



Atomic Energy Board of Namibia

Annual Review
2011/2012



REPUBLIC OF NAMIBIA

ATOMIC ENERGY BOARD

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ANNUAL REVIEW

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This Annual Review is submitted to the Hon. Minister of Health and Social Services in accordance with the requirements stipulated in Section 15(5) of the Atomic Energy and Radiation Protection Act (Act No 5 of 2005) and covers the activities of the *Atomic Energy Board* and of the *National Radiation Protection Authority*

Objectives of the Atomic Energy and Radiation Protection Act Act No 5 of 2005

- to minimize the exposure of persons and the environment in Namibia to the effects of harmful radiation
- to ensure that adequate control is exercised over the possession, production, processing, sale, export and import of radiation sources and nuclear material
- to create the necessary mechanisms to facilitate compliance with the obligations of Namibia under international agreements relating to nuclear energy, nuclear weapons and protection against the harmful effects of radiation.

A stylized, light blue atomic symbol is centered in the background of the page. It features a large central sphere with several smaller spheres orbiting it in elliptical paths, all rendered in a semi-transparent, artistic style.

CHAIRMAN'S REPORT

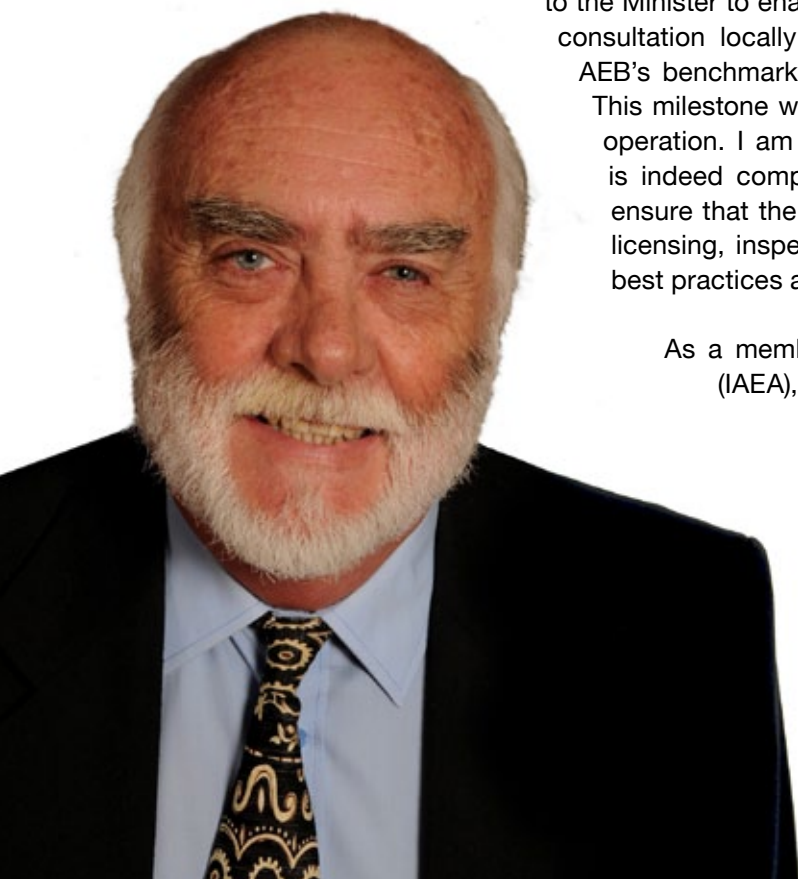
This is the final report of the current Atomic Energy Board (AEB) which was appointed three years ago to assist the Government of the Republic of Namibia with advice on nuclear energy and radiation sources. The National Radiation Protection Authority (NRPA), an official regulatory body, and the Board, worked hand in hand to ensure that the nuclear industry operates safely and that the benefits of nuclear energy are exploited to the benefit of all Namibians. The NRPA will continue to provide guidance to the Government until new Board members are appointed.

The Fukushima disaster in 2011 proved a turning point for the nuclear industry. This unprecedented earthquake and tsunami, which swamped the emergency cooling systems at the Fukushima Daichi nuclear power station and the large releases of radioactive material, calls for serious reflection.

The AEB has honoured its commitment to make nuclear and radiation safety, non-proliferation and transparency its highest priority. The Board concentrated on the rolling out of the 2005 Atomic Energy and Radiation Protection Act, the most important task was to formulate and recommend regulations to the Minister to enable the commencement of the Act. This involved wide consultation locally and internationally, specifically with the IAEA. The AEB's benchmark was to comply with international recommendations.

This milestone was achieved in January 2012 when the Act came into operation. I am confident that the current version of the regulations is indeed compatible with international standards. The NRPA must ensure that the regulatory activities such as notification, registration, licensing, inspection and enforcement are implemented by applying best practices and internationally recommended standards.

As a member state of the International Atomic Energy Agency (IAEA), Namibia continues to support nuclear non-proliferation. During the AEB's term of office, Namibia ratified the two international legal instruments that promote the enhancement of the nuclear non-proliferation regime, obligating parties to demonstrate their commitment towards peaceful applications of nuclear energy. These include the Additional Protocol to the Safeguards Agreement in connection with the NPT and the Treaty of Pelindaba.



The Board established synergistic ties with other governmental institutions to advance the contribution of nuclear science and technology in agriculture, human health, industry, energy, environmental protection and other sectors. Namibia also participated in the IAEA's Technical Cooperation (TC) programme. During the 2009/11 TC Cycle, Namibia implemented five national projects covering radiation therapy, nuclear medicine, crop production, water resources management and nuclear regulatory infrastructure. Namibia participated in twenty four regional projects covering a wide spectrum of applications of nuclear energy.

The AEB honoured its commitment to make nuclear safety, non-proliferation and transparency its highest priority.

Nuclear energy applications have the potential to make meaningful contributions to the achievement of a number of priority areas identified in Vision 2030 and the National Developmental Plans. The Board recommends that there should be a deliberate national drive to harness and exploit the peaceful and beneficial uses of nuclear energy. In this regard the AEB wishes to commend the Ministry of Mines and Energy for spearheading the formulation of a National Nuclear Fuel Cycle Policy. The Board played a complementary role in formulating this policy and is ready to continue to advise and serve when called upon.

The Board advocates the enactment of legislation and creation of a State entity mandated to embrace the peaceful application of nuclear energy. This may include research and development, training, education, nuclear fuel cycle activities; and non-nuclear fuel cycle activities such as those in health, agriculture and other industries. In view of these aspirations the Board advises that the Atomic Energy and Radiation Protection Act to be amended to include regulation of nuclear installations such as a nuclear power plant; nuclear fuel fabrication plant; enrichment plant; or spent fuel storage facility.

