THE INTEGRATED KOEBERG NUCLEAR EMERGENCY PLAN

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1.0 PURPOSE

1.1 This procedure prescribes the requirements for an Integrated Koeberg Nuclear Emergency Plan in terms of Eskom Generation Standard GGS-1301. The requirements have been derived from National Nuclear Regulator documents and internationally accepted practices to prevent the occurrence of deterministic health effects in individuals, to reduce the occurrence of stochastic effects in the population, to minimise the psychological impact of an emergency and to minimise the impact on the environment.

1.2 The objectives of the Integrated Koeberg Nuclear Emergency Plan are:

1.2.1 To establish an organised emergency response capability for timely, co-ordinated action of intervening organisations in an event of a nuclear accident;

1.2.2 To describe the capabilities, responsibilities and authorities of intervening organisations and a concept for integrating the activities in the interest of public health and safety.

2.0 SCOPE

2.1 The Integrated Koeberg Nuclear Emergency Plan is applicable to:

2.1.1 Any nuclear emergency that has or is expected to have a radiological effect within or outside the boundaries of the Koeberg Nuclear Power Station that could require an emergency response by several government organisations.

2.1.2 Eskom, its agents, the general public and those organisations that participate in the maintenance or execution of the Integrated Koeberg Nuclear Emergency Plan.

2.1.3 Any emergency that involves the transport of radioactive material related to Koeberg by land, sea or air.

3.0 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

3.1.1 Accident – Any unintended event, including operating errors, equipment failures or other mishaps, the consequences or potential consequences of which are not negligible from the point of view of protection or safety.
3.1.2 **Action** - means:

(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 resulting from exposure to ionising radiation; or

(c) any other action involving radioactive material.

3.1.3 **Action Level** – The level of dose rate or activity concentration above which remedial actions or protective actions should be carried out in chronic exposure or emergency exposure situations.

3.1.4 **Avertable Dose** – A dose to be avoided by a protective action i.e. the difference between the dose expected with the protective action and that to be expected without the protective action.

3.1.5 **Contamination** – The presence of radioactive substances in or on a material or the human body, or other place where they are undesirable or could be harmful.

3.1.6 **Decontamination** – The removal or reduction of contamination by a physical or chemical process.

3.1.7 **Deterministic Effect** – A radiation effect for which generally a threshold level of dose exists above which the severity of the effect is greater for a higher dose.

3.1.8 **Disaster** – A progressive or sudden, widespread or localised, natural or human-caused occurrence which:

(a) Causes or threatens to cause:-
   (i) death, injury or disease;
   (ii) damage to property, infrastructure or the environment; or
   (iii) disruption of the life of a community; and

(b) Is of the magnitude that exceeds the ability of those affected by the disaster to cope with its effects using only their own resources.

3.1.9 **Disaster Co-ordination Team** – Describes the three spheres of government namely the Department of Minerals and Energy, Provincial Government of the Western Cape and City of Cape Town who are responsible for joint decision making, joint co-ordination and joint management during the early, intermediate and late phases of a nuclear emergency.
3.1.10 **Disaster Management** – means a continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at:

(a) preventing or reducing the risk of disasters;

(b) mitigating the severity or consequences of disasters;

(c) emergency preparedness;

(d) a rapid and effective response to disasters; and

(e) post-disaster recovery and rehabilitation.

3.1.11 **Disaster Operations Centre** – means the Centre established by the City of Cape Town Disaster Management in terms of the Disaster Management Act, Act No. 57 of 2002. The Disaster Operations Centre is situated in Goodwood.

3.1.12 **Disaster Risk Management Plan** – A document describing the organisational structure, its roles and responsibilities and concept of operation covering all aspects of the Disaster Risk Management Continuum and placing an emphasis on measures that reduce vulnerability, viz. hazard identification, risk and vulnerability assessment, risk reduction and mitigation, emergency planning and emergency preparedness, emergency response, relief and recovery efforts.

3.1.13 **Dose** – The amount of radiation received, where the use of a more specific term such as “effective dose” or “equivalent dose” is not necessary for defining the quantity of interest.

3.1.14 **Dose Limit** – The value of effective dose or equivalent dose to individuals from actions authorised by a nuclear installation licence, nuclear vessel licence or certificate of registration, that must not be exceeded.

3.1.15 **Emergency** – An event that requires the prompt implementation of actions, or the special regulation of persons or property, to limit the risk to the health, safety, or welfare of people, or to limit damage to property or the environment.

3.1.16 **Emergency Plan** – A document describing the organisational structure, its roles and responsibilities, concept of operation, means and principles for intervention during an emergency.

3.1.17 **Emergency Planning** – The process of developing and maintaining the capability to take actions that will mitigate the impact of an emergency on persons, property or the environment.

3.1.18 **Emergency Planning Zones** – Emergency planning zones are the areas where the risk warrants the development of arrangements for protective actions. Ideally, emergency planning zones are identified using natural boundaries. Emergency planning zones include, for example, the precautionary action zone, the urgent protective action planning zone and the longer-term protective action planning zone.
3.1.19 **Emergency Preparedness** – The capability to promptly take actions that must effectively mitigate the impact of an emergency on persons, property or the environment.

3.1.20 **Emergency Procedures** – A set of documents describing the detailed actions to be taken by emergency response personnel during an emergency.

3.1.21 **Emergency Response** – The performance of actions to mitigate the impact of an emergency on persons, property or the environment.

3.1.22 **Environmental Monitoring** – The measurement of external dose rates due to sources in the environment and of radioactive nuclide concentrations in environmental media.

3.1.23 **Eskom** – Is used for Eskom Holdings Limited, its divisions and wholly owned subsidiaries.

3.1.24 **Evacuation** – The rapid, temporary removal of people from the area to avoid or reduce short-term radiation exposure in the event of an emergency.

3.1.25 **Exercise** – An evaluation of major portions of emergency response capabilities. An exercise tests the integrated capability of the emergency response organisation, to identify weaknesses that could affect the emergency response to an actual emergency.

3.1.26 **Exposure** – The act or condition of being subject to irradiation. Exposure may be either external exposure (irradiation by sources outside the body) or internal exposure (irradiation by sources inside the body). Exposure may be classified as either normal exposure or potential exposure, either: occupational, medical, or public exposure and in intervention situations, either emergency exposure or chronic exposure. The term exposure is also used in radio-dosimetry to express the amount of ionisation produced in air by ionising radiation.

3.1.27 **Generic Intervention Level** – The level of avertable dose at which a specific protective action or remedial action is taken in an emergency exposure situation, or a chronic exposure situation.

3.1.28 **Hazard** – A situation with a potential for human injury, damage to property, damage to the environment, or some combination of these.

3.1.29 **Health Surveillance** – Medical supervision intended to ensure the initial and continuous fitness of workers for their intended task.

3.1.30 **Intervening Organisation** – An organisation designated, or otherwise recognised by the government as being responsible for managing or implementing any aspect of an intervention, e.g. local authorities, police, armed forces, media, etc.
3.1.31 **Intervention** – Any action intended to reduce or avert exposure or the likelihood of exposure to a release which is not part of a controlled action or which is out of control as a result of a nuclear accident.

3.1.32 **Intervention Level** – The level of avertable dose at which a specific protective action or remedial action is taken in an emergency exposure situation or chronic exposure situation.

3.1.33 **Iodine Prophylaxis** – The ingestion of a compound of stable iodine (usually potassium iodate) to prevent or reduce the uptake of radioactive isotopes of iodine by the thyroid in the event of a nuclear accident involving radioactive iodine.

3.1.34 **Ionising Radiation** – Electromagnetic or corpuscular emission emitted from radioactive material and capable of producing ions, directly or indirectly while passing through matter.

3.1.35 **Longer Term Protective Action Planning Zone** – The pre-designated area around a nuclear installation in which contingency plans and procedures are in place for taking effective protective actions to reduce the long term exposure due to deposited radionuclides in the event of a nuclear accident.

3.1.36 **Monitoring** – The continuous or periodic measurement of radiological and other parameters or determination of the status of a system.

3.1.37 **Nuclear** – The term nuclear is used to designate actions that are directly related to the nuclear fuel cycle. In most cases, this refers to nuclear power reactors.

3.1.38 **Nuclear Accident** – Any occurrence or succession of occurrences having the same origin and resulting in an unintended/unauthorised exposure to ionising radiation or release of radioactive material, which is capable of giving rise to an effective dose in excess of 1 mSv to the public off-site in a year, or in excess of 50 mSv to a worker on site received essentially at the time of the event.

3.1.39 **Nuclear Damage** – means:

(a) any injury to or the death or any sickness or disease of a person; or
(b) other damage, including any damage to or any loss of use of property or damage to the environment, which arises out of, or results from, or is attributable to, the ionising radiation associated with a nuclear installation.

3.1.40 **Nuclear Incident** – Any unintended event which is reasonably capable of giving rise to an effective dose equal to or in excess of 0,1 mSv to the public off site received essentially at the time of the event, or the unintended spread of radioactive contamination or exposure to ionising radiation, which could reasonably give rise to an effective dose in excess 20 mSv to a worker on site received essentially at the time of the event, or significant failure of safety provisions.
3.1.41 **Off-Site** – The area beyond the public exclusion boundary of the Eskom nuclear installation.

3.1.42 **On-Site** – The area within the public exclusion boundary of the Eskom nuclear installation.

3.1.43 **Operational Intervention Levels (OIL)** – A calculated value (e.g. ambient dose rate or radionuclide concentration) that may be measured by instruments and that corresponds to a certain generic intervention level for a given protective action. Operational intervention levels differ from “intervention levels”, which are expressed in terms of dose that may be averted. Dose may be calculated from dose rate or from activity concentration.

3.1.44 **Plant** – Nuclear power station with associated components, machinery, equipment or devices.

3.1.45 **Precautionary Action Zone** – An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to reduce the risk of severe deterministic health effects off the site. Protective actions within this area are to be taken before or shortly after a release of radioactive material or an exposure on the basis of the prevailing conditions at the facility.

3.1.46 **Protective Action** – An intervention intended to avoid or reduce doses to members of the public.

3.1.47 **Public Exclusion Boundary** – The enclosure of Eskom controlled property. Members of the public are not permitted domicile, for any reason, within this area.

3.1.48 **Radiation** – means ionising radiation.

3.1.49 **Recovery** – Longer-term actions to protect the public and the environment against the residual hazards from a nuclear accident and the long-term measures to rehabilitate the population, the community infrastructure and the environment.

3.1.50 **Release** – The controlled or accidental discharge of radioactive substances into the environment, which may occur during nuclear or radiological actions.

3.1.51 **Risk** – (qualitatively expressed) the probability of a specified health effect occurring in a person or group as a result of exposure to ionising radiation or (quantitatively expressed) a multi-attribute quantity expressing hazard, danger, or chance of harmful or injurious consequences associated with actual or potential exposures relating to quantities such as the probability that specific deleterious consequences may arise and the magnitude and character of such consequences.

3.1.52 **Risk Assessment** – Assessment of the radiological risks associated with normal operation and potential accidents involving a source or action.
3.1.53 **Safety Assessment** – An analysis to evaluate the performance of an overall system and its impact, where the performance measure is radiological impact or some other global measure of impact on safety.

3.1.54 **Severe Accidents** – This term is used to designate nuclear accident conditions that are more severe than design basis accidents. Design basis nuclear accidents are those taken into account in the design of a facility according to established design criteria, and for which releases of radioactive material are kept within specified limits.

3.1.55 **Sheltering** – A protective action whereby members of the public are advised to stay indoors with windows and doors closed, intended to reduce their exposure in an emergency exposure situation.

