REGISTERED No. M - 302
L.-7646

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, WEDNESDAY, AUGUST 24, 2022

PART II

Statutory Notifications (S. R. O.)

GOVERNMENT OF PAKISTAN
PAKISTAN NUCLEAR REGULATORY AUTHORITY

NOTIFICATION

Islamabad, the 14th March, 2022

S.R.O. 1600 (I)/2022.—In exercise of the powers conferred by Section 16(2)(a) read with Section 56 of the Pakistan Nuclear Regulatory Authority Ordinance, 2001, Pakistan Nuclear Regulatory Authority is pleased to make and promulgate the following regulations:

1. **Short Title, Extent, Applicability and Commencement.**—(1) These regulations may be called the "Regulations on Management of a Nuclear or Radiological Emergency - (PAK/914) (Rev.1)".

(2) These regulations extend to the whole of Pakistan.

(3) These regulations shall be applicable for the management of a nuclear or radiological emergency.

(4) These regulations shall come into force at once.

Price : Rs. 80.00

[7657 (2022)/Ex. Gaz.]

2. **Definitions.**—(1) In these regulations, unless there is anything repugnant in the subject or context,

(a) *"accident"* means 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 and safety;

(b) *"alert"* means an event that warrants taking actions to assess and to mitigate the potential consequences at the facility;

(c) *"all-hazards approach"* means an integrated approach for a nuclear or radiological emergency that focuses on capacities and capabilities that are critical for preparedness and response to a full spectrum of emergencies, e.g. natural disaster, nuclear security event, etc.;

(d) *"arrangements"* mean the integrated set of infrastructural elements, put in place at the preparedness stage, that are necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency, and are also called as emergency arrangements;

(e) *"collective dose"* means the sum of the individual doses received in a given period by a specified population from exposure to a specified source of radiation;

(f) *"control"* means the function or power or (usually as controls) means of directing, regulating or restraining;

(g) *"conventional emergency"* means any emergency other than a nuclear or radiological emergency;

(h) *"coordinating mechanism"* means mechanism for ensuring coordination that may involve an existing body or a newly established body, e.g. a committee consisting of representatives from different organizations and bodies, that has been given the authority to ensure the necessary coordination;

(i) *"dangerous source"* means a source that could, if not under control, give rise to exposure sufficient to cause severe deterministic effects;

(j) *"deterministic effect"* means a radiation induced health effect for which generally a threshold level of dose exists above which the severity of the effect is greater for a higher dose;

(k) *"early protective action"* means a protective action in the event of a nuclear or radiological emergency that can be implemented within days to weeks and still be effective;

(l) *"effective dose"* means a measure of dose designed to reflect the risk associated with the dose, calculated as the weighted sum of the dose equivalents in the different tissues of the body;

(m) *"equivalent dose"* means the quantity $H_{T,R}$, defined as:

$$H_{T,R} = W_R \cdot D_{T,R}$$

where $D_{T,R}$ is the absorbed dose delivered by radiation type R averaged over a tissue or organ T and W_R is the radiation weighting factor for radiation type R;

(n) *"emergency"* means a non-routine situation or event that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment. This includes nuclear and radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. It includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard;

(o) *"emergency action level (EAL)"* means a specific, pre-determined criterion for observable conditions used to detect, recognize and determine the emergency class;

(p) *"emergency class"* means a set of conditions that warrant a similar immediate emergency response. This term is used for communicating, to the response organizations and to the public, the level of response needed;

(q) *"emergency classification"* means the process whereby an authorized official classifies an emergency in order to declare the applicable emergency class;

(r) *"emergency exposure"* means exposure received in an emergency. This may include unplanned exposures resulting directly from the emergency and planned exposures to persons undertaking actions to mitigate the consequences of the emergency;

(s) *"emergency exposure situation"* means a situation of exposure that arises as a result of an accident, a malicious act or other unexpected event, and requires prompt action in order to avoid or to reduce adverse consequences;

(t) *"emergency plan"* means a description of the objectives, policy and concept of operations for the response to an emergency and of the structure, authorities and responsibilities for a systematic, coordinated and effective response;

(u) *"emergency planning distance"* means the extended planning distance (EPD) and the ingestion and commodities planning distance (ICPD);

(v) *"emergency planning zone"* means the precautionary action zone (PAZ) and the urgent protective action planning zone (UPZ);

(w) *"emergency preparedness"* means the capability to take actions that will effectively mitigate the consequences of an emergency for human life, health, property and the environment;