The Board would not have been able to achieve any level of success without the excellent support and guidance of the Honourable Minister and the Permanent Secretary of the Ministry of Health and Social Services. The able assistance of the NRPA was outstanding. We are deeply indebted to them. I would also like to thank the members of the AEB for their high level of engagement during the past three years as well as for ensuring that our top priorities have been appropriately addressed.

Sincerely,



Wotan Swiegers



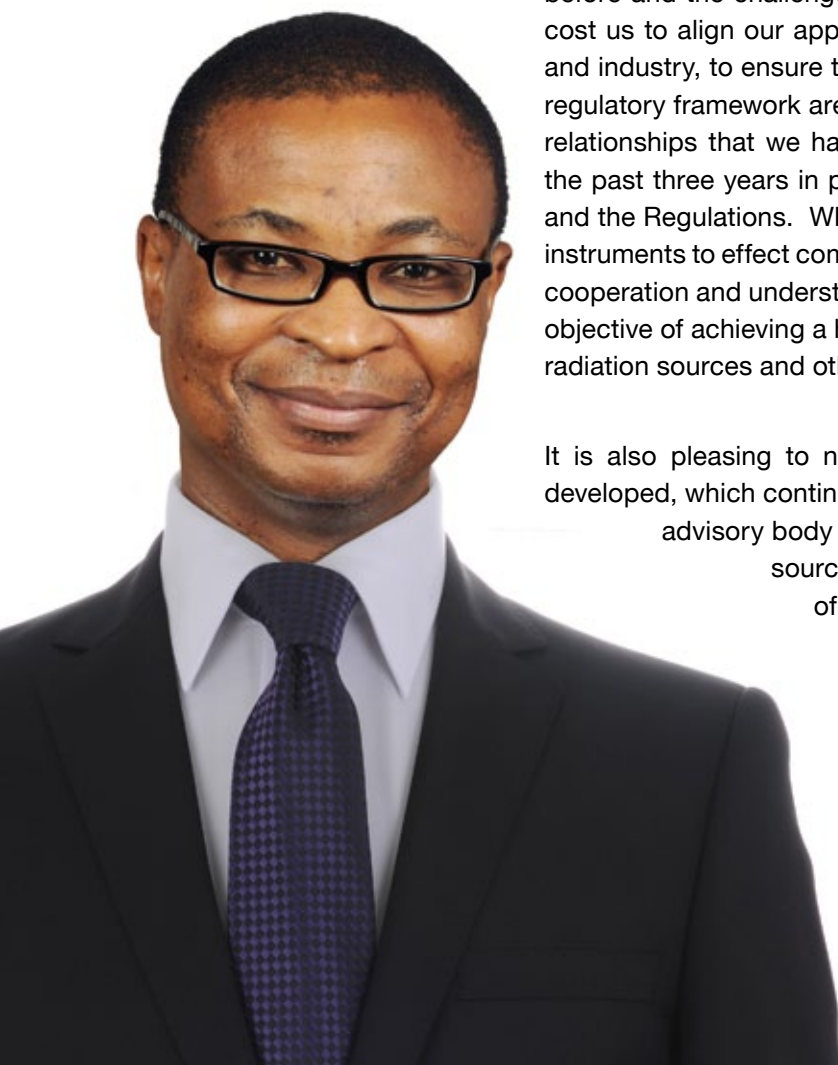
SECRETARY'S OVERVIEW

It is with gladness that we present the current report, especially in light of the recent rolling out of the Atomic Energy & Radiation Protection Act (Act no 5 of 2005). It is indeed an achievement which we celebrate as it has taken more than ten years to reach this milestone. Therefore at the onset I would like to congratulate the staff members of the National Radiation Protection Authority, the members of the Atomic Energy Board, the Ministry of Health and Social Services as well all those who have made a contribution towards this notable achievement.

While we celebrate this achievement we are also cognizant of the challenges that lie ahead. In particular we recognize the vacuum that existed before and the challenge to regulate some practices retrospectively. It will cost us to align our approaches and re-commit ourselves, both the NRPA and industry, to ensure that the requirements under the new legislative and regulatory framework are complied with. I also take comfort in the excellent relationships that we have built between the NRPA and the industry over the past three years in preparation for the full operationalisation of the Act and the Regulations. While the legislation and its regulations are important instruments to effect compliance with standards, I am convinced that mutual cooperation and understanding should enjoy high priority, with the common objective of achieving a high level of safety and security involving the use of radiation sources and other nuclear applications.

It is also pleasing to note the pleasant relationship that the NRPA has developed, which continues to flourish with the Atomic Energy Board, as an advisory body on matters relating to nuclear energy and radiation sources. The members of the Board and members of its committees indeed provided enriching and complimentary advice to the work of the Authority.

It is also worth noting the good progress which has been made with the development of the Nuclear Fuel Cycle policy, under the able leadership of the Ministry of Mines and Energy. This policy will inevitably have major impli-



I am confident that with the same commitment and resoluteness that has brought us to this level, Namibia can bravely take on the new challenges.

cations for both the work of the Atomic Energy Board and the NRPA and we indeed look forward to its finalization. The policy addresses a number of principles in terms of regulatory work and promotion of activities in the nuclear fuel cycle which in itself will present us with new challenges as we usher into the next phase. I am confident that with the same commitment and resoluteness that has brought us to this level, Namibia can bravely take on the new challenges.