3.1.56 **Source** – Anything that may cause radiation exposure, such as by emitting ionising radiation or by releasing radioactive substances or radioactive material, and may be treated as a single entity for safety purposes.

3.1.57 **Stochastic Effect** – A health effect, the probability of occurrence of which is greater for a higher radiation dose and the severity of which (if it occurs) is independent of dose and generally occurs without a threshold.

3.1.58 **Urgent Protective Actions** – Those actions that must be taken promptly in order to be effective, and the effectiveness of which would be markedly reduced by delay. These include sheltering, evacuation and distribution of iodine prophylaxis.

3.1.59 **Urgent Protective Action Planning Zone** – An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to avert doses off the site in accordance with international safety standards. Protective actions within this area are to be taken on the basis of environmental monitoring – or, as appropriate, prevailing conditions at the facility.

3.2 **Abbreviations**

3.2.1 **CoCT** – City of Cape Town

3.2.2 **DCT** – Disaster Co-ordination Team

3.2.3 **DME** – Department of Minerals and Energy

3.2.4 **DOC** – Disaster Operations Centre

3.2.5 **EP** – Emergency Plan

3.2.6 **ESL** – Environmental Survey Laboratory

3.2.7 **FAO** – Food and Agriculture Organisation of the United Nations
3.2.8 **HPC** – Health Physics Controller

3.2.9 **IAEA** – International Atomic Energy Agency

3.2.10 **IKNEP** – Integrated Koeberg Nuclear Emergency Plan

3.2.11 **KNEP** – Koeberg Nuclear Emergency Plan

3.2.12 **LPZ** – Longer Term Protective Action Planning Zone

3.2.13 **NDMC** – National Disaster Management Centre

3.2.14 **NECSA** – South African Nuclear Energy Corporation

3.2.15 **NNR** – National Nuclear Regulator

3.2.16 **PAZ** – Precautionary Action Zone

3.2.17 **PEB** – Public Exclusion Boundary

3.2.18 **PGWC** – Provincial Government of the Western Cape

3.2.19 **RBE** – Relative Biological Effectiveness

3.2.20 **RNET** – Regional Nuclear Emergency Team

3.2.21 **RP** – Radiation Protection

3.2.22 **TLD** – Thermoluminescent Dosemeter

3.2.23 **TSC** – Technical Support Centre

3.2.24 **UPZ** – Urgent Protective Action Planning Zone

### 4.0 REFERENCES

#### 4.1 Referenced Documents

4.1.1 **City Of Cape Town Plan for dealing with Nuclear Emergencies arising from the Koeberg Nuclear Power Station, Revision 5**


4.1.3 **IAEA: GS-R-2: Preparedness and Response for a Nuclear or Radiological Emergency**

4.1.4 **KAA-500, Rev 9: The Process for Controlled Procedures**

4.1.5 **KSA-011, Rev 7: The Requirements for Controlled Documents**
4.2 Applicable Documents

4.2.1 CoCT KNEP 1.2: Notification of Nuclear Accident

4.2.2 CoCT KNEP 2.1: City of Cape Town Disaster Operations Centre

4.2.3 CoCT KNEP 2.2: Head of the Disaster Management Centre

4.2.4 CoCT KNEP 2.5: Health Services Organisation and Duties

4.2.5 CoCT KNEP 2.9: Traffic and Law Enforcement Services

4.2.6 CoCT KNEP 3.1: South African Broadcasting Corporation (SABC)

4.2.7 CoCT KNEP 3.3: Media Liaison

4.2.8 CoCT KNEP 3.5: South African Police Services

4.2.9 CoCT KNEP 3.6: Provincial Government of the Western Cape-Emergency Medical Services

4.2.10 CoCT KNEP 3.8: SANDF Duties and Responsibilities

4.2.11 CoCT KNEP 3.9: IKNEP Joint Decision Co-ordinating Team

4.2.12 CoCT KNEP 4.1 (A): Use of Siren and Public Warning Systems

4.2.13 CoCT KNEP 4.1 (B): Public Notification: Vehicle Mounted Siren /PA Systems

4.2.14 CoCT KNEP 4.2: Potassium Iodate (KIO3) Distribution Control

4.2.15 CoCT KNEP 4.3: Sheltering

4.2.16 CoCT KNEP 4.4: Evacuation and Relocation

4.2.17 CoCT KNEP 4.5: Mass Care Centres

4.2.18 CoCT KNEP 4.6: Radioactive Contamination Monitoring Equipment

4.2.19 CoCT KNEP 4.7: Acquisition of Emergency Supplies and Assistance

4.2.20 CoCT KNEP 4.8: Food Ban and Control of Foodstuffs

4.2.21 CoCT KNEP 4.9: Staff Safety and Welfare

4.2.22 CoCT KNEP 4.10: Dosimeter Distribution and Control

4.2.23 CoCT KNEP 4.11: Personal Decontamination

4.2.24 CoCT KNEP 4.12: Late Phase Population Relocation

4.2.25 CoCT KNEP 5.1: Training
4.2.26 CoCT KNEP 5.5: Record Retention

4.2.27 Disaster Management Act, 2002 (Act No. 57 of 2002)

4.2.28 ESKPVAAD2: Megawatt Park Response to a Nuclear Alert or Emergency

4.2.29 GGP 1196: Regional Nuclear Emergency Plan

4.2.30 GGS-1301: Emergency Preparedness and Response Requirements for Eskom Nuclear Installations

4.2.31 KAA-611: Emergency Mustering Accountability and Evacuation

4.2.32 KAG-002: Emergency Plan Training Programme

4.2.33 KEP-002: Nuclear Emergency Plan Notifications and Call-Outs

4.2.34 KEP-010: Radiological Survey Techniques

4.2.35 KEP-014: Emergency Planning – Meteorological Support

4.2.36 KEP-020: Assessment of Radioiodine in the Human Thyroid

4.2.37 KEP-024: Protective Actions and Intervention Levels

4.2.38 KEP-033: Emergency Communication with Media and Employees

4.2.39 KEP-035: Radiation Protection Dosimetry Services Emergency Functions

4.2.40 KEP-036: Health Physics Controller Duties

4.2.41 KEP-041: Duties of Field Team Leader

4.2.42 KEP-056: Nuclear Emergency Plan Duties of the Operating Shift

4.2.43 KEP-060: Duties of the Emergency Controller

4.2.44 KEP-063: Technical Support Centre Emergency Duties

4.2.45 KEP-065: Off-Site Radiological Calculations

4.2.46 KEP-076: Duties of Radiation Protection Operations Staff

4.2.47 KEP-I-001: Operating Instruction for the Off-Site Public Warning System

4.2.48 KEP-I-004: Plotting of Radiation Data

4.2.49 KEP-I-005: Updating the Information Boards and Completing the Applicable Report Sheets

4.2.50 KEP-I-006: ESL Operation following Emergency Plan Activation

4.2.51 KEP-I-007: Collection of Post-Accident Environmental Samples
4.2.52 KEP-I-008: Inventory Checks of Emergency Equipment
4.2.53 KEP-I-010: Set-Up of the Alternate ESL for Emergency Plan Duties
4.2.54 KEP-I-013: Computer Based Radiological Programmes for use by the Nuclear Emergency Plan
4.2.55 KEP-I-016: Operating Instruction for the Digital Paging System
4.2.56 KGG-005: Koeberg Off-site Infrastructure Decontamination Guide
4.2.57 Koeberg Safety Analysis Report, Part III Chapter 4.2
4.2.58 KSAR: Koeberg Safety Analysis Report
4.2.59 KSSR: Koeberg Site Safety Report
4.2.60 Letter k12131: Technical Basis for the Koeberg Emergency Plan
4.2.61 Memorandum of Agreement between Eskom Holdings, Provincial Government of the Western Cape and the City of Cape Town
4.2.62 National Disaster Risk Management Framework, 2005
4.2.63 National Nuclear Disaster Management Plan, October 2005
4.2.64 National Nuclear Regulator Act, 1999 (Act No. 47 of 1999)
4.2.65 RD-014: Emergency Preparedness and Response Requirements for Nuclear Installations
4.2.67 UG-04042-GIS: GIS User Guide
4.2.68 UG-04042-FSV: Field Survey Vehicle System User Guide

5.0 RESPONSIBILITIES

5.1 The operational responsibilities of the different intervening organisations relating to implementation of the Integrated Koeberg Nuclear Emergency Plan are addressed in the work flow responsibility matrix, Appendix 1.

5.2 The responsibilities of national, provincial and local intervening organisations relating to nuclear emergencies are addressed in the Disaster Management Act, 2002 (Act No. 57 of 2002) and the National Nuclear Disaster Management Plan.

5.3 The responsibilities of Eskom and the National Nuclear Regulator relating to Integrated Koeberg Nuclear Emergency Plan are addressed in the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999).
6.0 PROCEDURE

6.1 Safety Assessment

6.1.1 The extent of the Integrated Koeberg Nuclear Emergency Plan is based on the Technical Basis for the Koeberg Emergency Plan approved and issued by the NNR via letter k12131, dated 17 July 2000 Appendix 2 and on the legal requirements contained in the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) and the Disaster Management Act, 2002 (Act No. 57 of 2002). The overall Integrated Koeberg Nuclear Emergency Plan is based on regulations and legislation.

6.2 Administrative Requirements

6.2.1 The Integrated Koeberg Nuclear Emergency Plan is also based on the requirements prescribed in Requirements Document RD 014 and the Eskom Generation Standard, GGS-1301.

6.2.2 Arrangements to implement the Integrated Koeberg Nuclear Emergency Plan via procedures and sufficient, trained resources are formalised via a Memorandum of Agreement entered into by Eskom Holdings Ltd, the Provincial Government of the Western Cape and the City of Cape Town.

6.3 Emergency Preparedness Requirements

6.3.1 Authority

Persons or positions listed in Appendix 1 have clear authority to make prompt decisions regarding the activation of nuclear emergency plans and the implementation of protective actions in terms of the Disaster Management Act, 2002 (Act No. 57 of 2002) and National Nuclear Disaster Management Plan.

6.3.2 Organisational Responsibilities

6.3.2.1 The National Executive is primarily responsible for the co-ordination and management of any national disaster and must deal with such a disaster in terms of existing legislation and contingency arrangements. These obligations of the National Executive must be serviced by the relevant officials and infrastructure of the three levels of government.

6.3.2.2 The National Disaster Management Centre is responsible to declare a National Disaster on the recommendation of the Disaster Co-ordination Team in the event of a General Emergency being declared at Koeberg Nuclear Power Station.

6.3.2.3 The Minister of Provincial and Local Government may declare a National State of Disaster if existing legislation and contingency arrangements are inadequate to effectively deal with a National Disaster. The Minister of Provincial and Local Government may then make regulations or issue directives after consultation with the responsible Cabinet member in connection with the release of national resources and personnel, etc.
6.3.2.4 The Minister of Minerals and Energy makes regulations related to nuclear emergency planning and must assume a leading role in the National Executive’s oversight during a nuclear disaster. The Minister is responsible to address claims in excess of the financial security provided by the holder of the nuclear authorization.

6.3.2.5 The Chief Directorate Nuclear in the Department of Minerals and Energy is specifically responsible to service the following DME obligations with regard to nuclear disaster management and emergency response:

(a) Service the obligations of the Minister of Minerals and Energy regarding nuclear emergency planning matters under the National Nuclear Regulator Act, 1999 (Act No. 47 of 2002).

