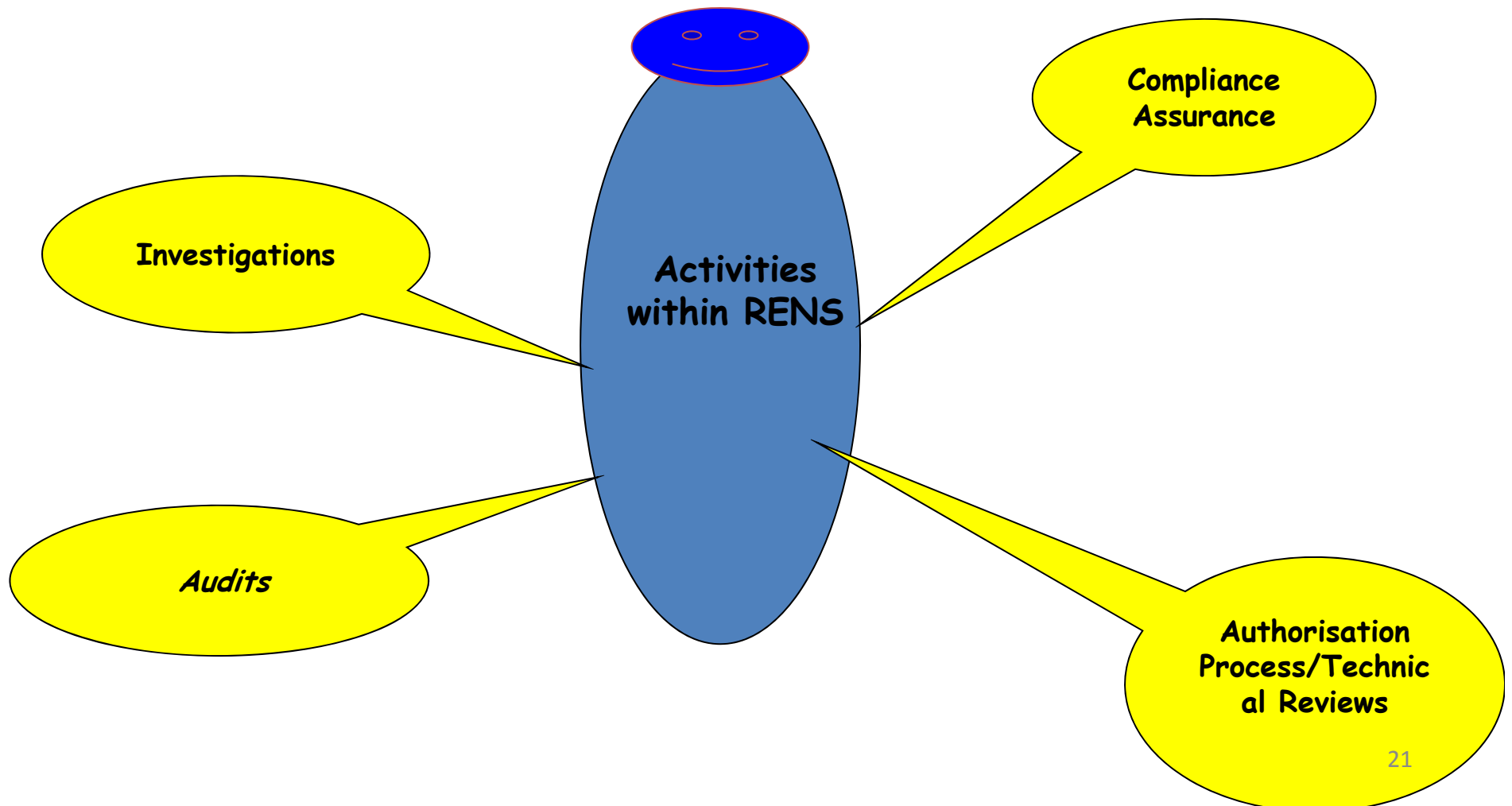
- Mining and Mineral processing facilities
- Scrap processors
- Scrap smelters
- Fertilizer manufacturing
- Service providers
- Small users