(x) *"emergency preparedness category"* means a category for hazards assessed by means of a hazard assessment to provide basis for a graded approach to the application of the requirements prescribed in these regulations and for developing generically justified and optimized arrangements for preparedness and response for a nuclear or radiological emergency;

(y) *"emergency response"* means the performance of actions to mitigate the consequences of an emergency for human life, health, property and the environment;

(z) *"emergency worker"* means a person having specified duties as a worker in response to an emergency. Emergency workers may include workers employed, both directly and indirectly, by licensees, as well as personnel of response organizations, such as police officers, firefighters, medical personnel, and drivers and crews of vehicles used for evacuation. Emergency workers may or may not be designated as such in advance to an emergency. Emergency workers not designated as such in advance of an emergency are not necessarily workers prior to the emergency;

(aa) *"evacuation"* means the rapid, temporary removal of people from an area to avoid or reduce short term radiation exposure in a nuclear or radiological emergency. Evacuation is an urgent protective action. It is expected to be in place for a short period of time, e.g. a day to a few weeks. If evacuation cannot be lifted within this short period of time, it shall be substituted by relocation;

(bb) *"existing exposure situation"* means a situation of exposure that already exists when a decision on the need for control is

necessitated to be taken. Existing exposure situations include exposure to natural background radiation that is amenable to control; exposure due to residual radioactive material that derives from past practices that were never subject to regulatory control; and exposure due to residual radioactive material deriving from a nuclear or radiological emergency after an emergency has been declared to be ended;

(cc) *"extended planning distance (EPD)"* means an area around a facility for which emergency arrangements are made to conduct monitoring following the declaration of a general emergency and to identify areas warranting emergency response actions to be taken off the site within a period after a significant radioactive release that would allow the risk of stochastic effects among members of the public to be effectively reduced. The area within EPD serves for planning purposes and may not be the actual area in which monitoring is to be conducted to identify areas where early protective actions, such as relocation, are necessary. While efforts need to be made at the preparedness stage to prepare for taking effective early protective actions within this area, the actual area will be determined by the prevailing conditions in an emergency. As a precaution, some urgent protective actions may be warranted within the EPD to reduce the risk of stochastic effects among members of the public;

(dd) *"facilities and activities"* mean a general term encompassing nuclear facilities, uses of all sources of ionizing radiation, all radioactive waste management activities, transport of radioactive material and any other practice or circumstances in which people may be subject to exposure to radiation from naturally occurring or artificial sources;

(ee) *"facility emergency"* means an emergency that warrants taking protective actions and other response actions at the facility and on the site but does not warrant taking protective actions off the site;

(ff) *"first responders"* mean the first members of the licensee's emergency response organization and off-site response organizations to respond at the site of an emergency;

(gg) *"general emergency"* means an emergency that warrants taking precautionary urgent protective actions, urgent protective actions; and early protective actions and other response actions on the site and off the site;

(hh) *"generic criteria"* mean levels for the projected dose, or the dose that has been received, at which protective actions and other response actions are to be taken;

(ii) *"graded approach"* means a process or method for a system of control, such as safety system, in which the stringency of the control measures and conditions to be applied is commensurate, to the extent practicable, with the likelihood and possible consequences of, and the level of risk associated with, a loss of control;

(jj) *"gray"* means SI unit of kerma and absorbed dose, it is expressed as Gy and is numerically equal to 1 J/kg;

(kk) *"hazard assessment"* means assessment of hazards associated with facilities, activities or sources in order to identify those events and the associated areas for which such protective actions and other response actions may be required that would be effective in mitigating the consequences of such events;

(ll) *"helper in an emergency"* means member of the public who willingly and voluntarily helps in the response to a nuclear or radiological emergency;

(mm) *"INES national officer"* means a person designated by the Authority to act as point of contact for rating nuclear and radiological events on International Nuclear and Radiological Event Scale (INES) and sharing the event rating reports with International Atomic Energy Agency (IAEA);

(nn) *"ingestion and commodities planning distance (ICPD)"* means an area around a facility for which emergency arrangements are made to take effective emergency response actions following the declaration of a general emergency in order to reduce the risk of stochastic effects among members of the public and to mitigate non-radiological consequences as a result of the distribution, sale and consumption of food, milk and drinking water and the use of commodities other than food that may have contamination from a significant radioactive release;