(b) Ensure compliance with the Disaster Management Act, 2002 (Act No. 57 of 2002) regarding the obligations of the National Organ of State to prepare and maintain a National Nuclear Disaster Management Plan and coordinate its implementation.

(c) Ensure establishment and chair the Nuclear Emergency Planning Steering and Oversight Committee (EPSOC) meetings relating to Koeberg Nuclear Power Station as per the formal Terms of Reference.

(d) In case of a National Disaster declared as a result of a nuclear emergency, deploy a DME representative to the Disaster Operations Centre (DOC) of the City of Cape Town or other designated centre and deploy a DME representative to the National Disaster Management Centre. At these centers the DME must participate in the Disaster Co-ordination Teams who are responsible for joint decision making, joint co-ordination and joint management of a nuclear emergency in accordance with the Integrated Koeberg Nuclear Emergency Plan and associated procedures.

(e) Responsible for joint decision making, joint co-ordination and joint management of post-disaster recovery and rehabilitation with the City of Cape Town, and the Provincial Government of the Western Cape and with the necessary input from Koeberg and the National Nuclear Regulator.

(f) Responsible for notifying, through official channels, South Africa’s bordering States about a nuclear emergency as required.

6.3.2.6 The Provincial Government of the Western Cape is responsible to establish and implement a Provincial Disaster Management Plan and establish a Provincial Disaster Management Centre. A representative from the Provincial Government of the Western Cape must participate in the Disaster Co-ordination Team after declaration of a nuclear emergency at Koeberg Nuclear Power Station.
6.3.2.7 The City of Cape Town is responsible to establish and implement a Municipal Disaster Management Plan and establish a Municipal Disaster Management Centre. The Disaster Co-ordination Team must meet at the City of Cape Town Disaster Operations Centre after declaration of a nuclear emergency at Koeberg Nuclear Power Station.

6.3.2.8 Where the possibility exists that a nuclear accident affecting the public may occur the holder of a nuclear authorisation must enter into an agreement with relevant municipalities and provincial authorities to establish a nuclear emergency plan and submit such plan for approval by the National Nuclear Regulator.

Koeberg is responsible for technical and radiological assessment during all phases of a nuclear emergency and based on such assessment Koeberg is responsible for implementing on-site protective actions and recommending off-site public protective actions to the Disaster Co-ordination Team based on formal procedures.

Eskom, Generation is responsible for providing financial security as per regulations in case of nuclear damage.

It should be noted that the obligation of “prevention” under the Disaster Management Act, 2002 (Act No.57 of 2002) is addressed at Koeberg Nuclear Power Station through the implementation of the National Nuclear Regulator requirements.

6.3.2.9 The National Nuclear Regulator must ensure that the Integrated Koeberg Nuclear Emergency Plan is effective for the protection of persons should a nuclear accident occur. The National Nuclear Regulator must recommend standards for the protection of the workers and the off-site public to be published as regulations by the Minister of Minerals and Energy. The National Nuclear Regulator must keep and maintain a record of the details of every nuclear accident and nuclear incident; store that record safely and retain that record for 40 years from the date of the nuclear accident or nuclear incident; and on request of any person, make that record available to that person.

6.3.2.10 The South African Nuclear Energy Corporation (NECSA) acts as the National Competent Authority and Contact Point (24 hour Emergency Control Centre) for the following International Atomic Energy Agency Conventions:

- Convention on early notification of a nuclear accident;
- Convention on assistance in the case of a nuclear accident or radiological emergency.

6.3.2.11 Other National Departments and Institutions must be involved as appropriate in terms of their legislation, functions and as directed in terms of a National State of Disaster.
6.3.2.12 In terms of the international Conventions, the IAEA must inform and provide information to any State party to the Conventions. On request from South Africa the IAEA must also provide assistance in case of a nuclear emergency or the IAEA may request assistance from South Africa in case of a nuclear emergency elsewhere.

6.3.2.13 Designated officials are assigned to key positions listed in the Appendix 1 and provisions are made via working level procedures to ensure continuity of the key positions following the declaration of an emergency.

6.3.3 **Maintaining nuclear emergency preparedness**

6.3.3.1 The Koeberg Power Station Manager is responsible for the execution of the on-site aspects of the Integrated Koeberg Nuclear Emergency Plan, including technical support and Radiation Protection.

6.3.3.2 The Nuclear Portfolio General Manager is responsible for:

(a) the establishment and maintenance of the Integrated Koeberg Nuclear Emergency Plan, including training;

(b) the establishment and execution of the off-site aspects of the Integrated Koeberg Nuclear Emergency Plan;

(c) the interface with provincial and local authorities on emergency planning requirements and provisions; and

(d) ensuring the continuous existence of the three party agreement between Eskom, Provincial Government of the Western Cape and City of Cape Town.

6.3.3.3 The Emergency Management Group at Koeberg is responsible for maintaining the Integrated Koeberg Nuclear Emergency Plan resources in a state of preparedness including the training of personnel necessary to provide for mitigatory actions in the event of a nuclear incident / nuclear accident.

6.3.3.4 The Emergency Management Group at Koeberg is responsible for ensuring the availability of meteorological services to support the Integrated Koeberg Nuclear Emergency Plan.

6.3.3.5 The Eskom Responsible Appointed Medical Practitioner, or his/her deputy, on site is responsible for the planning and arrangements associated with the emergency medical response necessary to accommodate the treatment of casualties who have physical injuries, who may have received large doses of ionising radiation, or who may be contaminated.

6.3.3.6 The Koeberg Shift Manager, Operating, is responsible for the initial assessment and classification of a nuclear accident situation and must adopt the duties of Emergency Controller, until relieved by the Standby Koeberg Emergency Controller.
6.3.3.7 The Koeberg Emergency Controller is responsible for the direction of all facets of the on-site emergency response and is the only member of the Koeberg Emergency Control Centre team authorised to provide recommendations regarding Protective Actions to the Disaster Co-ordination Team. The Protective Actions that may be recommended by the Emergency Controller are specified in Appendix 3. In the event of a rapidly evolving nuclear incident or nuclear accident and when the Disaster Operations Centre has not been activated, the Koeberg Shift Manager or the Koeberg Emergency Controller should as a priority act in the interest of the public by advising/recommending such urgent protective actions. If time permits this should be done in consultation with the Head: Disaster Management Centre, City of Cape Town, or designated duty Co-ordinator in the DOC.

6.3.3.8 The Koeberg Health Physics Controller is responsible for assessing the radiological information from the plant and from field teams, and recommending protective actions to the Koeberg Emergency Controller based on actual or predicted radiological conditions.

6.3.3.9 The Koeberg Field Team Leader is responsible for activating and directing the radiological survey teams and communicating the radiation field measurements to the Koeberg Health Physics Controller.

6.3.3.10 The South African Police Services is responsible for executing their duties and responsibilities in respect of any security initiated events, or a crime scene. Any action by the South African Police Services that may impact directly or indirectly on the management of a nuclear accident or nuclear incident condition must be in accordance with CoCT KNEP 3.5.

6.3.3.11 The South African National Defence Force is responsible for providing assistance and/or support to Government Disaster Management structures in the event of a nuclear emergency in accordance with procedure CoCT KNEP 3.8.

6.3.3.12 The Generation Technology and Assurance Manager, Megawatt Park, is responsible for the provision of a Nuclear Emergency Response Group at the Eskom National Emergency Centre. Responsibilities include the provision of logistical support, communication with the relevant government departments and safety analyses support as determined by the Regional Nuclear Emergency Manager.

6.3.3.13 The Eskom Senior Government and Media Liaison Practitioner, or designated nominee is responsible, in conjunction with the City of Cape Town Disaster Management spokesperson, for the co-ordination of the media agencies and the general public on matters relating to the Integrated Koeberg Nuclear Emergency Plan. The Eskom Senior Government and Media Liaison Practitioner is also responsible for the readiness and operation of the Joint Media Centre at Bellville.
6.3.3.14 The Chemistry Manager is responsible for the readiness and operation of the Environmental Survey Laboratory, technical liaison with the alternate laboratory Directorate: Radiation Control, Department of Health and those installations capable of providing analytical support, and the provision of training to the District Sampling Teams. The Chemistry Manager is also responsible for the provision of technical specialists and radiochemical analyses to support the TSC, if requested to do so by the Emergency Controller.

6.3.3.15 The Koeberg Radiation Protection Manager is responsible for the provision of Radiation Protection personnel to perform on-site and off-site radiological monitoring, radioactive waste disposal and dosimetry services.

6.3.3.16 The Koeberg Nuclear Services Manager is responsible for the on-site Fire Protection facilities and liaison with supporting Fire Services to ensure their compatibility with the requirements of the Integrated Koeberg Nuclear Emergency Plan.

6.3.3.17 The Regional Nuclear Emergency Manager is responsible for the activation and operation of the Eskom Regional Emergency Control Centre situated in Bellville.

6.3.3.18 The Eskom Regional Nuclear Emergency Team is responsible for Joint Media Operations Support, emergency communication, monitoring of the nuclear accident, nuclear safety assurance, and the provision of technical and logistics support as required by the Koeberg Emergency Controller.

6.3.3.19 Disaster Management Organisations

(1) The Municipal and Provincial Disaster Management Centres within their areas of jurisdiction are responsible for the extensive emergency planning and provision of a Disaster Management Plan for dealing with the off-site effects of a nuclear emergency arising from Koeberg Nuclear Power Station.

(2) The Department of Minerals and Energy, the Provincial Government of the Western Cape and the City of Cape Town are responsible for the control and implementation of their respective plans for dealing with Nuclear Emergencies arising from Koeberg Nuclear Power Station. The Head of the Disaster Operations Centre is responsible for the issuing and implementation of Protective Actions. The Head of the DOC is a member of the Disaster Co-ordination Team responsible for joint decision making, joint co-ordination and joint management of a nuclear emergency, in accordance with the Integrated Koeberg Nuclear Emergency Plan and associated procedures.

(3) The Department of Arts and Culture is the organisation responsible for the Robben Island Museum. The Safety Officer appointed by this department for the island is responsible, under the direction of the Disaster Operations Centre, for the protection of the population and the implementation of Protective Actions within the area of his jurisdiction.
(4) The South African Broadcasting Corporation, Sea Point, is responsible for the provision of emergency radio broadcasting services to support the implementation of Public Notification and Protective Actions.

6.3.4 Emergency Response Co-ordination

6.3.4.1 The emergency response and interaction protocols with intervening organisations related to the Integrated Nuclear Emergency Plan are documented in Appendix 1.

6.3.5 Plans and Procedures

6.3.5.1 Emergency preparedness aspects regarding proactive risk reduction is defined in the Koeberg Safety Analysis Report.

6.3.5.2 The Integrated Koeberg Nuclear Emergency Plan and Eskom procedures are subjected to the Eskom document control/quality assurance process and are revised, maintained, reviewed and updated at a frequency agreed with the National Nuclear Regulator.

6.3.5.3 The Nuclear Emergency Plans and associated procedures of Intervening Organisations are subjected to appropriate document control/quality assurance processes and are revised, maintained, reviewed and updated as required.

6.3.6 Emergency Classification

6.3.6.1 The Integrated Koeberg Nuclear Emergency Plan addresses the emergency conditions that would involve alerting, or activating progressively larger segments of the emergency organisation.

6.3.6.2 The emergency classes are defined in Appendix 5:

(1) Unusual Event

(2) Alert

(3) Site Emergency

(4) General Emergency

6.3.6.3 In terms of the National Nuclear Disaster Management Plan, the declaration of a General Emergency at Koeberg Nuclear Power Station must result in the declaration of a National Disaster under the Disaster Management Act, 2002 (Act No. 57 of 2002), and subsequent consideration for declaration of a National State of Disaster.
6.3.7 Assessment of Nuclear Installation Conditions

6.3.7.1 The Integrated Koeberg Nuclear Emergency Plan addresses the means to monitor the situation in the Control Room and perform a prognosis in accordance with procedures documented in Appendix 1.