Categorisation of CORs

Category	Action Authorised	Authorisation fee	Number of authorised holders
Category 1	Small users, laboratories and refurbishes	R 17,990.03	57
Category 2	Scrap processors, scrap smelter service providers	R 20,418.63	37
Category 3	Fertilizers and other lesser mineral processing facilities	R 169, 289.33	9
Category 4	Medium operators and other lesser mining and mineral processing facilities	R175, 679.87	33
Category 5	Large operators which include major mining and mineral facilities	R 447,798.05	18



NORM REGULATION





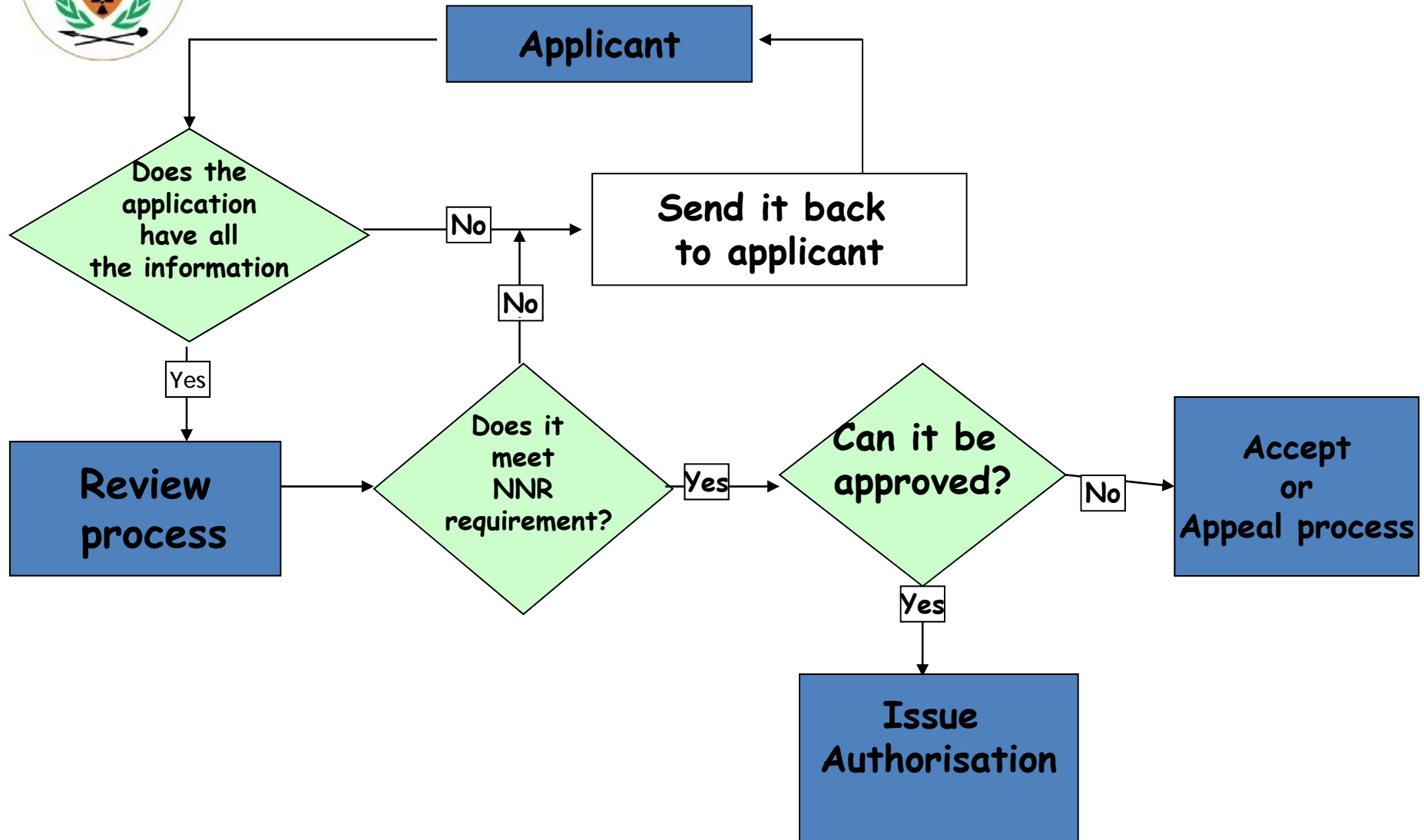
NORM Regulatory Approach

- The NORM regulatory programme use two regulatory processes, i.e.,
 - *Authorisation Process* and
 - *Compliance Assurance Process.*