Axel Tibinyane

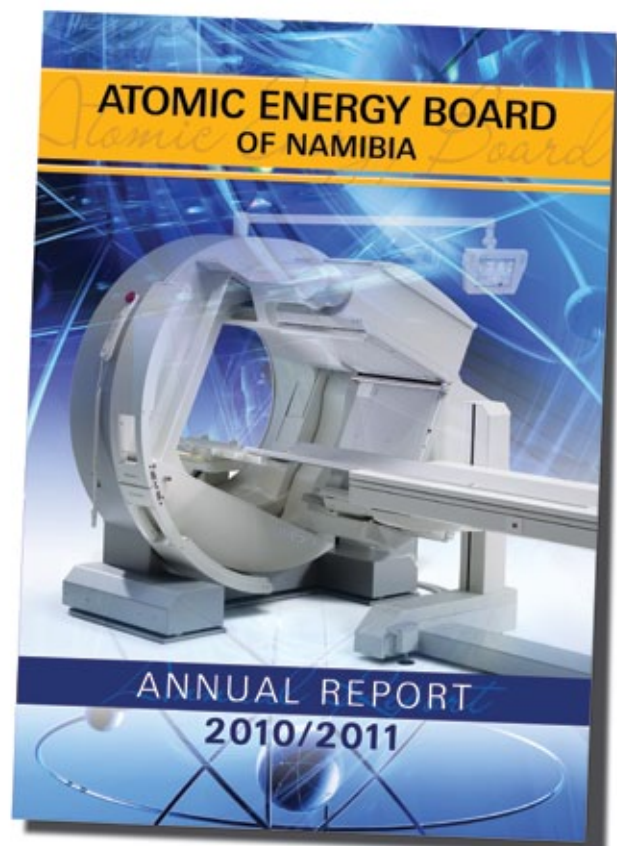
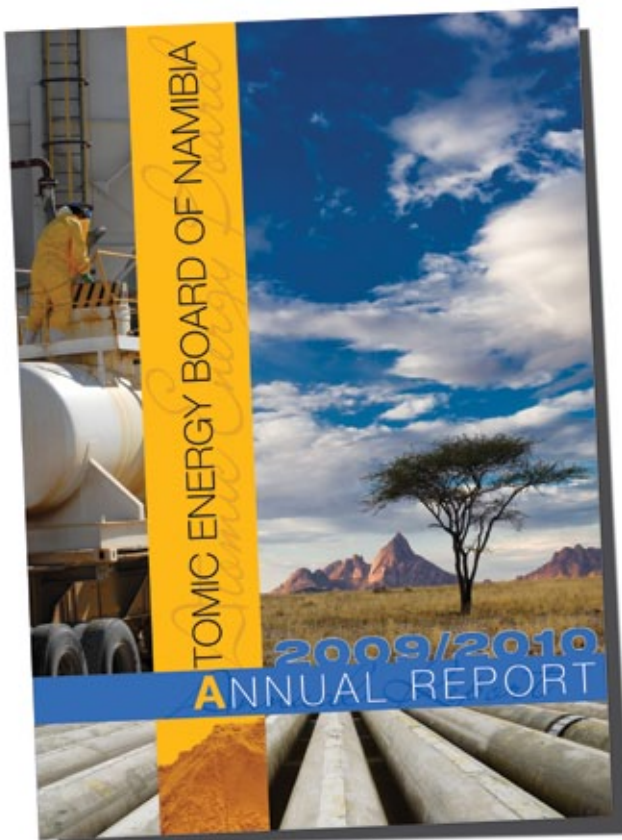


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The Atomic Energy Board is a statutory body, established under the Atomic Energy & Radiation Protection Act (Act No 5 of 2005), as an advisory body to Government on all matters pertaining to radiation sources and nuclear energy. The Board was constituted in February 2009 for a term of office of three years. The Board is supported by the National Radiation Protection Authority, which was also established in 2009 as the technical arm responsible for the administration of the Act.








Since its inception, the Board, with the support from the National Radiation Protection Authority, was able to produce two annual reports. The current report is the third of its kind and summarizes the activities of the Board and of the National Radiation Protection Authority over the period April 2011 to March 2012.



Atomic Energy Board Mandate and Vision

The core mandate of the Atomic Energy Board is to advise organs of state and other stakeholders on matters pertaining to nuclear energy and radiation sources. Its scope of mandate includes establishing operational frameworks under which Namibia can best harness the use of nuclear technology for socio-economic development, while also developing and maintaining an effective system of regulatory control. As such, the vision of the Board is the long-term management of Namibia's nuclear and radioactive materials in a manner that safeguards people and respects and protects the environment, now and in future.

The current representation on the Atomic Energy Board is from the Ministries of Mines & Energy, Foreign Affairs, Labour & Social Welfare, Environment & Tourism, Health & Social Services and Office of the President while the Chairperson is selected as an independent expert from the private sector. These members have been appointed by the Minister of Health and Social Services on recommendation of the line Ministries.

1. Dr. Wotan Swiegers Chairperson of the Board	
2. Dr. Shitaleni Chocky Herman nominated by Hon. Minister of Health and Social Services	
3. Ms. Helena Itamba nominated by Hon. Minister of Mines and Energy	
4. Mr. Ileni Shikwambi nominated by Hon. Minister of Labour and Social Welfare	
5. Mr. Teo Nghitila nominated by Hon. Minister of Environment and Tourism	
6. Mr. Gerard Theron nominated by Hon. Minister of Foreign Affairs	
7. Ms. Martha Hitenanye from the Office of the President	
8. Mr. Axel Tibinyane Secretariat Director: National Radiation Protection Authority	

The Board meets at least four times annually to consider various matters within the scope of its mandate and functions. The nature of its mandate is diverse and broadly includes matters relating to (i) nuclear and radiation safety for protection against the harmful effects of radiation; (ii) security of nuclear and radioactive material; (iii) safeguarding of nuclear material; and (iv) promoting nuclear technology programmes for socio-economic development.