(oo) *"inner cordoned off area"* means an area established by first responders in an emergency around a potential radiation hazard, within which protective actions and other emergency response actions are taken to protect first responders and members of the public from possible exposure and contamination;

(pp) *"integrated emergency exercise"* means emergency exercise in which both on-site and off-site emergency plans and their integration with other plans including contingency plan, physical protection plan, etc. are tested;

(qq) *"interested party"* means a person or group having an interest in the performance of an organization. Those who can influence events may effectively become interested parties whether their 'interest' is regarded as 'genuine' or not in the sense that their views need to be considered. Interested parties have typically included the following: customers, owners, operators, employees, suppliers, partners, trade unions; the regulated industry or professionals; scientific bodies; governmental agencies or regulatory bodies whose responsibilities may cover nuclear energy; the media; members of the public (individuals, community groups and interest groups); and other States, especially neighbouring States that have entered into agreements providing for an exchange of information concerning possible transboundary impacts, or States involved in the export or import of certain technologies or materials;

(rr) *"justification"* means the process of determining, for an emergency exposure situation or an existing exposure situation, whether a proposed protective action or remedial action is likely, overall, to be beneficial, i.e. whether the expected benefits to individuals and to society, including the reduction in radiation detriment, from introducing or continuing the protective action or remedial action outweigh the cost of such action and any harm or damage caused by the action;

(ss) *"licensee"* means holder of a valid license issued by the Authority;

(tt) *"management of nuclear or radiological emergency"* means all administrative and operational activities involved in the preparedness and response to a nuclear or radiological emergency;

(uu) *"management system"* means a set of interrelated or interacting elements (system) for establishing policies and objectives, and enabling the objectives to be achieved in an efficient and effective manner;

(vv) *"mitigatory action"* means immediate action to be taken by the licensee or response organizations to reduce the potential for conditions to develop, or to mitigate source conditions that would result in exposure or a release of radioactive material requiring emergency actions on or off the site;

(ww) *"non-radiation-related hazard"* means hazards other than hazards of ionizing radiation such as release of toxic chemicals, fires, explosions, floods etc.;

(xx) *"non-radiological consequences"* mean adverse psychological, societal or economic consequences of a nuclear or radiological emergency or of an emergency response affecting human life, health, property or the environment;

(yy) *"notification"* means a set of actions taken upon detection of emergency conditions with the purpose of alerting promptly all organizations with responsibility for emergency response in the event of such conditions. This also includes promptly providing details of an emergency or a potential emergency to the Authority;

(zz) *"notification point"* means a designated organization with which arrangements have been made to receive notification and to initiate promptly the predetermined actions to activate a part of the emergency response;

(aaa) *"nuclear or radiological emergency"* means an emergency in which there is, or is perceived to be, a hazard due to the energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction; or radiation exposure. and is also called as an emergency;

(bbb) *"nuclear security event"* means an event that has potential or actual implications for nuclear security that must be addressed. Such events include criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities or associated activities. A nuclear security event, for example, sabotage of a nuclear facility or detonation of a radiological dispersal device, may give rise to a nuclear or radiological emergency;

(ccc) *"off-site"* means area outside the site;

(ddd) *"on-site"* means area within the site;

(eee) *"operating personnel"* mean individual workers engaged in the operation of an authorized facility or the conduct of an authorized activity;

(fff) *"operational criteria"* mean values of measurable quantities or observable conditions, i.e. observables, to be used in response to a nuclear or radiological emergency in order to determine the need

for appropriate protective actions and other response actions. Operational criteria used in emergency preparedness and response include operational intervention levels (OILs), EALs, specific observable conditions and other indicators of conditions on the site;

(ggg) *"operational intervention level (OIL)"* means a set level of a measurable quantity that corresponds to generic criterion. Operational intervention levels are typically expressed in terms of dose rates or of activity of radioactive material released, time integrated air activity concentrations, ground or surface concentrations, or activity concentrations of radionuclides in environmental, food or water samples. An operational intervention level is used immediately and directly without further assessment to determine the appropriate protective actions on the basis of an environmental measurement;

(hhh) *"optimization"* means the process of determining the level of protection and safety that would result in the magnitude of individual doses, the number of individuals, workers and members of the public, subject to exposure and the likelihood of exposure being as low as reasonably achievable (ALARA), taking into account the economic and social factors;

(iii) *"other response action"* means an emergency response action other than a protective action such as medical examination, consultation and treatment; registration and long-term medical follow-up; control of access and traffic restrictions; provision of psychological counselling; and public information and other actions for mitigating non-radiological consequences and for public reassurance;