- The two processes are supported by:
 - Technical review and assessment and
 - Legal assessment.



Flow Chart





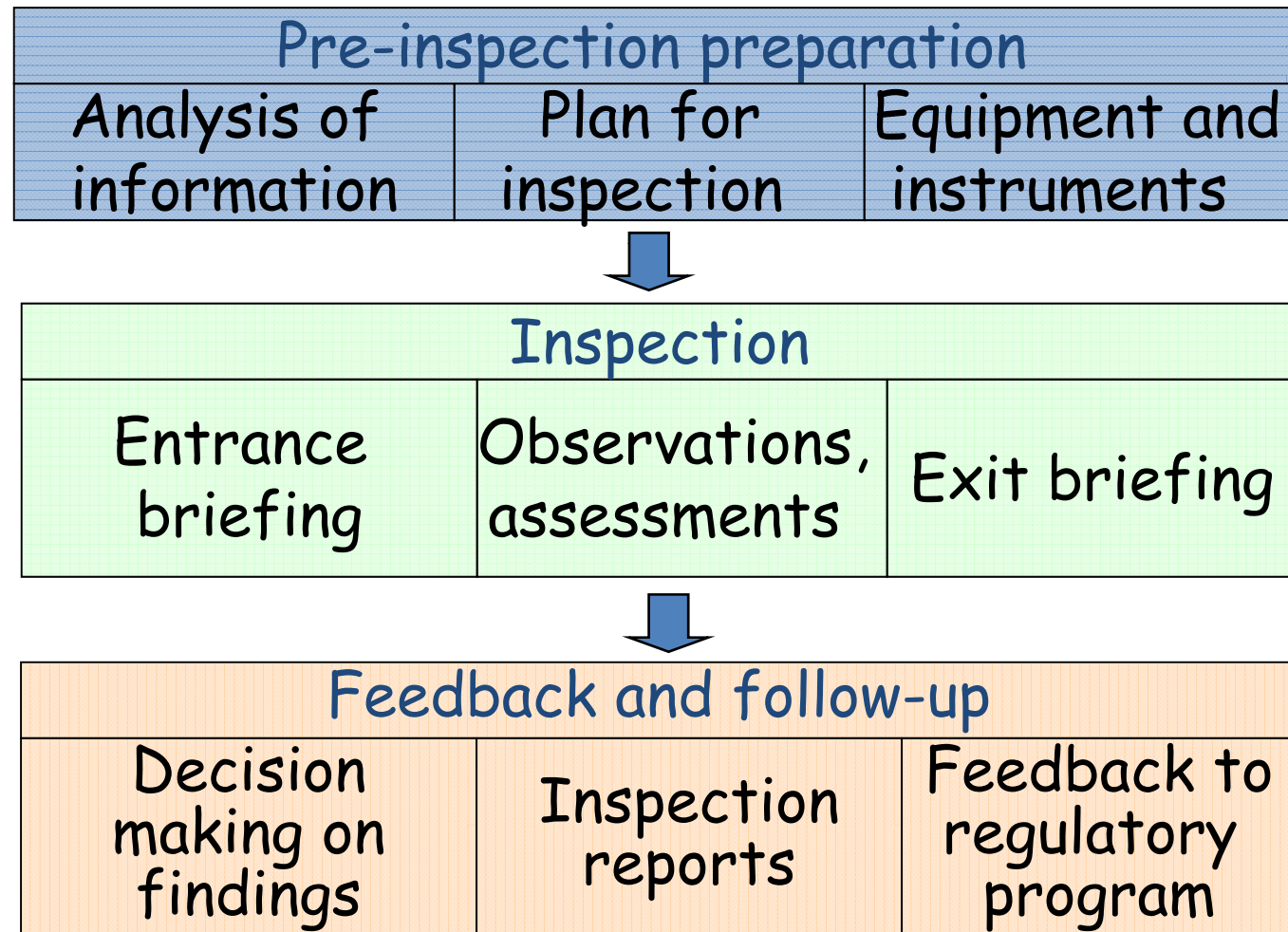
Compliance Assurance Process

The objectives of the compliance assurance exercises are accomplished by visiting facilities to physically conduct inspections and audits on holders of nuclear authorisation to verify compliance to the conditions of authorisation.