6.3.7.2 The Integrated Koeberg Nuclear Emergency Plan addresses the means to classify the nuclear incident in accordance with procedures documented in Appendix 1 and addresses the declaration of an unusual event or an alert or a site emergency or a general emergency.

6.3.7.3 The Integrated Koeberg Nuclear Emergency Plan relies on the capability to carry out emergency monitoring of ionising radiation from overhead plume and/or radioactive contamination related to a nuclear accident, both on and off-site.

6.3.8 Notification and Activation

6.3.8.1 The intervening organisations are notified in accordance with the lines of communication depicted in Appendix 5.

6.3.8.2 The procedures for the prompt notification of the public and for implementation of protective measures, if they become necessary, are addressed in Appendix 1.

6.3.8.3 The Integrated Koeberg Nuclear Emergency Plan is complimented by the Memorandum of Agreement entered into by Eskom Holdings LTD, the Provincial Government of the Western Cape and the City of Cape Town in order to ensure a co-ordinated and integrated emergency response.

6.3.8.4 The Integrated Koeberg Nuclear Emergency Plan addresses key positions who are empowered to declare an emergency. The process for declaration of a Nuclear Emergency is addressed in Appendix 1.

6.3.8.5 The Integrated Koeberg Nuclear Emergency Plan addresses a notification scheme which includes information to identify the location of the emergency, the class, its nature, the time of occurrence, the important actions taken and the recommendations for urgent protective actions.

6.3.8.6 The Integrated Koeberg Nuclear Emergency Plan addresses required emergency response times in Appendix 6 for Koeberg Nuclear Power Station standby personnel responding to a nuclear emergency.
6.3.9 Mitigation

6.3.9.1 The Integrated Koeberg Nuclear Emergency Plan addresses an accident management programme in Appendix 1 to ensure that there are provisions for early mitigation of nuclear incidents and / or nuclear accidents.

6.3.9.2 The Integrated Koeberg Nuclear Emergency Plan applies radiological surveillance information to monitor, confirm or adjust protective actions. Availability of equipment, instrumentation and diagnostic aids that may be needed to influence the course and consequences of a nuclear accident are addressed in the procedures referenced in Appendix 1.

6.3.9.3 The Integrated Koeberg Nuclear Emergency Plan addresses deployment of resources and emergency response teams to areas as referenced in Appendix 1.

6.3.9.4 The Integrated Koeberg Nuclear Emergency Plan addresses protective actions, personnel decontamination, control of contaminated food and water, infra-structural decontamination, traffic and transportation and longer term protective actions listed in Appendix 1.

6.3.9.5 Intervention levels and action levels addressed in Appendices 7, 8, 9 and 10 are applied. The application and implementation of intervention and action levels are addressed in procedures referenced in Appendix 1.

6.3.10 Emergency Planning Zones

6.3.10.1 Emergency Planning Zones consist of:

(1) Precautionary Action Zone (PAZ) – PEB – 5 km: An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to reduce the risk of severe deterministic health effects off the site. Protective actions within this area are to be taken before or shortly after a release of radioactive material or an exposure on the basis of the prevailing conditions at the facility.

(2) Urgent Protective Action Planning Zone (UPZ) – 5 – 16 km: An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to avert doses off the site in accordance with international safety standards. Protective actions within this area are to be taken on the basis of environmental monitoring – or, as appropriate, prevailing conditions at the facility.
(3) Longer Term Protective Action Zone (LPZ) – PEB – 80 km: The pre-designated area around a nuclear installation in which contingency plans and procedure are in place for taking effective protective actions to reduce the long term exposure due to deposited radionuclides in the event of a nuclear accident.

**NOTE:** Detailed arrangements for the implementation of protective actions are required during the early phase for the zones PEB – 16 km. Contingency plans for the implementation of protective actions are required for the zone 16 – 80 km.

6.3.10.2 Koeberg maintains the capabilities, means, resources and tools necessary to recommend as appropriate the implementation of urgent protective actions in the Precautionary Action Zone and Urgent Protective Action Planning Zone, including the ability to conduct prompt environmental monitoring.

6.3.10.3 Procedures are listed in Appendix 1 to ensure the safety of persons on-site in the event of an emergency.

6.3.10.4 Arrangements are addressed in the procedures listed in Appendix 1 for the appropriate care of sheltered, or evacuated populations including decontamination, surveillance, food, registration, and medical and social care.

6.3.11 Public Education and Information

6.3.11.1 Koeberg provides information on the Integrated Koeberg Nuclear Emergency Plan to members of the public who could be affected by a nuclear accident.

6.3.11.2 The Integrated Koeberg Nuclear Emergency Plan and the Emergency Plans of intervening organisations address arrangements to ensure the timely provision of information to the public during an emergency and to correct false/inaccurate information.

6.3.12 Protection of Emergency Workers

6.3.12.1 Emergency worker exposures must be maintained below the prescribed limits described in Appendix 11.

6.3.12.2 Duty emergency workers must be accounted for at all times during an emergency.

6.3.12.3 The Integrated Koeberg Nuclear Emergency Plan and the Emergency Plans of intervening organisations address the protection of emergency workers, controlling of doses they receive and requirements for medical follow-up.

6.3.12.4 Emergency workers are provided with the training and equipment necessary to restrict their potential exposure, commensurate with the likely magnitude of exposure in an emergency situation.
6.3.13 Medical Assistance

6.3.13.1 The Integrated Koeberg Nuclear Emergency Plan and the Emergency Plans of intervening organisations address arrangements for medical staff to ensure the prompt availability and co-ordinated emergency response of medical first aid and assistance.

6.3.14 Longer Term Protective Actions

6.3.14.1 Intervention levels listed in Appendix 9 and 10 for the implementation and withdrawal of longer-term protective actions must be followed.

6.3.14.2 The Integrated Koeberg Nuclear Emergency Plan addresses the exposure of individuals and addresses requirements for long-term health monitoring in Appendix 1.

6.3.15 Logistic Support

6.3.15.1 Adequate supplies, equipment, communications systems and emergency facilities required to allow intervening organisations to fulfil their responsibilities have been identified and kept available as listed in Appendix 12, for use during an emergency.

6.3.15.2 The Environmental Survey Laboratory at Koeberg, iThemba Labs, NECSA and the Department of Health are capable to perform the analysis of radioactively contaminated samples.

6.3.16 Training

6.3.16.1 The skills and performance requirements for all positions relating to the Integrated Koeberg Nuclear Emergency Plan are defined and documented in authorised procedures.

6.3.16.2 The programme to provide for the training of employees and for periodic exercising are defined and documented in authorised procedures. This includes specialised initial training and periodic re-training programmes.

6.3.16.3 Radiological orientation training are available to intervening organisations.

6.3.16.4 Routine emergency response exercises, with the participation of the various Disaster Management Organisations are performed under the direction of the National Nuclear Regulator as and when required.

6.3.16.5 The Integrated Koeberg Nuclear Emergency Plan and associated procedures are subjected to routine reviews in the light of experience gained in exercises, other compliance/assurance activities and the experience gained at other facilities.
6.4 Emergency Response Requirements

The following emergency response requirements must be complied with.

6.4.1 Prognosis of the Initiating Event

6.4.1.1 The operators must monitor the situation in the Koeberg control room and perform a prognosis in accordance with plant procedures. Records must be kept of all actions and decisions.

6.4.2 Classification of the Event

6.4.2.1 The Koeberg Shift Manager and/or the Emergency Controller must classify the event in accordance with authorised procedures either as an Unusual Event; or an Alert; or a Site Emergency; or a General Emergency. Records must be kept of all actions and decisions.

6.4.3 Declaration of an Event

6.4.3.1 The Koeberg Shift Manager and/or the Koeberg Emergency Controller must declare the nuclear incident based on the classification, determine the appropriate protective actions as required and recommend to the Disaster Co-ordination Team, conduct on-site announcements and muster essential staff, review the declaration and classification in accordance with the prognosis as plant conditions change and maintain communication with key stakeholders as required. Records must be kept of all actions and decisions.

6.4.3.2 In the event where there is a need for urgent protective actions in the public domain and where the local authority is not yet in a position to order such protective actions, the holder of the nuclear authorisation should as a priority act in the interest of the public by advising/recommending such urgent protective actions. If time permits this should be done in consultation with the Head: Disaster Management Centre, City of Cape Town, or designated duty Co-ordinator in the DOC.

6.4.4 Declaration of a General Emergency

6.4.4.1 The Koeberg Shift Manager or Emergency Controller must conduct on-site announcements, muster all staff, initiate emergency notifications, complete the emergency notification form, specify the emergency category, specify the affected unit, provide access information, provide the wind direction and information on the release situation.
6.4.5 Termination of a general emergency

6.4.5.1 The on-site emergency situation may be terminated by the Koeberg Emergency Controller in consultation with the National Nuclear Regulator when the plant is under control and releases from the plant are within acceptable limits for normal operation. The site emergency organisation, however, should assist the public authorities until such time as the off-site emergency has been declared terminated. The recovery operations must be led by governmental bodies with the assistance of Eskom.

6.4.6 Activation of the Integrated Koeberg Nuclear Emergency Plan

6.4.6.1 The Koeberg Shift Manager and/or the Koeberg Emergency Controller must initiate the site alarm, activate standby emergency workers, activate and direct the Regional Nuclear Emergency Team to Bellville, deploy the on-site radiological monitoring team, activate and deploy appropriate components of nuclear incident or nuclear accident assessment, damage control and fire and rescue teams, activate the Emergency Control Centre at Koeberg promptly within 1 hour, activate Radiation Protection support, activate all supporting agencies and other emergency control centres, deploy Technical Advisors to SABC and to the CoCT Disaster Operations Centre.

6.4.6.2 The Head: Disaster Management Centre, City of Cape Town must activate the appropriate National Organisations, i.e. the DME representative assigned to participate in the Disaster Co-ordination Team, and the Heads of the Provincial and National Disaster Management Centres.

6.4.7 Declaration of a Disaster

6.4.7.1 The declaration of a General Emergency at Koeberg must result in the declaration of a National Disaster under the Disaster Management Act, 2002 (Act No. 57 of 2002), and subsequently consideration for a National State of Disaster.

6.4.7.2 The Head of the Disaster Operations Centre may declare a local disaster or recommend that a provincial disaster or national disaster be declared. A National Disaster must be declared by the National Disaster Management Centre when a General Emergency is declared at Koeberg Nuclear Power Station.

6.4.8 Review available information upon activation of Emergency Control Centres

6.4.8.1 The Koeberg Shift Manager and/or the Koeberg Emergency Controller must review, consolidate and supply all relevant information to the other Emergency Control Centres, i.e. the Regional Emergency Control Centre in Bellville and the Disaster Operations Centre, when activated.
6.4.8.2 The Disaster Co-ordination Team must review and understand the available information generated during the early phases of the emergency.

6.4.8.3 The Disaster Co-ordination Team must review the urgent protective actions called for and assess the type and resources that may be needed to implement the recommended protective actions.

6.4.9 Co-ordinate Media Liaison

6.4.9.1 The Disaster Co-ordination Team in conjunction with Eskom must co-ordinate the joint media liaison and communication in consultation with intervening organisations.

6.4.9.2 The Disaster Co-ordination Team in conjunction with Eskom must maintain communication with key stakeholders on plant prognosis and changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.