(jjj) *"physical protection"* means measures, including structural, technical and administrative protective measures, taken to prevent an adversary from achieving an undesirable consequences, such as sabotage, or the unauthorized removal of nuclear material in use, storage or transport, and to mitigate or minimize the consequences if the adversary initiates such a malicious act;

(kkk) *"planned exposure situation"* means a situation of exposure that arises from the planned operation of a source or from a planned activity that results in an exposure from a source. In planned exposure situations, a certain level of exposure is expected to occur;

(lll) *"precautionary action zone (PAZ)"* means an area around a facility for which emergency arrangements have been made to take urgent protective actions in the event of a nuclear or radiological

emergency in order to avoid or to minimize severe deterministic 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 prevailing conditions at the facility;

(mmm) *"precautionary urgent protective action"* means an urgent protective action taken before or shortly after a release of radioactive material, or an exposure, on the basis of the prevailing conditions in order to avoid or to minimize severe deterministic effects;

(nnn) *"preparedness stage"* means the stage or phase at which arrangements for an effective emergency response are established prior to a nuclear or radiological emergency;

(ooo) *"projected dose"* means the dose that would be expected to be received if planned protective actions were not taken;

(ppp) *"protective action"* means an action for the purposes of avoiding or reducing doses that might otherwise be received in an emergency exposure situation or an existing exposure situation;

(qqq) *"radiological assessor"* means a person or team who in the event of a nuclear or radiological emergency assists the licensee or response organizations by performing radiological surveys, performing dose assessments, controlling contamination, ensuring the radiation protection of emergency workers and formulating recommendations on protective actions and other response actions;

(rrr) *"radiological consequences"* mean consequences of a nuclear or radiological emergency causing exposures that have effects on human health and safety, quality of life, property or the environment;

(sss) *"reference level"* means for an emergency exposure situation or an existing exposure situation, the level of dose, risk or activity concentration above which it is not appropriate to plan to allow exposures to occur and below which optimization of protection and safety would continue to be implemented;

(ttt) *"relocation"* means non-urgent removal or extended exclusion of people from an area to avoid long-term exposure from deposited radioactive material. Relocation is an early protective action. It may be a substitution for the urgent protective action of evacuation. Relocation is considered to be permanent relocation if return is not foreseeable; otherwise it is temporary relocation;

(uuu) *"residual dose"* means the dose expected to be incurred after protective actions have been terminated, or after a decision has been taken not to take protective actions. Residual dose applies for an existing exposure situation or an emergency exposure situation;

(vvv) *"response organization"* means an organization designated or recognized by a licensee or local, provincial or federal government as being responsible for managing or implementing any aspect of an emergency response. This also includes those organizations or services necessary to support the management and conduct of an emergency response, such as meteorological services;

(www) *"security system"* means an integrated set of security measures;

(xxx) *"sievert"* means the SI unit of equivalent dose and effective dose, it is expressed as Sv and is numerically equal to 1 J/kg;

(yyy) *"sheltering"* means short term use of a structure for protection from an airborne plume or deposited radioactive material. Sheltering is an urgent protective action, used to provide shielding against external exposure and to reduce the intake of airborne radionuclides by inhalation;

(zzz) *"significant release of radioactive material"* means a radioactive release that could lead to severe deterministic effects off the site and thus warrants taking protective actions or other response actions off the site;

(aaaa) *"site"* means a geographical area that contains a licensed facility, authorized or licensed activity or source, and within which the management of the licensed facility or activity or first responders may directly initiate emergency response actions;

(bbbb) *"site area emergency"* means an emergency that warrants taking protective actions and other response actions on the site and in the vicinity of the site;

(cccc) *"source"* means anything that may cause radiation exposure, such as by emitting ionizing radiation or by releasing radioactive substances or radioactive material, and can be treated as a single entity for purposes of protection and safety. A complex or multiple installation situated at one location or site may, as appropriate, be considered a single source for the purposes of application of these regulations;

(dddd) *"special facility"* means a facility for which predetermined facility specific actions need to be taken if urgent protective actions are

ordered in its locality in the event of a nuclear or radiological emergency. Such facilities may include chemical plants that cannot be evacuated until certain actions have been taken to prevent fire or explosions and telecommunication centers that must be staffed in order to maintain communication services;