That is usually accomplished through interviews, observation, walk through, taking measurements and confirmatory measurements, verifying operating procedures, processes and records.



Phases of a compliance assurance process





Enforcement phase

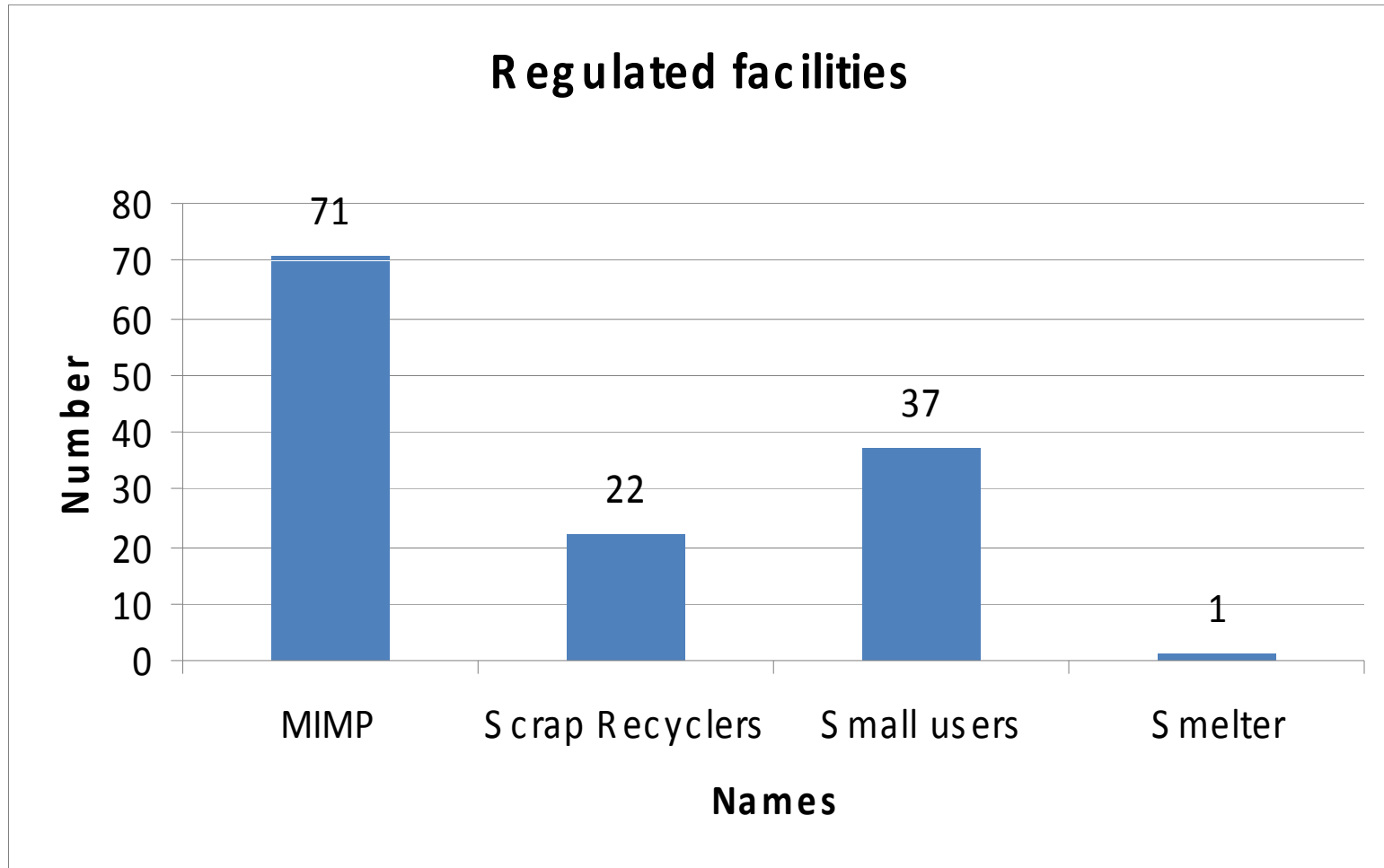
Definition: Enforcement involves actions taken in the case of non-compliance with legislation, conditions of authorization, regulations or regulatory directive