National Radiation Protection Authority

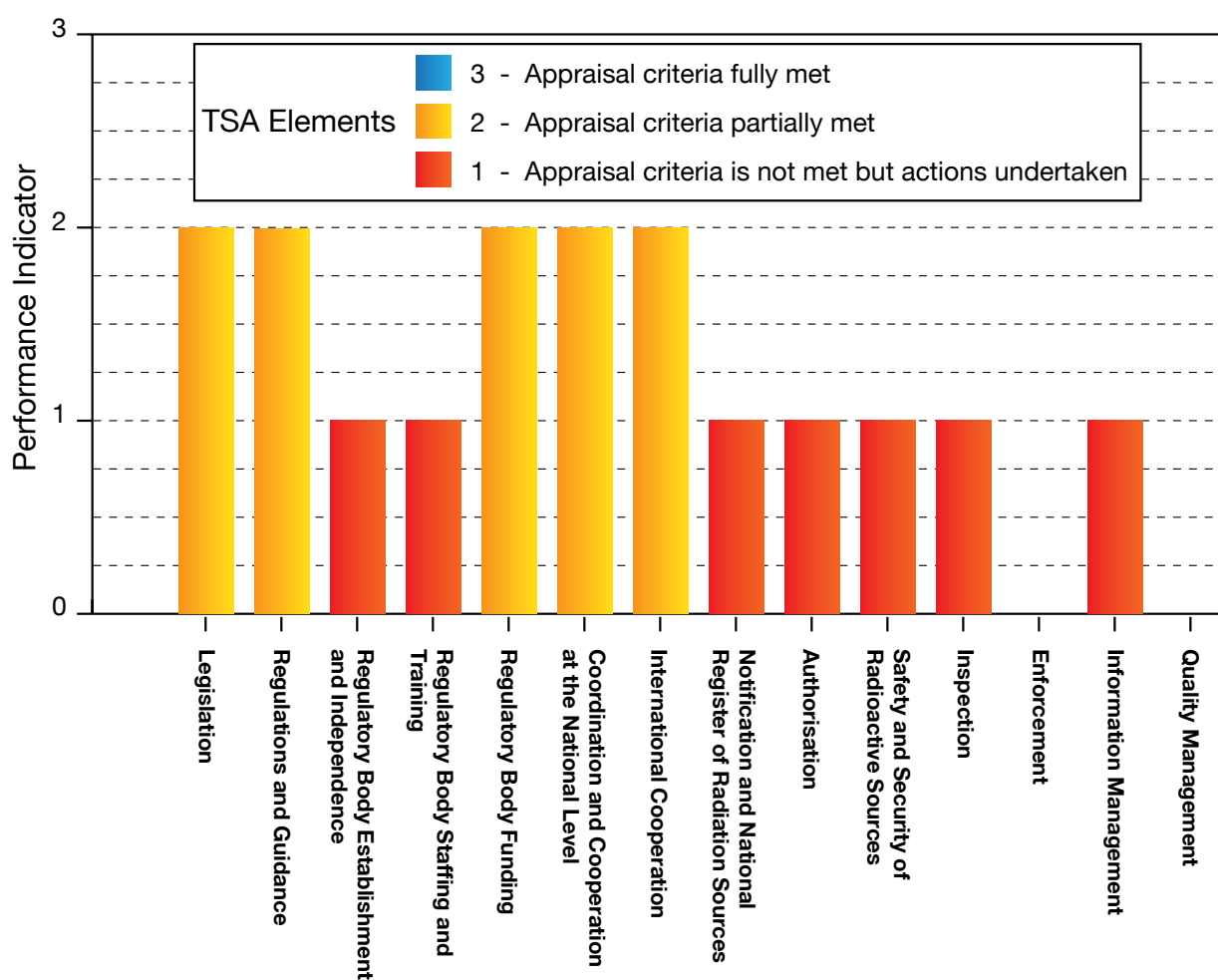
The National Radiation Protection Authority was established pursuant to the provisions of the Atomic Energy & Radiation Protection Act. The Director of the National Radiation Protection Authority (NRPA) is the Secretary of the Atomic Energy Board and as such develops and provides technical advice to the Board. The NRPA is also mandated with the administration of the Atomic Energy & Radiation Protection Act, including (i) establishing programmes for the assessment and determination of risk associated with radiation exposure; (ii) regulatory activities in accordance with the provisions of the Act; and (iii) ensuring compliance with international legal instruments in the sphere of nuclear and radiation safety. In this context, its vision is to be the national competent regulatory authority for nuclear and radiation safety and security, ensuring consistency with international standards and best practises by providing for the adequate protection of the environment and of people in current and future generations against the harmful effects of radiation.



A major milestone was recorded this year when the Radiation Protection & Waste Disposal Regulations were gazetted, which paved the way for the full operationalisation of the Act. In its assessment the Board is of the opinion that the current legislation is of sufficient scope to ensure protection and safety against the current inventory of radiation sources, radioactive and nuclear material. The regulations are also compatible with international standards, but there are still some omissions that need to be attended to, including requirements relating to accounting for and control of nuclear materials; security of radioactive material; competency levels of radiation safety officers; decommissioning of facilities; extraction and processing of radioactive ores; and the scales of fees to be paid in respect of functions of the Authority.

A major concern remains the effective independence of the regulatory authority. While in terms of the Act, the Authority is granted the power to operate independently, it still resorts under the Ministry of Health and Social Services. This prompted the Board to compare the current regulatory systems against the recommended international standards, which summary is provided in the chart below. It clearly shows that while the country has started to make progress, there are still some areas that need attention; the effective independence of the Authority is one of them.

Regulatory Infrastructure in Namibia - TSA1

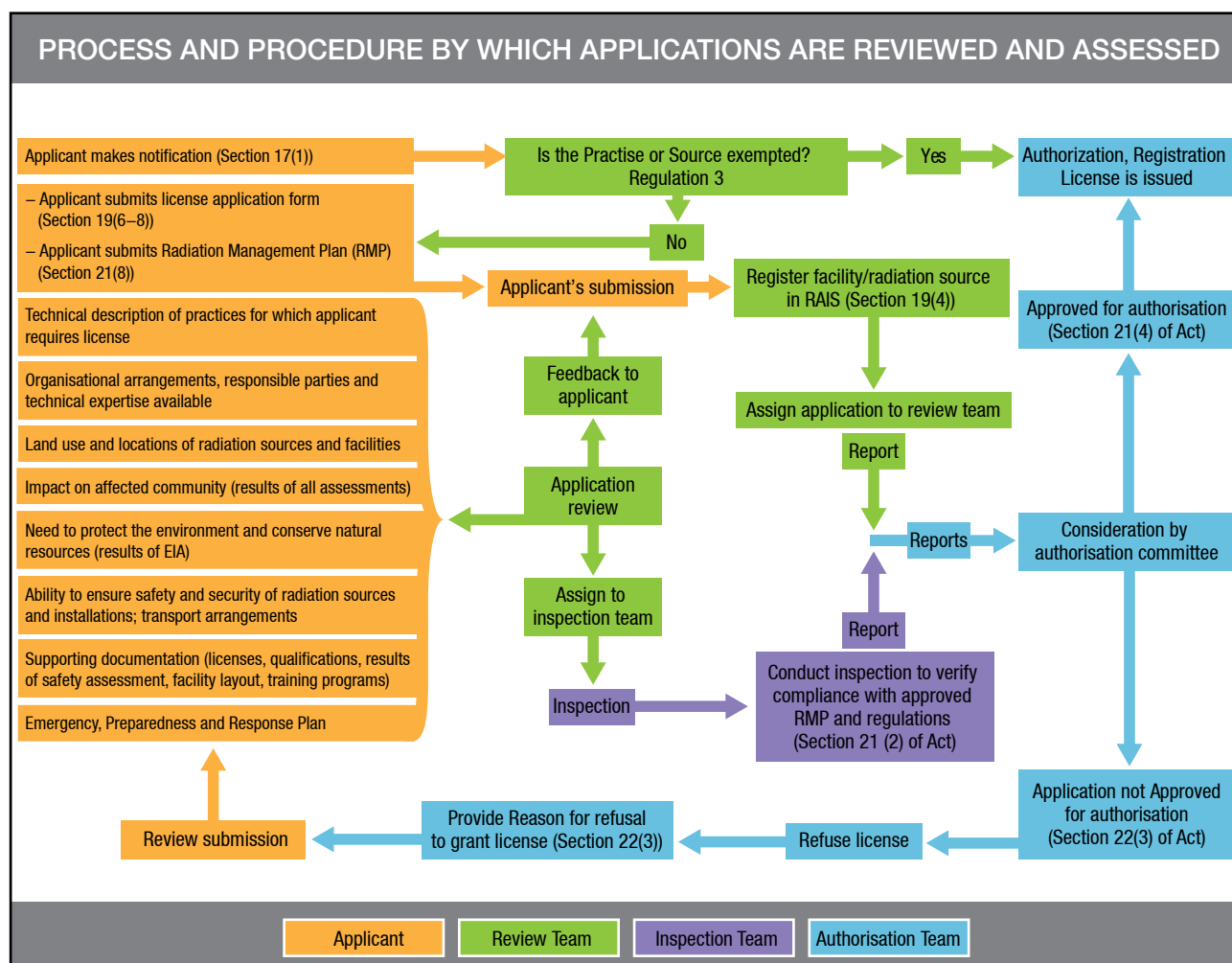


Activities of the Regulatory Authority

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The establishment and maintenance of an adequate level of security, safety and protection against radiation exposure demands an equally effective regulatory system, which is responsive to the extent and scope of nuclear related or radiation-based technology in the country. While the law and regulations are the basic tools for control, these needs to be translated into effective regulatory practices and processes in order to achieve the objects of the Act.