6.4.10 Co-ordinate Support Emergency Services

6.4.10.1 The Disaster Co-ordination Team must activate and co-ordinate the required emergency response support services, personnel for security, control measures for controlling contaminated food and water, and resources to control traffic and transportation.

6.4.10.2 The Disaster Co-ordination Team must expedite protective actions and provide for mass care, co-ordinate public notifications, co-ordinate zone isolation.

6.4.11 Protective Actions

6.4.11.1 The Koeberg Shift Manager and/or the Koeberg Emergency Controller must apply the available plant data in accordance with approved procedures, meteorology and radiological data or modelling to recommend protective actions to the Disaster Co-ordination Team.

6.4.11.2 The Koeberg Health Physics Controller must apply new radiological surveillance information to monitor, confirm or recommend adjustment to recommended protective actions.

6.4.11.3 The Koeberg Health Physics Controller must recommend evacuation or sheltering or relocation of people who are residing in plume affected areas subjected to ionising radiation above the intervention levels.

6.4.11.4 The Koeberg Health Physics Controller must recommend the distribution of potassium iodate prophylaxis as required in accordance with the intervention levels.

6.4.11.5 For protective actions decision making purposes during the early phase, the minimum angle to be considered with any given or predicted wind vector must be 67.5°.
6.4.12 Security Services

6.4.12.1 The Disaster Co-ordination Team must co-ordinate security services to protect evacuated areas.

6.4.13 Radiological Monitoring and Sampling

6.4.13.1 The Koeberg Field Team Leader and Koeberg Health Physics Controller must co-ordinate deployment and management of radiological monitoring team in affected areas.

6.4.13.2 The Koeberg Field Teams must perform radiological monitoring, delineate hotspots and collect environmental TLDs as required.

6.4.13.3 The Eskom Environmental Sampling Teams must collect environmental samples in soil, water, vegetables, milk, fish, and other media as directed by the ESL Sample Co-ordinator.

6.4.13.4 The Plotters must plot the measured data, such as ground concentrations, dose rates and integrated doses on the maps.

6.4.13.5 The Koeberg Field Team Leader and Koeberg Health Physics Controller must apply the radiological surveillance information to monitor, confirm or adjust protective actions relating to shelter, evacuation and relocation.

6.4.14 Personal Decontamination

6.4.14.1 The Koeberg Field Team Leader and Koeberg Health Physics Controller must recommend deployment of decontamination teams from the CoCT Environmental Health to areas as required. The Koeberg Radiation Protection Personnel or people under supervision of Koeberg Radiation Protection Personnel may assist the CoCT Environmental Health Practitioners to monitor potentially contaminated persons, locate and assess levels of contamination on the body and determine if contamination is internal, use bioassay techniques and consult a medical practitioner, as appropriate.

6.4.14.2 The Koeberg Radiation Protection Personnel or people under supervision of Koeberg Radiation Protection Personnel must apply personal decontamination techniques on contaminated members of the public and refer contaminated casualties for emergency medical treatment as required.
6.4.15 Control of Contaminated Food and Water

6.4.15.1 The Koeberg Field Team Leader and Koeberg Health Physics Controller must apply environmental surveillance information to monitor, confirm or recommend adjustment of protective actions relating to the control of contaminated food and water in the plume affected area.

6.4.15.2 The Disaster Co-ordination Team, must co-ordinate deployment of emergency response teams to implement contaminated food and water ban in areas as recommended by the Koeberg Emergency Controller.

6.4.16 Infra-structural Decontamination

6.4.16.1 The Disaster Co-ordination Team must co-ordinate deployment of resources to perform decontamination of infrastructure, i.e. large buildings, cars and soil in habitable areas etc. Infrastructure decontamination must be performed under supervision of Koeberg Radiation Protection Personnel or Trained Radiation Protection Specialists.

6.4.17 Traffic and Transportation

6.4.17.1 The Disaster Co-ordination Team must recommend roadblocks based on radiological monitoring results to identify affected areas, which require traffic control and transportation.

6.4.17.2 The Disaster Co-ordination Team must co-ordinate deployment of traffic control officers and transportation to areas as required.

6.4.18 Longer Term Monitoring

6.4.18.1 The Disaster Co-ordination Team must co-ordinate a long-term health monitoring programme for exposed people with probable deterministic effects, initiate epidemiological studies and implement long-term radiological monitoring in relocated or resettled areas.

6.4.19 Termination of the Late Phase

6.4.19.1 The Disaster Co-ordination Team must terminate the late phase of the nuclear emergency in consultation with all relevant authorities.

7.0 RECORDS

7.1 Records relating to nuclear accidents must be kept in a documentation system for 40 years after the event.
8.0 ATTACHMENTS

Appendix 1 – Work Flow Responsibility Matrix
Appendix 2 – NNR Requirements from the Technical Basis for the Koeberg Emergency Plan
Appendix 3 – Protective Actions
Appendix 4 – Classification of Nuclear Emergencies
Appendix 5 – Principal Lines of Communication
Appendix 6 – Emergency Response Times for Warning, Notification and Stand-by Personnel
Appendix 7 – Emergency Intervention Levels for Early Phase Protective Actions
Appendix 8 – Levels of Avertable Dose that Justify Intervention
Appendix 9 – Emergency Intervention Levels for Temporary Relocation and Permanent Resettlement
Appendix 10 – Generic Action Levels for Foodstuffs
Appendix 11 – Total Effective Dose Guidance for Emergency Workers
Appendix 12 – Emergency Plan Facilities and Equipment
Appendix 13 – Integrated Koeberg Nuclear Emergency Plan Document Hierarchy
Appendix 14 – Justification
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<td>1.1 Monitor the situation in the Control Room and perform a prognosis in accordance with plant procedures.</td>
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### NOTES & REFERENCES

- Operating Shift to perform prognosis in accordance with KEP-056.
- Control room personnel assess events using Koeberg Incident Procedures.
- All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.
- Classification to be performed in accordance with KEP-060 or KEP-056
- Declaration to be performed in accordance with KEP-060 or KEP 056.
- KEP-060 or KEP-056 Emergency Notification Form
- KEP-024 Protective Action Form
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<td>5.6 Maintain communication with key stakeholders on plant prognosis and changes to protective actions.</td>
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<td>5.7 CoCT to liaise with DME to send representatives to the DOC in Cape Town.</td>
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### NOTES & REFERENCES

All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.

Declaration to be performed in accordance with KEP-060 or KEP-056.

KEP-060, or KEP-056 Emergency Notification Form

KEP-060, or KEP-056 Appendix 4 KEP-024

KEP-060 or KEP-056 KAA-811

KEP-060, or KEP-056 Emergency Notification Form

Review plant conditions against criteria contained in KEP-056, or KEP-060.

Appendix 6 KEP-056, KEP-060

CoCT KNEP 3.9

All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.
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<td>6.0 Declaration of a General Emergency</td>
<td>Declaration to be performed in accordance with KEP-060, or KEP-056.</td>
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<td>KOEBERG HEALTH PHYSICS CONTROLLER</td>
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<td>ESKOM REGIONAL NUCLEAR EMERGENCY MANAGER</td>
<td>6.2 Complete off-site dose projections.</td>
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<td>6.3 Determine and recommend protective actions.</td>
<td>Appendix 4 Protective Action Form KEP-024</td>
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<td>HEAD OF NATIONAL DISASTER MANAGEMENT CENTRE</td>
<td>6.4 Conduct on-site announcements and muster all staff</td>
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<td>NATIONAL NUCLEAR REGULATOR</td>
<td>6.5 Initiate emergency notifications and complete the emergency notification form. Specify the emergency category, affected unit; access information, wind direction, release situation.</td>
<td>KEP-060, or KEP-056 Emergency Notification Form KEP-I-016 KEP-I-001</td>
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<tr>
<td>EMERGENCY RESPONSE INTERVENING ORGANISATIONS</td>
<td>6.6 Maintain communication with key stakeholders on plant prognosis and changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.</td>
<td>KEP-056, KEP-060 Appendix 6</td>
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<td>6.7 DME to send a Representative to NDMC when a General Emergency is declared at KNPS.</td>
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<td>6.8 Keep a record of all actions and decisions.</td>
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<td>7.0 Activation of the Integrated Koeberg Nuclear Emergency Plan</td>
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<tr>
<td>7.1. Initiate site alarm and notifications</td>
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<td>7.2 Activate standby emergency workers.</td>
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<td>7.3 Direct the Regional Nuclear Emergency Team to Bellville.</td>
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<td>7.4 Deploy the off-site radiological monitoring team.</td>
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<td>7.5 Activate and deploy appropriate components of incident assessment, damage control and fire and rescue teams.</td>
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<td>7.6 Activate Koeberg ECC and assume emergency control promptly within 1 hour.</td>
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<td>7.7 Activate Megawatt Park Emergency Plan.</td>
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<td>7.8 Activate RNET</td>
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<td>7.9 Activate all supporting agencies emergency control centres.</td>
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<td>7.10 Deploy Technical Advisors to SABC and DOC.</td>
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<td>7.11 Maintain communication with key stakeholders on plant prognosis and changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions</td>
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All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.
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### 8.0 Activation of Disaster Operations Centre (DOC)

8.1 Activate the Disaster Operations Centre

8.2 Obtain a briefing from Koeberg Nuclear Emergency Controller on the plant status, plant conditions, plant prognosis and nuclear incident or accident classifications.

8.3 Obtain briefings on recommended protective actions as appropriate.

8.4 Implement protective actions as appropriate.

8.5 Maintain communication with key stakeholders on plant prognosis and changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.

8.6 Keep a record of all actions and decisions.

### NOTES & REFERENCES

CoCT KNEP 2.1
CoCT KNEP 3.9

KEP-060
CoCT KNEP 1.2
CoCT KNEP 2.1

CoCT KNEP 1.2.

CoCT KNEP 3.9
CoCT KNEP 4.1 (A) & (B)
CoCT KNEP 4.2 – 4.11

NOTE: In principle the Head of the Disaster Management Centre (CoCT) may implement the recommendations from the Koeberg Emergency Controller in the absence of representatives from the DME and PGWC.

CoCT KNEP 1.2
CoCT KNEP 2.1
CoCT KNEP 3.1
CoCT KNEP 3.3

All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.

CoCT KNEP 5.5
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<td>TECHNICAL SUPPORT CENTRE LEADER</td>
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</table>

### ACTIVITIES

#### 9.0 Classification of the Disaster

**9.1** Upon declaration of a General Emergency at Koeberg, recommend declaration of a National Disaster under the Disaster Management Act

- [I] - [I] - [R] - [C] - [I] - [I]

The Head: Disaster Management Centre, CoCT and representatives from DME and Provincial Disaster Management are responsible for joint coordination, decision-making and management of an emergency.

#### 9.2 Record the prescribed particulars of the disaster in the prescribed register.

- [S] - [R]

DMA section 23(1c)

#### 10.0 Declaration of a National State of Disaster

**10.1** Declare a national state of disaster.


DMA section 27(1)

**10.2** Activate the national disaster management centre and alert disaster management role-players in the country that may be of assistance.

- [I] - [I] - [I] - [R] - [I] - [I] - [I]

DMA section 27(1)

The National Executive must deal with a national disaster

DMA section 26(2)

**10.3** Keep a record of communication.

- [R] - [I] - [R]

All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.