Principle: A graded approach is adopted towards enforcement and the degree of enforcement should match the seriousness of the non-compliance. The seriousness shall be evaluated by considering various criteria...

Type of enforcement actions: The NNR can take formal action by issuing a verbal (confirmed in writing) or written directive from an inspector to discontinue the action, rectify the condition or rehabilitate the site, system of (spot) fines, revoking the authorization and/or referring the matter for prosecution , etc....



Present Situation





Regulatory Control of Scrap generated from NORM Facilities

- + In 1993, radioactive scrap was exported from South Africa to the United Kingdom and returned because of the presence of contamination.
- + 38 sites contaminated with radioactive scale from scrap from gold mines
- + During 1993 only 3 Scrap facilities and 1 smelter obtained licences
- + Currently in 2011, there are 22 scrap processors and 1 scrap smelter (authorised by NNR)



REGULATORY REQUIREMENTS- SCRAP RECYCLERS-COR

Scope of authorisation

Operational radiation protection programme

- Appoint a Radiation Protection Officer and Radiation Protection Monitor
- Instrumentation-(drive through bulk gate, Portable rate meter) Out of 22 holders only 6 have bulk gate detectors.

Radioactive waste programme

Transportation-IAEA requirements

Physical security

Occurrences

Quality management



Regulatory Challenges

CROSS-BORDER MOVEMENT





Regulatory Challenges

Illegal mining

- Mines were formally not regulated
- During that time some mines used scrap and tailings residue to backfill sinkholes
- Most of these sinkholes are in areas that are outside the scope of regulation
- Illegal mining is currently taking place in around mines for *Scrap* and gold.

Theft

- Stealing of scrap by public at Salvage yards
- Equipments containing radioactive sources.



National Participation

- **HAZCOM Committee**

A joint Committee for the detection, safe removal and disposal of radioactive, explosive and other hazardous material in the metallic raw material recycling industry

- Metal Recyclers Association (MRA)
- Non Ferrous Metals Industry(NFMIA)
- National Recyclers Organization (NRO)
- Recycling Association of South Africa(RASA)
- South African Institute of Foundrymen (SAIF)
- South African Iron and Steel Institute (SAISI)
- South African Police Service Bomb Squad(Vereeniging)
- South African Department of Health(DoH)
- South African National Nuclear Regulator (NNR)
- ArmScor



National Participation Current Activities

- Draft Protocol on Levels of responsibilities and controls regarding Radioactive Material-DoH & NNR
- General radiation brochure
- Workshop for Scrap metal dealers-14 September 2011
- Register of Incidents of Hazardous scrap
- Radiation Detection installation at ports of entry.



International Participation

- United Commission for Europe: Group of Experts meeting on monitoring of radioactively contaminated scrap metal, Switzerland, Geneva, 12-14 June 2006.
- IAEA Technical Meeting on Radiation Safety in Scrap Metal and Recycling Industry, Austria, Vienna, 11-13 December 2006
- International Conference on the Control and Management of inadvertent radioactive material in scrap metals, Spain, Tarragona, 23-27 February 2009
- IAEA consultancy meeting to develop an initial draft proposal for an international agreement concerning the trans-boundary movement of scrap metal containing radioactive Austria, Vienna, 19-23 July 2010
 - Open meeting discussions July 2011 -finalising the Draft



Where to
from here...