Since its establishment in 2009, the National Radiation Protection Authority has been aligning and preparing itself for the implementation of the Act, which commenced in January 2012. This included equipping itself with the human resources, developing processes and technical capability to effectively exercise its mandate in the context of the provisions of the Act and Regulations. The specific regulatory activities developed and adopted include the (i) systems of notification; (ii) review & assessment; (iii) authorization; (iv) registration; (v) licensing; (vi) compliance assurance and (vii) enforcement as illustrated in one of the process maps below.



With the commencement of the Atomic Energy & Radiation Protection Act on 16 January 2012 the previous legislative and regulatory provisions were repealed. All the authorization, licenses or permits issued under the previous regulatory framework were rendered invalid as these were initially based on compliance with requirements under the old legislative framework. However, the current legislation provides for an interim provision which allows operators to continue with their operations after having applied for a license and to continue to operate until such time that a license is issued or denied.

The process of bringing all operators under the current regulatory system was initiated in January 2012 with a number of applicants having made submission for review and assessment. The table below shows an inventory of the practices and sources within the scope of regulation.

Practices	Estimate number of practices in total	Quantities of radioactive material or radiation sources
Mining	3	Ore concentrate (+/- 5000 tons)
Exploration	6	Various quantities of natural ore
Diagnostic Radiology	60	178
Dental Radiology	46	108
Nuclear Medicine	3	Various quantities of radiopharmaceuticals
Nuclear Gauging	33	420
Industrial Radiography	3	3
Well logging	2	2
Radiation Therapy	2	5
Transport Agents	3	-
Analytical Laboratories	3	-
Others	12	-

Nuclear & Radiation Safety for Protection against the Harmful Effects of Radiation

10

Radiation may be classified into ionizing and non-ionizing radiation and as such have distinct health effects. It is well documented that exposure to ionizing radiation could lead to (i) deterministic health effects (acute radiation sickness, erythema, amputation of limbs, death, etc) if the exposure is in significant amounts and over a short period of time; and (ii) stochastic effects such as cancer or hereditary effects in cases where doses are low and received over an extended period

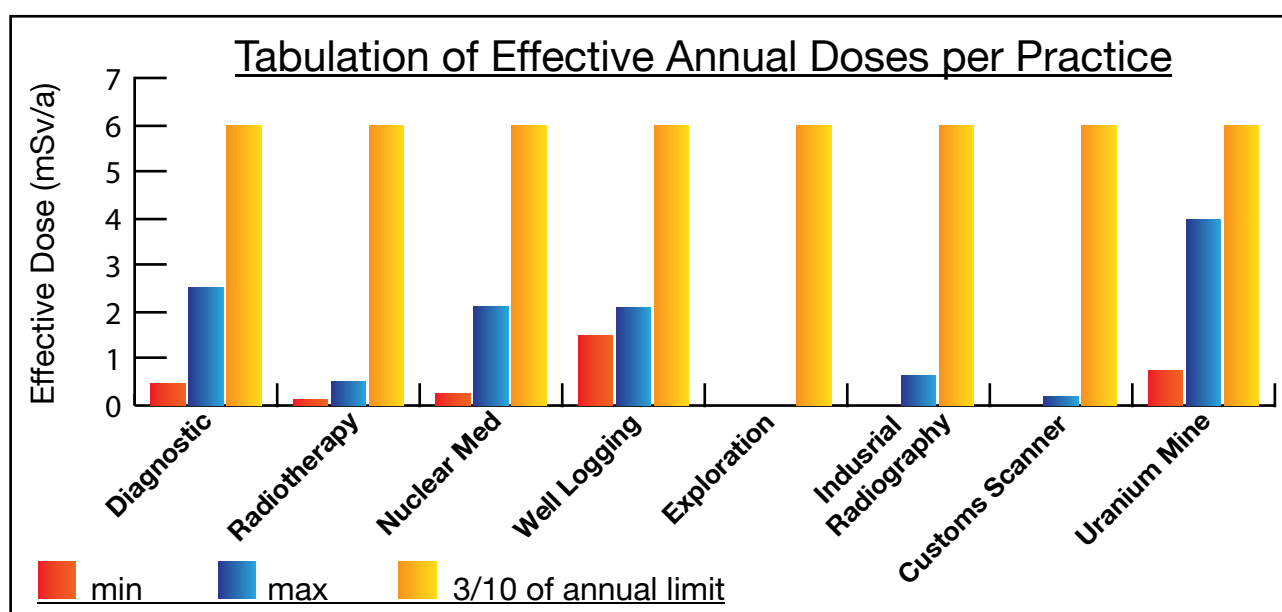
With regard to ionizing radiation, the foremost priority is to prevent occurrence of deterministic health effects and then to minimize the probability of occurrence of any stochastic health effects. It is pleasing to note that no known deterministic effects have occurred to date in Namibia as a result of excessive radiation exposure. The stochastic effects due to radiation exposure are complex to quantify and therefore the best possible means of protection is to ensure that radiation exposure to workers, the public and patients are kept within legal exposure limits and as low as reasonably achievable. An additional protective measure is to ensure that the use of land is not lost due to contamination resulting from releases of radioactive material to the environment.