#### 11.0 Activation of Late Phase activities.

**11.1** Formal de-briefing and assessment of early and intermediate phase activities.

- [R] - (I) - [C] - [I] - [I]

Emergency Controller transfer information from Koeberg to the Disaster Co-ordination Team

**11.2** Review and consolidate information generated during the early phases of the emergency.

- [S] - (I) - [R] - [I] - [I] - [I]
### WORK FLOW RESPONSIBILITY MATRIX

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<td>11.3</td>
<td>Apply land-use database and maps for characterising the affected area, food and population.</td>
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<td>[S] (I) [R] [I] [I] [I]</td>
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<td>KEP-I-004 CoCT GIS KSSR</td>
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<tr>
<td>11.4</td>
<td>Identify areas where remedial actions must be taken and areas where remedial actions may be considered.</td>
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<td>[S] (I) [R] [I] [I] [I]</td>
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<td>CoCT KNEP 4.12 –4.13 KEP-024</td>
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<tr>
<td>11.5</td>
<td>Co-ordinate media liaison and communication.</td>
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<td>[S] [R] [I]</td>
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<td>KEP-033 CoCT KNEP 3.3</td>
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<td>11.6</td>
<td>Recommend protective actions</td>
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<td>11.7</td>
<td>Review recommended protective actions.</td>
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<td></td>
<td>The Head: Disaster Management Centre, City of Cape Town, and representatives DME, in conjunction with the PGWC Disaster Management Centre, are responsible for joint co-ordination, decision-making and management. CoCT KNEP 3.9</td>
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<tr>
<td>11.8</td>
<td>Perform Public Notification.</td>
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<td>(S) [I] [R] [I] [I] [S]</td>
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<td>KEP-002 CoCT KNEP 4.1 (A) &amp; (B)</td>
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<td>11.9</td>
<td>Assess the type and potential source of resources that may be needed for implementation of recommended protective actions.</td>
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<td>[I] (I) [R] [S] [I] [I]</td>
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<td>The Head: Disaster Management Centre, City of Cape Town, and representatives from DME, in conjunction with the PGWC Disaster Management Centre, are responsible for joint co-ordination, decision-making and management. CoCT KNEP 4.8 CoCT KNEP 4.12 KGG-005</td>
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<tr>
<td>11.10</td>
<td>Activate and co-ordinate emergency response organisations</td>
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<td>[I] [I] [R] [S]</td>
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<td></td>
<td>CoCT KNEP 1.2</td>
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<tr>
<td>11.11</td>
<td>Co-ordinate and Activate personnel for security</td>
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<td>[I] (I) [R] [I] [I] [S]</td>
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<td></td>
<td>CoCT KNEP 3.5 CoCT KNEP 3.8</td>
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## WORK FLOW RESPONSIBILITY MATRIX

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<th>ACTIVITIES</th>
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<th>KOBEBG REGIONAL NUCLEAR EMERGENCY MANAGER, RNIEC</th>
<th>DISASTER CO-ORDINATION TEAM</th>
<th>HEAD OF NATIONAL DISASTER MANAGEMENT CENTRE</th>
<th>NATIONAL NUCLEAR REGULATOR</th>
<th>EMERGENCY RESPONSE INTERVENING ORGANISATIONS</th>
<th>NATIONAL EXECUTIVE</th>
<th>MINISTER OF PROVINCIAL AND LOCAL GOVERNMENT</th>
<th>FIELD TEAM LEADER AND FIELD TEAMS</th>
<th>TECHNICAL SUPPORT CENTRE LEADER</th>
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<tr>
<td>11.12</td>
<td>Co-ordinate the control of contaminated food and water</td>
<td>[I]</td>
<td>[R]</td>
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<td>11.13</td>
<td>Co-ordinate the control of traffic and transportation</td>
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<td>11.14</td>
<td>Expedite protective actions and provide for mass care and relocation.</td>
<td>[I]</td>
<td>[R]</td>
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<td>11.15</td>
<td>Perform zone isolation.</td>
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<tr>
<td>11.16</td>
<td>Use plant information, meteorology and radiological data or modelling to recommend additional protective actions.</td>
<td>[R]</td>
<td>(S)</td>
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<td>[C]</td>
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<td>11.17</td>
<td>Perform radiological surveys to monitor, confirm or recommend other protective actions.</td>
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<td>(C)</td>
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<td>11.18</td>
<td>Maintain communication with key stakeholders on plant prognosis and changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.</td>
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<td>11.19</td>
<td>Provide security services to protect evacuated and relocated areas.</td>
<td>[I]</td>
<td>[R]</td>
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<td>11.20</td>
<td>Co-ordinate operations at emergency reception centres and provide emergency social services, including lodging, food, clothing, registration, inquiry and personal services.</td>
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<td>[R]</td>
<td>[I]</td>
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<td>11.21</td>
<td>Muster emergency response teams and co-ordinate dosimeter services.</td>
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<td>(S)</td>
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<tr>
<td>11.22 Keep a record of all actions and decisions.</td>
<td>[R]</td>
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<td><strong>NOTES &amp; REFERENCES</strong></td>
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<td>All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident. CoCT KNEP 5.5</td>
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**12.0 Radiological Monitoring and Sampling**

12.1 Deploy and manage radiological monitoring teams in populated plume affected areas.  
- [R] (C) [I] [I] [I] [I] [I] [S]  
- KEP-041  
- KEP-036

12.2 Perform radiation and contamination surveys. Delineate hotspots. Collect and process environmental TLDs.  
- [R] (C) [I] [I] [I] [I] [I] [I] [S]  
- KEP-010  
- KEP-035

12.3 Collect, assess and validate results from radiological surveillance field teams.  
- [R] (S) [I] [I] [I] [I] [I] [I] [I] [S]  
- KEP-036  
- KEP-041  
- KEP-065

12.4 Prepare large area maps based on measured data, such as ground concentrations, dose rates and integrated doses.  
- [R] (S) [I] [I] [I] [I] [I] [I] [I] [S]  
- KEP-036  
- KEP-041  
- KEP-I-004

12.5 Apply radiological surveillance information to monitor, confirm or adjust protective actions relating to shelter, evacuation and relocation.  
- [R] (S) [I] [I] [I] [I] [I] [I] [I]  
- KEP-024  
- The Koeberg Emergency Controller recommends changes as required to the Disaster Co-ordination Team.

12.6 Maintain communication with key stakeholders on changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.  
- [I] [S] [R] [I] [I] [I] [I] [I]  
- CoCT KNEP 1.2  
- CoCT KNEP 2.1  
- CoCT KNEP 3.1  
- CoCT KNEP 3.3

12.7 Deploy environmental sampling teams in plume affected areas.  
- [R] [C] [I] [I] [I] [I] [I] [I] [S]  
- KEP-I-007
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<td>KOEBERG REGIONAL NUCLEAR EMERGENCY MANAGER</td>
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</table>
| DISASTER CO-ORDINATION TEAM | **KEP-024**
| HEAD OF NATIONAL DISASTER MANAGEMENT CENTRE | **KEP-036**
| NATIONAL NUCLEAR REGULATOR | **CoCT KNEP 1.2, 2.1, 3.1, 3.3**
| NATIONAL EMERGENCY RESPONSE INTERVENING ORGANISATIONS | **CoCT KNEP 4.2 – 4.12**
| NATIONAL EXECUTIVE | **CoCT KNEP 5.5**
| MINISTER OF PROVINCIAL AND LOCAL GOVERNMENT | **CoCT KNEP 2.1**
| FIELD TEAM LEADER AND FIELD TEAMS | **CoCT KNEP 2.1**
| TECHNICAL SUPPORT CENTRE LEADER | **CoCT KNEP 2.1**

**NOTES & REFERENCES**

**ACTIVITIES 12 3 4 5 6 7 8 9 10 11 12**

12.8 Collect environmental samples in soil, water, vegetables, milk, fish, etc.

12.9 Assess radionuclide concentration in samples and identify and quantify specific radionuclides.

12.10 Maintain communication with key stakeholders on changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.

12.11 Keep a record of all actions and decisions.

13.0 Protective Actions

13.1 Apply radiological surveillance information to monitor, confirm or adjust protective actions.

13.2 Deploy emergency response teams to areas as required.

13.3 Evacuate, shelter, relocate people who are residing in plume affected areas subjected to radiation levels in excess of the intervention levels.

13.4 Distribute iodine prophylaxis as required in accordance with the intervention levels.

All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident.

KEP-024
KEP-036
CoCT KNEP 4.2 – 4.12
CoCT KNEP 3.9
CoCT KNEP 4.2
CoCT KNEP 3.9

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**Flow Path:**

Main Flow Secondary Flow

**ACTIVITIES**

1. **13.5** Maintain communication with key stakeholders on changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.

2. **13.6** Keep a record of all actions and decisions.

3. **14.0** Personal Decontamination

   1. **14.1** Recommend deployment of decontamination emergency response teams to areas as required.

   2. **14.2** Monitor contaminated / potentially contaminated persons.

   3. **14.3** Locate and assess levels of contamination on the body and determine dose.

   4. **14.4** If contamination is internal, use bioassay techniques.

   5. **14.5** Apply personal decontamination techniques and processes.

   6. **14.6** Provide emergency medical treatment of contaminated casualties.

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CoCT KNEP 1.2  
CoCT KNEP 2.1  
CoCT KNEP 3.1  
CoCT KNEP 3.3  
CoCT KNEP 4.11  
Koeberg RP personnel or people under Koeberg RP personnel supervision must perform personal decontamination.

CoCT KNEP 3.6  
KEP-076  
CoCT-KNEP 2.5
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<th>ORGANISATION / FUNCTION</th>
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<td>14.7 Maintain communication with key stakeholders on changes to protective actions; verify the effectiveness of remedial action.</td>
<td>[S] [R] [I] [S]</td>
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<tr>
<td>14.8 Keep a record of all actions and decisions.</td>
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<tr>
<td>15.0 Control of Contaminated Food and Water</td>
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<tr>
<td>15.1 Apply environmental surveillance information to monitor, confirm or adjust protective actions relating to the control of contaminated food and water in the plume affected area and the country.</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S]</td>
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<tr>
<td>15.2 Deploy emergency response teams to control contaminated food and water in areas as required.</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S]</td>
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<tr>
<td>15.3 Control food (temporary or permanent food bans, food contamination reduction measures, food diversion, etc).</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S]</td>
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<td>15.4 Provide alternative food supplies if required.</td>
<td>[I] [I] [R] [S] [I] [I] [S]</td>
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<td>15.5 Restrict the movement of contaminated food out of the affected area.</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S]</td>
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<tr>
<td>15.6 Implement and enforce food control measures for import and exports.</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S]</td>
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**NOTES & REFERENCES**
- CoCT KNEP 1.2
- CoCT KNEP 2.1
- CoCT KNEP 3.1
- CoCT KNEP 3.3
- CoCT KNEP 4.8
- KEP-I-006
- KEP-024

All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident. CoCT KNEP 5.5
### WORK FLOW RESPONSIBILITY MATRIX

**NOTES & REFERENCES**

- CoCT KNEP 1.2
- CoCT KNEP 2.1
- CoCT KNEP 3.1
- CoCT KNEP 3.3
- CoCT KNEP 5.5
- KEP-010
- KEP-065
- KGG-005
- CoCT KNEP 4.4

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<td>15.7 Maintain communication with key stakeholders on changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.</td>
<td>[S] [R] [I]</td>
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<tr>
<td>15.8 Keep a record of all actions and decisions.</td>
<td>[R] [R] [I]</td>
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<tr>
<td>16.0 Infra-structural Decontamination</td>
<td></td>
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<tr>
<td>16.1 Apply environmental surveillance information and radiological monitoring results to determine the need for decontamination of the infrastructure i.e. roads, buildings, cars, etc.</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S] [S]</td>
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<tr>
<td>16.2 Deploy decontamination teams to remove contamination from structures and soil in habitable areas.</td>
<td>[S] [S] [I] [R] [I] [I] [S] [S] [S]</td>
</tr>
<tr>
<td>16.3 Perform radiation and contamination surveys to assess the degree of success.</td>
<td>[R] [C] [I] [I] [I] [I] [I] [S] [S]</td>
</tr>
<tr>
<td>16.4 Apply post-decontamination surveillance information and radiological monitoring results to monitor, confirm or adjust protective actions relating to relocation.</td>
<td>[R] [C] [I] [I] [I] [I] [I] [I] [S] [S] [S]</td>
</tr>
</tbody>
</table>
### ACTIVITIES

16.5 Maintain communication with key stakeholders on changes to evacuation and relocation protective actions verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.