International Conference on Control and Management of Radioactive Material Inadvertently Introduced into Scrap Metal in Tarragona

Among others the following were noted :

- There is no international requirement to report a load which is rejected at a border to the authorities in the neighbouring countries
- There is no international requirement for the certification of monitoring of loads being exported from a country and
- There are different acceptance criteria for radioactivity in scrap metal that can lead to inconsistent rejections of conveyances at borders.



Establishment of a non-binding agreement

The IAEA General Conference Resolution GC (53)/RES/10 noted the outcomes from the Tarragona conference and requested the Secretariat to take into account the recommendations of this conference. In response to above Resolution, a consultancy meeting was held in Vienna from 19 to 23 July 2010 to explore the development of some type of international agreement concerning the transboundary movement of scrap metal containing radioactive material



Objectives of a non-binding agreement

- To establish an appropriate graded approach to the protection of people, property and the environment for the presence of radioactive material in transboundary movements of scrap metal;
- To harmonize the approach of Member States and to promote and facilitate cooperation among relevant authorities and the metal recycling industry concerning the prevention and discovery of, and response to the presence of radioactive material in transboundary movements of scrap metal;
- To foster cooperation between exporting, importing and transshipment States with regard to transboundary movements of scrap metal containing radioactive material

Objectives of a non-binding agreement

- Establishment of appropriate arrangements to give effect to the provisions of this agreement
- Harmonized criteria for radioactivity in scrap metal
- Co-operation among Member States regarding the discovery of and response to radioactive material in transboundary movements of scrap metal
- Training of relevant individuals concerning actions to be taken as a result of the suspected or actual presence of radioactive material in scrap metal



Exporting Member State Actions

- **Performing radiation monitoring and visual inspection**
- **Removal of any radioactive material that is discovered in such consignments**
- **Provision of a certificate accompanying exported scrap metal attesting that the shipment has been monitored for radioactivity and no radioactive material was discovered.**



Importing Member State Actions

- Performance of radiation monitoring and visual inspection.
- Actions to be taken in the event that radioactive material is discovered in scrap metal including:
 - Possible isolation, investigation, and removal of radioactive material from a consignment,
 - Notification of the relevant national authorities and exporting and transshipment Member States,
- Subsequent safe handling of radioactive material in accordance with regulatory requirements including transport of radioactive material in accordance with the IAEA Regulations for the Safe Transport of Radioactive Material



Transit and Transshipment Member States

- Notification of the discovery of radioactive material in a shipment to the exporting and importing Member State.
- Safe handling of discovered radioactive material in accordance with regulatory requirements including potential transport of radioactive material in accordance with the IAEA Regulations for the Safe Transport of Radioactive Material.



Role of the IAEA

- Establishment of the relevant guidance documents including the development of procedures, technical and functional specifications [protocols] for detecting radioactivity in scrap metal
- Promote awareness and implementation of this agreement
- Gather and disseminate lessons learned concerning incidents involving the presence of radioactive material in scrap metal



Conclusion and Recommendations

- The meeting provided an opportunity to exchange experiences and practices with a view to promoting the harmonization of best practices in preventing incidents from radioactive metal scrap and in dealing promptly and effectively with any such incidents with other local and international experts.
- The meeting provided platform to ensure that South Africa and the NNR in particular stay abreast of international developments in dealing with radioactively contaminated scrap within and outside the country



Benefits to Africa (South Africa)

- The elements of the proposed non-binding agreement will be presented at the forthcoming IAEA 55th General Conference in Vienna in September 2011. Once approved, an all inclusive meeting will be convened for more deliberation.
- It is recommended that once the agreement has been approved that it be also presented to the Forum for Nuclear Regulatory Bodies in Africa including the NNR for implementation.



KE A LEBOGA!!!!



THANK YOU!!!!