(eeee) *"special population group"* means members of the public for whom special arrangements are necessary, to be made in order for effective protective actions, to be taken in the event of a nuclear or radiological emergency. This group may include persons with disabilities, hospital patients and prisoners;

(ffff) *"stochastic effect"* means a radiation induced 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. Stochastic effects may be somatic effects or hereditary effects, and generally occur without a threshold level of dose;

(gggg) *"transient population group"* means those members of the public who are residing for a short period of time (days to weeks) in a location, such as a camping ground, that can be identified in advance. This does not include members of the public who may be traveling through an area;

(hhhh) *"transnational emergency"* means a nuclear or radiological emergency of actual, potential or perceived radiological significance for more than one State. This may include:

(i) a significant transboundary release of radioactive material. However, a transnational emergency does not necessarily imply a significant transboundary release of radioactive material;

(ii) a general emergency at a facility or other event that could result in a significant transboundary release (atmospheric or aquatic) of radioactive material;

(iii) discovery of the loss or illicit removal of a dangerous source that has been transported, or is suspected of having been transported, across a national border;

(iv) an emergency resulting in significant disruption to international trade or travel;

(v) an emergency warranting the taking of protective actions for foreign nationals or embassies in the State in which it occurs;

(vi) an emergency resulting, or potentially resulting, in severe deterministic effects and involving a fault and problem, such as in equipment or software, that could have serious implications for safety internationally; and

(vii) an emergency resulting, or potentially resulting, in great concern among the population of more than one State owing to the actual or perceived radiological hazard.

(iiii) *"unforeseen location"* means any location where there is a significant likelihood of encountering a dangerous source, contaminated commodity and other nuclear and radioactive material that is not under regulatory control, e.g. scrap metal processing facilities, public places, transportation routes, border crossing points, seaports, airports, etc.;

(jjjj) *"urgent protective action"* means a protective action in the event of an emergency which must be taken promptly, normally within hours, in order to be effective, and the effectiveness of which will be markedly reduced if it is delayed. The most commonly considered urgent protective actions in a nuclear or radiological emergency are evacuation, decontamination of individuals, sheltering, respiratory protection, iodine prophylaxis and restriction of the consumption of potentially contaminated foodstuffs;

(kkkk) *"urgent protective action planning zone (UPZ)"* means 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 in order to avert doses off the site. Protective actions within this area are to be taken on the basis of environmental monitoring or, as appropriate, prevailing conditions at the facility; and

(llll) *"worker"* means any person who works, whether full time, part time or temporarily, for an employer and who has recognized rights and duties in relation to occupational radiation protection. A self-employed person is regarded as having the duties of both an employer and a worker.

(2) Any term or phrase used herein that is not defined shall have the same meaning as defined in the Pakistan Nuclear Regulatory Authority Ordinance, 2001.

3. **Scope.**—These regulations shall apply for the management of a nuclear or radiological emergency irrespective of the cause of the emergency,

whether the emergency follows a natural event, a human error, a mechanical or other failure, or a nuclear security event, and shall apply to the facilities and activities, as well as sources, with the potential for causing radiation exposure, environmental contamination or concern on the part of the public, warranting protective actions and other response actions.

4. **Interpretation.**—The decision of the Chairman PNRA regarding interpretation of any word or phrase of these regulations shall be final and binding.

5. **General Responsibilities.**—(1) The licensee shall establish, maintain, demonstrate and provide assurance to the Authority that arrangements for preparedness and response for a nuclear or radiological emergency are in place for facilities or activities under its responsibility.

(2) The licensee shall make all necessary arrangements for achieving the goals of emergency preparedness and response to ensure that an adequate capability including infrastructure is in place for an effective response in case of a nuclear or radiological emergency. The goals of an emergency response shall be to:

(a) save lives of public and affected workers;

(b) render first aid to provide critical medical treatment and to manage the treatment of radiation injuries;

(c) avoid or minimize severe deterministic effects;

(d) reduce the risk of stochastic effects;

(e) regain control of the situation and to mitigate consequences;

(f) keep the public informed and to maintain public trust;

(g) mitigate, to the extent practicable, non-radiological consequences;

(h) protect, to the extent practicable, property and the environment; and

(i) prepare, to the extent practicable, for the resumption of normal social and economic activity.

GENERAL REQUIREMENTS

6. **Emergency Management System.**—(1) The licensee shall develop and implement an emergency management system within an integrated management system for preparedness and response to a nuclear or radiological emergency for facilities and activities under its jurisdiction.