16.6 Keep a record of all actions and decisions.

#### 17.0 Traffic and Transportation

17.1 Apply environmental surveillance information and radiological monitoring results to identify affected areas, which requires traffic control and transportation.

17.2 Deploy traffic control officers and transportation to areas as required.

17.3 Control access to contaminated areas in order to limit the spread of contamination.

17.4 Implement marine, rail and traffic control in the affected area.

17.5 Maintain communication with key stakeholders on changes to protective actions, verify the effectiveness of remedial action and inform the public on the degree of success of remedial actions.
## WORK FLOW RESPONSIBILITY MATRIX

### ORGANISATION / FUNCTION

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.6 Keep a record of all actions and decisions.</td>
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<td>18.0 Longer Term Monitoring</td>
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<tr>
<td>18.1 Develop and implement long-term health monitoring of people with probable deterministic effects.</td>
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<tr>
<td>18.2 Initiate epidemiological studies.</td>
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<tr>
<td>18.3 Implement long-term radiation monitoring in relocated or resettled areas.</td>
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<td>18.4 Prepare for possible litigation.</td>
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<tr>
<td>18.5 Keep a record of each person who was within the area affected by the accident at the time of the accident</td>
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<tr>
<td>18.6 Keep a record of all actions and decisions.</td>
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</table>

### NOTES & REFERENCES

- All records of details of the nuclear accident must be kept safely for 40 years from the date of the nuclear accident. CoCT KNEP 5.5

### 19.0 Termination of the Late Phase

19.1 Terminate the late phase by notice in the applicable gazette.

- The Head: Disaster Risk Management Centre, City of Cape Town, and representatives from DME, in conjunction with the PGWC Disaster Management Centre, are responsible for coordinated decision making. CoCT KNEP 1.3
APPENDIX 2

NNR REQUIREMENTS FROM THE TECHNICAL BASIS FOR THE KOEBERG EMERGENCY PLAN

<table>
<thead>
<tr>
<th>ZONE</th>
<th>SIZE (km)</th>
<th>ACTION</th>
<th>IMPLEMENTATION TIME (hours)</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAZ</td>
<td>PEB – 5</td>
<td>Evacuation (all sectors) based on in-plant conditions</td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Reduces the risk of deterministic effects by pre-emptively evacuating out to a radius where deterministic mortality effects may not occur. LG-1036 and IAEA TECDOC 953 and 955</td>
</tr>
<tr>
<td>UPZ</td>
<td>5 – 16</td>
<td>Shelter (downwind sectors)</td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Reduces the risk of stochastic effects by pre-emptively sheltering downwind and then evacuating based on prevailing conditions (e.g. plant degradation and environmental monitoring). LG-1036 and IAEA TECDOC 953 and 955</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evacuation based on in-plant conditions leading to 12-16 hour advance warning.</td>
<td>16</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Thyroid blocking (downwind sectors)</td>
<td>10&lt;sup&gt;a&lt;/sup&gt;</td>
<td>In line with international practice</td>
</tr>
<tr>
<td>LPZ</td>
<td>PEB – 80</td>
<td>Relocation (based on environmental monitoring)</td>
<td>Long term action</td>
<td>Reduces the risk of stochastic effects from long term exposure to deposition and ground shine. LG-1036 and IAEA TECDOC 953 and 955</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Food ban (based on environmental monitoring)</td>
<td>Long term action</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Implementation time is measured from the time when the protective action is recommended by the Emergency Controller and is accepted by the CoCT Disaster Operations Centre.
APPENDIX 3

PROTECTIVE ACTIONS

1.0 Protective Actions are intended to prevent or mitigate the radiological or psychological consequences of a nuclear incident for the on and off-site populations. As a general principle, it must be appropriate to implement a protective action when the risk associated with the averted dose exceeds the social and monetary risks associated with that action.

2.0 The Protective Actions that may be recommended by Eskom and ordered by the Disaster Co-ordination Team are:

2.1 Notification of the Public – Warning to the public, which may minimise the emergency response, time required to complete a Protective Action.

2.2 Ad Hoc Respiratory Protection – Reduction of aerosol inhalation provided by the use of common household and personal items.

2.3 Protective Action Zone Isolation – Prevention of access to, or removal of property from, a radiologically affected area to prevent or minimise the consequences of exposure to ionising radiation or contamination.

2.4 Sheltering – Protection from exposure to radioactivity which may be afforded by buildings of a permanent nature.

2.5 Relocation – The non-urgent removal or extended exclusion of people from a contaminated area to avoid chronic radiation exposure following the passage of a radioactive plume.

2.6 Thyroid Protection – Administration and ingestion of stable iodine (KIO₃) which may minimise the exposure of the thyroid to radioactive iodine.

2.7 Evacuation – Urgent removal of a population from an area to avoid the imminent or actual threat of acute radiation exposure, e.g. from an airborne radioactive plume.

2.8 Analysis and Control of Foodstuffs – Measures leading to the control of food and water contaminated by a release of radioactivity. Food banning in a potentially affected area must be recommended by Eskom and ordered by the Disaster Co-ordination Team as a preventive measure, pending analysis.

2.9 Decontamination of Persons – Usually persons may be decontaminated in ordinary shower facilities, followed by a change of clothing.

2.10 Use of Stored Animal Feed – The transfer of domestic animals from free-range feeding to stored foodstuff may reduce the uptake of radioactive materials resulting from deposition.

2.11 Infrastructure Decontamination – Decontamination of areas, buildings, equipment, roads, land, etc, is a protective measure that applies to the intermediate or late phase. Decontamination involves the removal of radioactivity from an affected area to another location where it must be less hazardous.

2.12 Permanent Resettlement – The permanent removal or exclusion of people from a contaminated area, where return is not foreseeable, to avoid chronic radiation exposure.
APPENDIX 4

CLASSIFICATION OF NUCLEAR EMERGENCIES

UNUSUAL EVENT
An abnormal occurrence which indicates an unplanned deviation from normal operations; the actual or potential consequences of which require the partial or limited activation of the emergency plan.

ALERT
A situation exists that could develop into a SITE or GENERAL EMERGENCY and therefore requires notification of all emergency personnel in order to obtain a state of readiness to respond.

SITE EMERGENCY
An emergency condition exists that poses a serious radiological hazard on-site, but poses no serious radiological hazard beyond the public exclusion boundary.

GENERAL EMERGENCY
An emergency condition exists that involves, or potentially involves, a serious radiological hazard beyond the public exclusion boundary. The declaration of a General Emergency at Koeberg Nuclear Power Station must result in the declaration of a National Disaster under the Disaster Management Act.
APPENDIX 5

PRINCIPAL LINES OF COMMUNICATION

- NECSA
- IAEA
- Framatome
- EdF
- Eskom, Megawatt Park ECC
- Eskom, Regional ECC in Bellville
- Eskom, Koeberg ECC
- NNR Site Office
- NNR Head Office
- Affected Public

Flowchart showing the principal lines of communication involving various organizations and authorities, including Eskom, NECSA, IAEA, Framatome, EdF, and others, with responsibilities ranging from national executive to local government and disaster management agencies. The diagram includes decision-making centers and emergency response organizations, such as National Disaster Management Centre, Disaster Operations Centre, National Executive, MEC Local Government and Housing, and City Manager, among others.

Intervening Support Organisation:
- SABC & Radio KFM
- SAPS
- TAXI Associations
- Port of Cape Town
- Robben Island Museum
- Metro EMS
- Tygerberg Hospital
- SANDF
- Various Bus Services
- Applicable Local Disaster Management Agencies

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APPENDIX 6

EMERGENCY RESPONSE TIMES FOR WARNING, NOTIFICATION AND STAND-BY PERSONNEL

Warning and notification must be achieved within the following time frames and direction:

♦ Site and PAZ – 15 minutes, throughout 360°.
♦ UPZ (5 – 10 km) – 30 minutes, 67,5° downwind sector.
♦ UPZ (10 – 16 km) – 45 minutes, 67,5° downwind sector.

Response times for Koeberg Nuclear Power Station stand-by personnel:

♦ Emergency Controller to relieve Shift Manager: Promptly within one hour of call out.
♦ Standby ECC personnel: promptly within one hour of call out.
♦ Standby personnel to activate Bellville ECC: promptly within two hours of call out.

Response times for Disaster Co-ordination Team:

♦ CoCT and PGWC representatives must muster at the DOC within one hour after initial notification.
♦ DME representatives to the NDMC should report within one hour after the declaration of a General Emergency.
### APPENDIX 7

**EMERGENCY INTERVENTION LEVELS FOR EARLY PHASE PROTECTIVE ACTIONS**

<table>
<thead>
<tr>
<th>Protective Action</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Whole body [mSv]</td>
</tr>
<tr>
<td></td>
<td>Lungs*, Thyroid* and any Single Organ</td>
</tr>
<tr>
<td></td>
<td>Preferentially Irradiated [mSv]</td>
</tr>
<tr>
<td>Sheltering &amp; Stable Iodine Administration</td>
<td></td>
</tr>
<tr>
<td>UPPER DOSE LEVEL</td>
<td>50</td>
</tr>
<tr>
<td>LOWER DOSE LEVEL</td>
<td>5</td>
</tr>
<tr>
<td>Evacuation</td>
<td></td>
</tr>
<tr>
<td>UPPER DOSE LEVEL</td>
<td>500</td>
</tr>
<tr>
<td>LOWER DOSE LEVEL</td>
<td>50</td>
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</tbody>
</table>

* In the event of $\alpha$-irradiation of the lung, the numerical values apply to the product of radiation weighting factor and absorbed dose in mGy.

+ For practical reasons, one intervention level is recommended for all age groups.
APPENDIX 8

LEVELS OF AVERTABLE DOSE THAT JUSTIFY INTERVENTION

<table>
<thead>
<tr>
<th>Protective Action</th>
<th>Generic intervention level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheltering</td>
<td>10 mSv</td>
</tr>
<tr>
<td>Evacuation</td>
<td>50 mSv</td>
</tr>
<tr>
<td>Iodine Prophylaxis</td>
<td>100 mSv</td>
</tr>
</tbody>
</table>

NOTE 1: The intervention levels in Appendix 7 must be used to determine protective actions during the initial stages of an emergency.