photo: Rössing Uranium



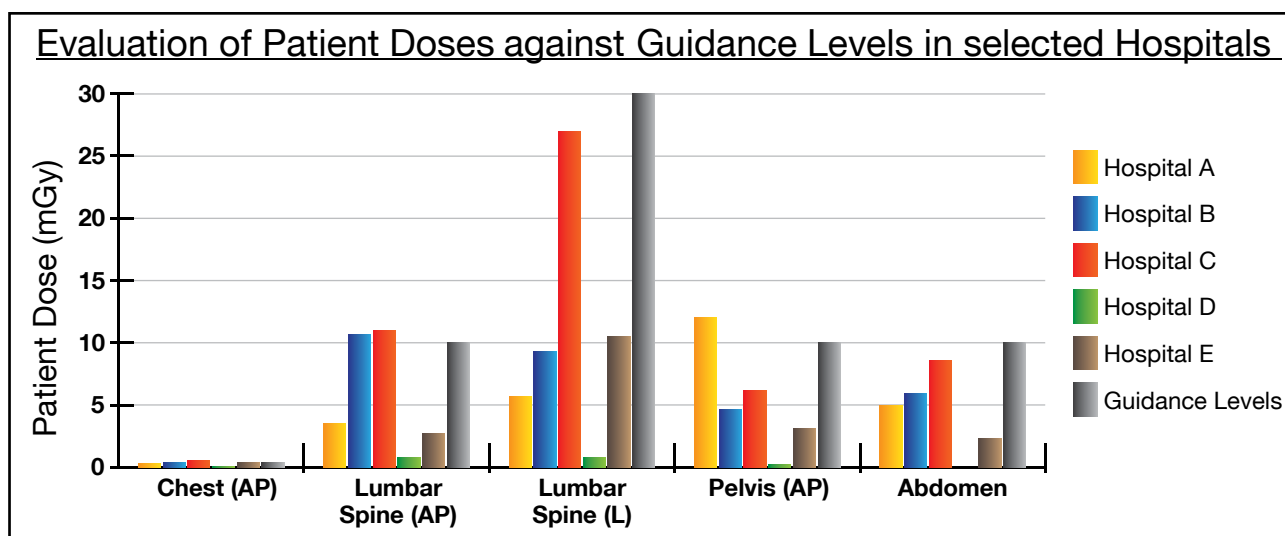
10.1 Protection of Radiation Workers

The permissible radiation exposure for radiation workers is 20 mSv per annum. This is based on the acceptable level of risks for radiation workers when compared with similar risks in other industries. Although stochastic effects may be at play at low doses, deterministic effects only occur at significantly higher doses, starting from 1 000 mSv single acute dose. In this regard the table below provides a summary of average doses received by radiation workers during the past year in Namibia as an indication of the magnitude of radiation doses received by the radiation workers in the various practices and should be read and interpreted with the aid of the aforementioned explanation.



10.2 Protection of Persons Receiving Radiation Exposure for Medical Reason

The aim of administering a radiation dose to a patient is (i) to obtain a quality image with the least amount of radiation for diagnostic purposes; or (ii) to administer the maximum dose to the treatment area while keeping the exposure to the adjacent healthy tissue to a minimum. Failure to apply these principles may give rise to unnecessary exposure of the patient, thereby potentially causing a stochastic effect later in life, and in some cases, such as radiotherapy, it could lead to a deterministic health effect. In some cases, the introduction of new technology may also contribute to administration of high radiation doses which may defeat the very purpose of promoting health. Therefore, facilities are not just assessed for compliance with the regulatory requirements; but there is also an on-going programme to assess the level of radiation exposure to patients against established guidance levels for specific procedures. The table below shows the results of a study conducted during the preceding year and these results are compared with recommended guidance levels. The regulatory programme seeks to bring about adjustments to ensure that the quality of medical exposure is enhanced without having to unnecessarily induce side effects that may compromise the quality of health.



10.3 Protecting the Public against Radiation Exposure from Practices

Similar to protection of radiation workers, the exposure of the members of the public are subject to legal annual dose limits as well. The protective measure is that the combined radiation dose to any member of the public which results from all authorized practices should not exceed 1 mSv per annum. This radiation dose is considered to be the acceptable quantity for any member of the public as compared with similar risk from other industrial applications. Therefore the radiation doses which results from any of the practices or radiation sources must be limited so that the dose does not exceed 1 mSv. The regulatory systems require that licensees establish public exposure programmes and monitor the critical group along the exposure pathway. The NRPA is currently conducting a survey to determine exposure pathways and doses.

10.4 Protecting the Public against Radiation Exposure from Naturally Occurring Radioactive Material

The occurrence of radiation is natural and emanates from celestial and terrestrial bodies, including raw commodities. There is therefore little that can be done to reduce the levels of radiation exposure, but if the levels are significantly high, appropriate protective and safety measure can be applied to minimize exposure to individuals. Therefore a two-pronged approach is needed. It is necessary first to identify the areas and potential radiological risk, and secondly to advise on the appropriate measures that must be adopted to protect exposed individuals, if and when necessary. Presently a study is in progress to assess the radiological risk in Windhoek, which is being extended to the Erongo (Swakopmund, Arandis), Otjozondjupa (Otavi, Otjiwarongo) and Oshikoto (Tsumeb) regions. Previous studies focused on gamma radiation while current studies are measuring radon exposure in homes. While some results are available, sampling is still ongoing and it is too early to draw conclusions.

The Constitution encourages the State to establish policies and provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory. The Treaty of Pelindaba, which Namibia ratified during this reporting period, also effectively prohibits the dumping and cross-border movement of radioactive waste. Furthermore, the Radiation Protection & Waste Disposal Regulations have established the requirements for the management of radioactive waste by local operators. In the framework of the Act and the Regulations, the Authority oversees that waste generators comply with the provisions made under these local and international legal instruments.

While the waste generator is responsible for the management of the radioactive waste on site, the State is also cognizant of its role to facilitate the establishment of a central waste management facility. Most of the radioactive waste cannot be disposed of unless it has decayed to levels that are acceptable for conventional disposal. However, most of the waste in the current inventory has a long half-life, making it unsafe to dispose of conventionally. This underscores the need for a central waste storage facility to be established. This process requires the development of (i) specifications; (ii) site selection; (iii) an environmental impact assessment; (iv) public consultation; (v) construction and management of the facility and the waste. This process is currently at its initial phase of developing the specifications while at the same time an interim storage facility is also under consideration for the temporary storage of sources that are either orphaned or have been confiscated.

photos: Yay Image Bank



Security measures are necessary to prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of radioactive or nuclear material. Illicit trafficking and theft of radioactive and nuclear material can lead to nuclear proliferation or the possible construction of improvised nuclear devices or radiological dispersal and exposure devices. Therefore measures to detect and respond to such acts are essential components of a comprehensive nuclear security programme.

Facilities are therefore obligated to implement physical protection measures to protect against possible risks associated with radiation sources. These physical protection measures are established to (i) prevent or timely detect unauthorized access; and (ii) effectively response to any case involving unauthorized act. Therefore, every facility is obligated to provide measures which ensure that the security system is adequate.

The current inventory of radioactive material and nuclear material for which specific security measures are required is listed below. Practices are grouped based on the magnitude of risk involved should an accident or incident occur.