NOTE 2: Protective actions may be justified using levels of avertable dose listed above later in an emergency.
APPENDIX 9

EMERGENCY INTERVENTION LEVELS FOR TEMPORARY RELOCATION AND PERMANENT RESETTLEMENT

<table>
<thead>
<tr>
<th>Period</th>
<th>Intervention Level</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Month</td>
<td>30 mSv</td>
<td>Temporary relocation</td>
</tr>
<tr>
<td>Subsequent month</td>
<td>10 mSv</td>
<td>Temporary relocation</td>
</tr>
<tr>
<td>Lifetime (50 years)</td>
<td>1000 mSv</td>
<td>Permanent resettlement</td>
</tr>
</tbody>
</table>
### APPENDIX 10

**GENERIC ACTION LEVELS FOR FOODSTUFFS**

<table>
<thead>
<tr>
<th>Isotope Group</th>
<th>Radionuclides</th>
<th>Generic Action Levels (kBq/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cs-134, Cs-137, Ru-103, Ru-106, Sr-89, I-131</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Sr-90</td>
<td>0,1</td>
</tr>
<tr>
<td>3</td>
<td>Am-241, Pu-238, Pu-239, Pu-240, Pu-242</td>
<td>0,01</td>
</tr>
<tr>
<td>4</td>
<td>Cs-134, Cs-137, Ru-103, Ru-106, Sr-89</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Sr-90, I-131</td>
<td>0,1</td>
</tr>
<tr>
<td>6</td>
<td>Am-241, Pu-238, Pu-239, Pu-240, Pu-242</td>
<td>0,001</td>
</tr>
</tbody>
</table>

**MILK, INFANT FOODS AND DRINKING WATER**

**Notes:**

These levels apply to situations where alternative food supplies are readily available. Where food supplies are scarce, higher levels may apply. They also apply to food prepared for consumption, and would be unnecessarily restrictive if applied to dried or concentrated food prior to dilution or reconstitution.

For practical reasons the criteria for separate radionuclide groups must be applied independently to the sum of the activities of the radionuclides in each group.

Classes of food that are consumed in small quantities (e.g. less than 10 kg per person per year), such as spices, which represent a very small fraction of the total diet and would make very small additions to individual exposures, may have action levels ten times higher than those for major foodstuffs.
## APPENDIX 11

### TOTAL EFFECTIVE DOSE GUIDANCE FOR EMERGENCY WORKERS

<table>
<thead>
<tr>
<th>TASKS</th>
<th>(a) $E_{\text{rad}}$ [mSv]</th>
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<tbody>
<tr>
<td><strong>Type 1</strong></td>
<td></td>
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<tr>
<td>• Life-saving actions</td>
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<tr>
<td>• Prevention of core damage or given core damage to prevention of a large release.</td>
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<tr>
<td><strong>Type 2</strong></td>
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<tr>
<td>• Prevent serious injury.</td>
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<tr>
<td>• Avert a large effective dose.</td>
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<tr>
<td>• Prevent the development of catastrophic conditions.</td>
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<tr>
<td>• Recovery of reactor safety systems.</td>
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<tr>
<td>• Off-site ambient dose rate monitoring (gamma dose rate)</td>
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<tr>
<td><strong>Type 3</strong></td>
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<tr>
<td>• Short-term recovery operations.</td>
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<tr>
<td>• Implement urgent protective actions.</td>
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<tr>
<td>• Environmental sampling.</td>
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<tr>
<td><strong>Type 4</strong></td>
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<tr>
<td>• Longer-term recovery operations.</td>
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<tr>
<td>• Work not directly concerned with a nuclear accident.</td>
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</tbody>
</table>

(a) These doses may be exceeded if JUSTIFIED, but every effort must be made to keep dose below this level, and certainly below the thresholds for deterministic biological effects. The workers must be trained in radiation protection and understand the risk that they face.

(b) Every reasonable effort should be made to keep the dose to women of reproductive capacity as far below 100 mSv as is practicable. Women who know or suspect that they are pregnant should not be assigned duty as an emergency worker.

(c) The equivalent dose to skin of any emergency worker undertaking actions during an emergency must be controlled to ensure that a dose limit of 5000 mSv is not exceeded.

**NOTE 1:** Workers who undertake actions in which the dose may exceed the occupational maximum single year dose limit, must be volunteers.

**NOTE 2:** The person responsible for compliance with these requirements is the Eskom Emergency Controller for Eskom staff.

**NOTE 3:** The Eskom Emergency Controller must authorise dose extensions for emergency workers who are Eskom employees. The Disaster Co-ordination Team must authorise dose extensions for all other emergency workers.

**NOTE 4:** Workers must not normally be precluded from incurring further occupational exposure because of doses received in an emergency exposure situation. However, qualified medical advice must be obtained before any such further exposure.

**NOTE 5:** The implementing procedures must provide emergency worker turn-back dose guidance expressed as a function of integrated external gamma exposure.
APPENDIX 12

EMERGENCY PLAN FACILITIES AND EQUIPMENT

The following facilities must be maintained in a continuous state of readiness to implement the plan:

1) HVCR – High Voltage Control Room
2) ECC – Emergency Control Centre
3) AECC – Alternate Emergency Control Centre
4) TSC – Technical Support Centre, situated in the ECC
5) ATSC – Alternate Technical Support Centre
6) Damage Control Store – Adjacent to NAB entry
7) Joint Media Centre, situated at Bellville
8) ESL – Environmental Survey Laboratory
9) AESL – Alternate ESL
10) Medical and Decontamination Facilities, Medical Centre
11) Radiation Casualty Handling Facility, Tygerberg Hospital
12) Koeberg Fire Station
13) Vehicles allocated to the Emergency Plan for radiological surveillance, or identified as being required to support emergency response.
14) SABC – Emergency Studio
15) CoCT – Disaster Operations Centre
16) Emergency kits allocated to:
   • District Sampling Teams
   • Robben Island Museum (Retained at the ESL for conveyance by RP Monitor)
   • EMS / METRO
17) Koeberg Site Muster Stations
18) Koeberg Site Emergency Cabinets
19) Koeberg Central Alarm Station
APPENDIX 12 (continued)

EMERGENCY PLAN FACILITIES AND EQUIPMENT

20) Public Notification System

21) Redundant communications system in all Emergency Control Centres.

22) City of Cape Town – Two sub-zone Disaster Management units situated at:
   - Atlantis
   - Melkbosstrand

23) Mass Care Centres
   - Avonwood Sports Complex
   - Grassy Park Sports Complex
   - Goodwood Rugby Field
   - Bellville Velodrome and Sports Complex
   - Durbanville Race Course

24) Relocation Centres

**NOTE 1:** Arrangements must be in place to ensure that at no time must the inventory of emergency equipment allocated to these facilities be reduced to below the minimum specified levels. The Mass Care Centres must be selected and allocated emergency equipment upon the declaration of the general emergency. The Relocation Centres must be selected and equipped with the necessary resources during the intermediate or late phase of the nuclear emergency.

**NOTE 2:** Calibration of radiological surveillance equipment must be performed.

**NOTE 3:** Potassium iodate (KIO₃) tablets must be analysed for replacement or extension every five years. Extension must be at the discretion and written approval of the Medicines Control Board. The quantity considered to be adequate for protection within the Plume Exposure Zone must be determined, and stored upon receipt, by CoCT. The tablets intended for the protection of the population on Robben Island must be stored and controlled by the Safety Officer. The storage on-site of sufficient tablets to provide for the protection of site personnel must be controlled by the Eskom Chief Medical Officer. Tablets must be available from:

- Central Muster Stations
- Emergency Control Centre
- Medical Centre
- Main Gate (Access Control Point #2)
- HVCR
- Radiation Protection Cold Laundry
- Emergency Plan Vehicles and Survey kits

Following recommendation by the Koeberg Emergency Controller, CoCT is responsible for the issue of KIO₃ to the general public, supported as necessary by the appropriate municipal departments.
APPENDIX 13
INTEGRATED KOEBERG NUCLEAR EMERGENCY PLAN DOCUMENT HIERARCHY

1. LEGISLATIVE REQUIREMENTS

- NNR ACT No 47
- DM ACT 2002
- Nuclear Licence NL1 Var15
- National Disaster Management Framework
- RD-14 EP Requirements
- National Nuclear Disaster Management Plan
- GGM-0564 Koebberg Licensing Basis Manual
- Provincial Emergency Preparedness, Response Plan

2. PREPAREDNESS

- EM GROUP / EPSOC / EPC
  - KAG-001
  - KAG-002
  - KAG-003
  - KAG-004
  - KAG-005
  - KAG-006
  - KAG-007
  - KAG-008
  - KAG-009
  - KAG-010
  - KAG-011
  - KAG-012
  - EPSOC TOR
  - EPC TOR
  - CoCT Plans Preparedness
    - CoCT KNEP 5.1
    - CoCT KNEP 5.2
    - CoCT KNEP 5.3
    - CoCT KNEP 5.4
    - CoCT KNEP 5.5

3. ACTIVATION

- ACTIVATION
  - SHIFT EMERGENCY CONTROLLER
    - KEP-056
    - KEP-002
    - KAA-611
    - KEP-042
  - CoCT Plans ACTIVATION
    - CoCT KNEP 1.2

4. RESPONSE

- CONTROL
  - EMERGENCY CONTROLLER
    - KEP-060
    - KEP-076
    - KEP-024
  - CoCT Plans CONTROLLER
    - CoCT Plans KNEP 2.1
    - CoCT KNEP 2.2
    - CoCT KNEP 2.3
    - CoCT KNEP 2.4
    - CoCT KNEP 2.5
    - CoCT KNEP 2.6
    - CoCT KNEP 2.7
    - CoCT KNEP 2.8
    - CoCT KNEP 2.9

- RADIOPHYSICAL MONITORING & ASSESSMENT
  - HEALTH PHYSICS CONTROLLER
    - KEP-036
    - KEP-010
    - KEP-014
    - KEP-017
    - KEP-020
    - KEP-035
    - KEP-041
    - KEP-065
  - CoCT Plans MONITORING & ASSESSMENT
    - CoCT KNEP 4.1 A & B
    - CoCT KNEP 4.2
    - CoCT KNEP 4.3
    - CoCT KNEP 4.4
    - CoCT KNEP 4.5
    - CoCT KNEP 4.6
    - CoCT KNEP 4.7
    - CoCT KNEP 4.8
    - CoCT KNEP 4.9
    - CoCT KNEP 4.12

- LOGISTICS & ADMINISTRATION
  - ADMIN OFFICER
    - KEP-038
    - KEP-004
    - KEP-023
    - KEP-042
    - KEP-051
  - CoCT Plans PROTECTIVE ACTION IMPLEMENTATION
    - CoCT KNEP 3.1
    - CoCT KNEP 3.2
    - CoCT KNEP 3.3
    - CoCT KNEP 3.4
    - CoCT KNEP 3.6
    - CoCT KNEP 3.7
    - CoCT KNEP 3.8
    - CoCT KNEP 3.9

- PLANT TECHNICAL SUPPORT
  - TSC LEADER
    - KEP-083
    - KEP-083
    - KSA-061
  - CoCT Plans SUPPORT
    - CoCT Plans KNEP 3.1

WORK INSTRUCTIONS AND GUIDES

- KEP-001
- KEP-008
- KEP-016
- KEP-003
- KEP-007
- KEP-010
- KEP-013
- KEP-018
- KEP-008
- KEP-006
- TSC OPS Procedures
- DSE's & System Drawings
- Electrical Diagrams
- SAMG's
- OPS LAB's

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APPENDIX 14

JUSTIFICATION

Revision 0

1. The Integrated Koeberg Nuclear Emergency Plan is a new procedure required in terms of the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999).

Revision 1

1. The Integrated Koeberg Nuclear Emergency Plan was revised to be in line with the NNR Requirements Document RD-014, The National Nuclear Disaster Management Plan and Government Regulations R.388.

2. The levels of avertable dose that justify intervention were included in the plan.

3. The joint co-ordination, decision-making and management by the Disaster Co-ordination Team in the Disaster Operations Centre is included in the plan.