Group	Practice	Quantity
1	Teletherapy	1
2	Industrial gamma radiography High/medium dose rate brachytherapy	5
3	Fixed industrial gauges Well logging gauges	285
4	Low dose rate brachytherapy Thickness/fill-level gauges Portable gauges (e.g. moisture/density gauges) Bone densitometers Static eliminators	103
5	Low dose rate brachytherapy eye plaque X ray fluorescence devices	34

With regard to uranium ore products, the main risk is theft at production facilities and at storage facilities with a potential for unauthorized removal during transport. Again the facilities must establish adequate means to prevent any such occurrence and be able to detect it timely, should it occur, with appropriate mechanisms to respond. However, there is no uniform application of security provisions at these facilities and during transport locally and across borders. The matter is currently under consideration by the Nuclear Security Committee for the purpose of standardization and responding effectively to emergency scenarios. The threat assessment is still underway to quantify the potential threat and risk in order to develop a responsive physical protection system. It is worth noting that during this reporting period one incident of theft of uranium ore product was reported and the criminal case is on-going.

photos: Stock.XCHNG image bank



The role of the Atomic Energy Board is to advise on matters relating to nuclear energy and radiation sources, including sources of non-ionizing radiation such as protection against harmful radiation resulting from the use of mobile phones and base station. In this connection, the Atomic Energy Board has taken note of the continuing debate and controversy surrounding the effects on health as a result of mobile phone use and the presence of base stations near residential sites.



The Board further acknowledges the usefulness of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guide as a means to protect against the adverse health effects associated with electromagnetic fields (EMF). It should be recognized that these guidelines are based on short-term, immediate health effects such as stimulation of peripheral nerves and muscles, shocks and burns caused by touching conducting objects, and elevated tissue temperatures resulting from absorption of energy during exposure to EMF (e.g. non-ionizing radiation from the use of cell phones and base stations).

Similarly the Board takes note that the ICNIRP guidelines do not guarantee adequate protection against the long-term effects of exposure, such as increased risk of cancer. As concluded by ICNIRP, available data are insufficient to provide a basis for setting exposure restrictions. This is a matter of current investigation by the international community, including WHO, and therefore calls for patience before conclusive evidence is presented to warrant further protective measures or not.

The Board is convinced that appropriate requirements must be put in place to ensure protection of persons against the harmful effects of radiation without unduly depriving the nation or individuals of the beneficial utilization of the technology. As an advisory body to Government on radiation sources, the Board acknowledges the collective responsibility to ensure that the benefit of technology is maximized while the harmful effect or perceived harmful effect is reduced.

While the Board supports the adoption of the ICNIRP guideline, it believes that there must be a deliberate consideration of the concerns of all stakeholders. For this reason, the Board has started the process of consulting broadly in order to find a common and amicable approach of regulating sources of non-ionizing radiation, such as protection against radiation from base stations.

Namibia is a major contributor to the activities in the Nuclear Fuel Cycle through the mining and processing of uranium bearing ores. While uranium contributes significantly to the developmental efforts locally and helps to generate electricity the world over, it is also the basis for the development of nuclear weapons. It is therefore essential that each State, including Namibia, gives assurance that its nuclear material is being used only for peaceful purposes.

It is essential that each State, including Namibia, gives assurance that its nuclear material is being used only for peaceful purposes.

The International Atomic Energy Agency (IAEA) and its Safeguards Regime were established so that nuclear energy could be put squarely into the service of peace and development. The acceptance and implementation of IAEA safeguards serve as important confidence building measures, through which Namibia can demonstrate and be assured by others that nuclear material is being used only for peaceful purposes.

Thus, in pursuance of this objective Parliament has approved both the Treaty of Pelindaba and the Additional Protocol to the Safeguards Agreement.

Photo: the Deputy Minister of Health and Social Services, Honourable Deputy Minister Petrina Haingura, at the General Conference of the IAEA.

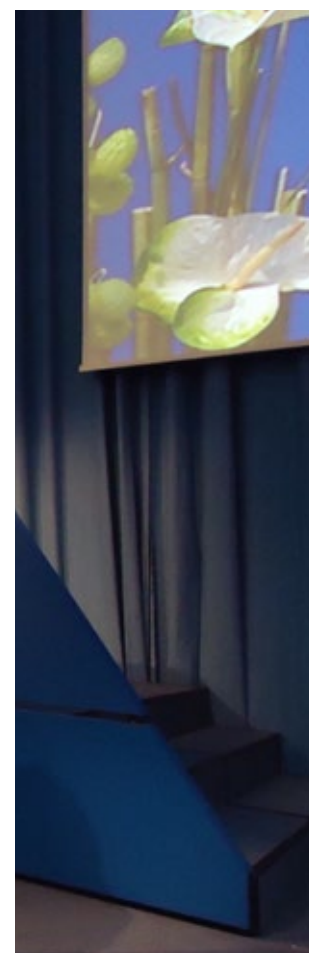


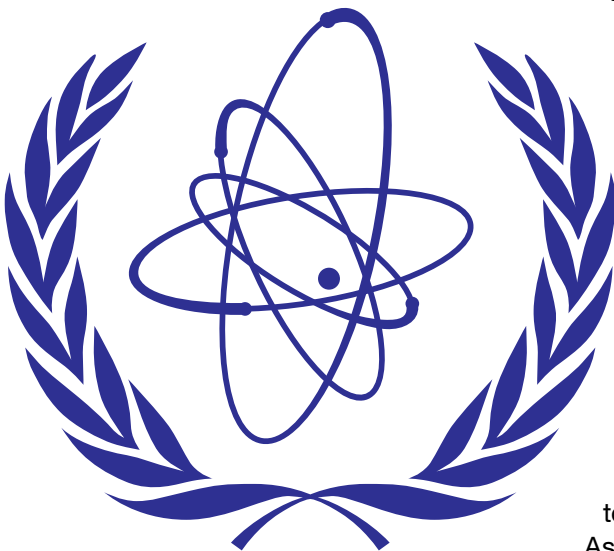


photo: IAEA building in Vienna. Courtesy of Axel Tibinyane.

The Treaty of Pelindaba, which came into force in July 2009, seeks to create the enabling framework for the establishment and maintenance of a nuclear-weapons-free zone in Africa. It further seeks to promote cooperation and encourage collaboration for the enhancement of peaceful activities of nuclear technology among participating states. Through this Treaty Namibia

is now in a position to demonstrate that its nuclear materials are used for peaceful purposes only and also to leverage the opportunities available through participation in regional technical cooperation activities.

The Treaty's First Conference of State Meeting was held in November 2010 while the First Ordinary Session of the African Commission on Nuclear Energy (AFCONE) as implementing body of the Treaty was held on May 2011.



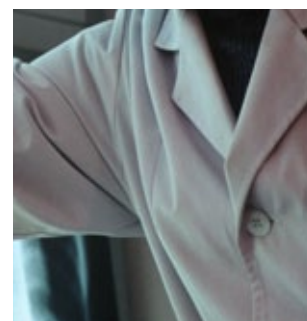
IAEA

The Model Protocol Additional to the Agreement between Namibia and the IAEA for the Application of Safeguards offers the opportunity for Namibia to extend its safeguards obligations such that the IAEA can formulate an opinion about Namibia's declared and undeclared nuclear activities. This is an important step which strengthens Namibia's position in terms of promoting international peace and demanding access to nuclear technology for socio-economic development. As part of its obligations under the Safeguards Agreement, Namibia continues to make declarations on an annual basis of the quantities of uranium oxide exported to various non-nuclear weapons states. The IAEA verifies that amounts exported correlates with the quantities received by the importing State to ensure that no material is diverted during the reporting period.

The application of radioisotopes and use of radiation-based technology contributes meaningfully to some national developmental goals, including (i) improving quality of health; (ii) contributing towards the eradication of poverty; and (iii) enhancing the level of productive and competitive human resources and institutions. The Government, in cooperation with the International Atomic Energy Agency, has developed various projects aimed at exploiting the benefits of nuclear technology for socio-economic development. During the reporting period five new projects have been approved with a total budget of N\$ 6 mil. The current area of focus is crop production, animal health, water resources management, human health, and human resource development. Some examples of the contribution of these projects are provided below.

15.1 Quality Of Life

The use of radiation-based technology is well established in the field of diagnostic radiology and the country is keeping abreast with the latest technology in this field with the installation of state of the art equipment such as computer tomography systems. A total of three have so far been installed in state facilities while three are operational in the private sector. There is still room for advancement in this area, especially in the area of magnetic resonance imaging.



Another diagnostic procedure which has established itself is the use of radioisotopes for imaging purpose. There is currently one facility in the private sector, one in the public sector and an additional state facility to be commissioned in the next financial year.

photo: Image Bank

The use of radiation-based technology for management of cancer conditions started in 1997 with an average annual patient load of about 500. However, the current need far exceeds the available services and therefore there is an on-going project to expand this service to northern Namibia that is expected to ease the current burden.

Overall the use of nuclear technology in the health sector makes a unique contribution in the area of non-communicable diseases, which is emerging as a key health threat in the world. The Government is responding well to this by expanding both nuclear medicine and radiotherapy services to northern Namibia, which will ensure that the services are accessible and affordable to a large population of the country.

15.2 Productive and Competitive Human Resources

The local expertise in various fields of nuclear technology is limited in terms of quality and quantity. Mostly the skills have been acquired abroad and often the framework for skills transfer is lacking. Many nuclear-related projects have not been successful, mainly because of the inadequate supply of trained and skilled human resources. Furthermore there is an aspiration to pursue a nuclear power programme which will require a steady injection of the right skills and competencies.



Photos courtesy of Axel Tibinyane

Therefore, an IAEA-supported national project has been developed specifically to strengthen the local capacity and capability for the development of human resources with sufficient background and skills in the fields of nuclear technology. This would entail (i) reviewing relevant undergraduate curricula at the Polytechnic of Namibia (ii) building teaching capability within some areas relevant to nuclear technology; and (iii) establishing research capacity in the various areas of nuclear technology. The aim of the project is to creating an enabling framework for the development and supply of expertise in support of the advancement of nuclear technology that have the potential to make a meaningful contribution to socio-economic development.



15.3 Food Security using Mutation Breeding

An IAEA-supported project on the induced mutation breeding and evaluation of mutant crops is now in the third year of implementation. The project uses plant breeding methods, including irradiation technologies, to improve crop performance in terms of yield and resistance to drought and pests. Some mutant populations were identified in cowpea, sorghum and pearl millet. An increase in the number of cowpea pods was observed in all varieties, especially among pods of the Shindimba variety. Another observation made was the straightening of the usually coiled Shindimba pods. The experiment will still continue in order to identify more mutant populations and also to confirm the identified lines following the extension of the project by the IAEA. The new mutant varieties identified in cowpea, sorghum and pearl millet are to be planted this year (2012) for further investigation.

Education and training is an effective means to empower society with the ability and capabilities to take charge of its own destiny in terms of good health, prosperity or generally contributing meaningfully to the development of oneself and the greater community. The area of nuclear and radiation safety is by no means an exception and for this reason the key groups have been targeted for skills transfer, knowledge and information sharing.

The staff of the Authority is important in creating an effective and efficient regulatory system. To this end some of the staff had the opportunity to participate in training events, workshops and long-term training programmes which are aimed at educating and renewing their capabilities in the field of nuclear and radiation safety.

It is equally important to ensure that society and users fully understands the pros and cons relating to the use of radiation sources, radioactive and nuclear material by (i) developing educational and training material that promotes a high level of safety and protection and (ii) ensuring that the regulatory requirements and provisions are fully understood. For this reason, educational materials have been developed, workshops held and information sharing events hosted to create awareness about the regulatory processes as well as protection and safety in various fields.

The Board also commissioned its website, which serves to educate the public, users of radiation sources and other stakeholders about the work of the Board and that of the Authority.



The Board is an important platform which promotes consultation and inter-ministerial collaboration. The representation is from key stakeholders including the Ministries of Mines & Energy, Health & Social Services, Foreign Affairs, Environment & Tourism, Labour & Social Welfare and Office of The President. While the decision making process is enriched because of this representation, the Board advises that this area be strengthened, especially in the area of legal advice.

Having considered the strength of the inter-ministerial collaboration, the Board has previously commissioned the Nuclear Security Committee and the Scientific Committee, which is aimed at complementing and strengthening the Board's stakeholder consultative mechanism. However, the Board has taken note that the progress of work under these committees has not been encouraging and needs to be re-vitalized, especially to enhance the technical support and encourage active participation by the membership.

A cooperative arrangement is in place with the Customs & Excise Directorate which defines the framework and mechanism of cooperation between the Authority and the Custom & Excise Directorate. This agreement is being implemented and the training of customs officials has yielded positive results with detection of unauthorized cross-border movement of radioactive material. A second cooperative agreement is currently being considered for cooperation with the Namibia Police which will establish the framework and mechanism for the escort of vulnerable radioactive material, training of police officials, and responses to emergency scenarios that may involve radioactive material.

It is equally vital to establish strategic partnerships beyond the national borders with institutions that share a common scope of mandate and would contribute positively towards the vision of the Board and the Authority. In this regard a cooperative agreement has been agreed upon by the heads of nuclear regulatory bodies in the SADC Region with the option to establish a formal cooperative framework under SADC. This arrangement will foster closer collaboration, especially in harmonizing regulatory systems, control of cross-border movement of radioactive material and regulation of radiological impacts in the uranium mining industry.



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