(2) The emergency management system shall be designed to be commensurate with the results of the hazard assessment and shall enable an effective and efficient emergency response for a nuclear or radiological emergency.

(3) The licensee shall ensure that the emergency management system is integrated, to the extent practicable, into all other hazards emergency management system.

(4) The licensee, as part of its management system, shall ensure the availability and reliability of all supplies, equipment, communication systems and facilities, plans, procedures and other arrangements necessary to perform functions in a nuclear or radiological emergency. The program shall include arrangements for inventories, re-supply, tests and calibrations, to ensure that arrangements are continuously available and are functional for use in a nuclear or radiological emergency.

(5) The licensee shall ensure that the emergency management system also includes the provision of periodic and independent appraisals of its emergency preparedness and response arrangements as prescribed in these regulations.

(6) The licensee shall establish and maintain adequate records in relation to both emergency arrangements and the response to a nuclear or radiological emergency, to include dose assessments, results of monitoring and inventory of radioactive waste generated, in order to allow for their review, evaluation to make necessary improvements in emergency preparedness and response arrangements. These records shall also provide for the identification of those persons requiring longer term medical actions, as necessary, and shall provide for the long-term management of radioactive waste.

7. **Roles and Responsibilities in Emergency Preparedness and Response.**—(1) The licensee shall ensure that roles and responsibilities for preparedness and response for a nuclear or radiological emergency are clearly specified and assigned in advance. The licensee shall ensure that line of succession for decision making positions in the emergency response organization has been identified and is in place.

(2) For radiation facilities and activities, the licensee shall make arrangements for the recovery and rehabilitation of the affected workers, public and the environment as prescribed in the Regulations for the Licensing of Radiation Facility(ies) other than Nuclear Installation(s) - (PAK/908), whereas, for the nuclear installations, the licensee shall be liable for nuclear damage under the provisions of the Pakistan Nuclear Regulatory Authority Ordinance, 2001, respectively.

(3) The licensee shall ensure that the necessary human, financial and other resources are available to prepare for and to deal with both radiological and non-radiological consequences of a nuclear or radiological emergency.

(4) The licensee shall establish, maintain and demonstrate leadership in relation to preparedness and response for a nuclear or radiological emergency.

(5) The licensee shall demonstrate the emergency arrangements in an exercise before radioactive material is brought to the facility or nuclear material is introduced into the system of nuclear installations.

(6) The licensee shall establish a coordinating mechanism to be functional at the preparedness stage, consistent with its emergency management system to:

(a) ensure that roles and responsibilities are clearly specified and are understood by all personnel part of licensee emergency response organization and all relevant interested parties;

(b) conduct hazard assessment of the facility and periodic reviews of the assessed hazards to establish and revise the emergency arrangements as necessary;

(c) ensure consistency of emergency arrangements on-site, off-site and at national level under the all-hazards approach, including those arrangements for the response to nuclear security events;

(d) ensure consistency and integration among emergency plans, physical protection plans, etc.;

(e) conduct subsequent analysis of an emergency, including analysis of the emergency response;

(f) ensure that appropriate and coordinated training and exercise programs are in place and implemented, and that trainings and exercises are systematically evaluated; and

(g) ensure effective communication with the public in preparedness for a nuclear or radiological emergency.

8. **Hazard Assessments.**—(1) The licensee shall perform hazard assessment, of its facilities and activities, to determine the extent of preparedness and response arrangements for a nuclear or radiological emergency, based on graded approach.

(2) The licensee shall assess the potential consequences of the emergency on workers, public and the environment based on identified hazards

to provide basis for establishing arrangements for preparedness and response for a nuclear or radiological emergency. These arrangements shall commensurate with such hazards and the potential consequences of the emergency.

(3) The licensee shall establish the preparedness and response arrangements for a nuclear or radiological emergency in accordance with the emergency preparedness categories as provided in Schedule I of these regulations. This categorization shall be used for developing generically justified and optimized arrangements for preparedness and response for a nuclear or radiological emergency.

(4) The licensee shall include the following elements, as appropriate, in hazard assessment:

(a) Events that could affect the facility or activity, including events of very low probability and events not considered in the design;

(b) Events involving a combination of a nuclear or radiological emergency with a conventional emergency; and

(c) Events that could affect several facilities and activities concurrently, as well as consideration of the interactions between the facilities and activities affected.

(5) The licensee shall ensure that the hazard assessment includes consideration of the results of threat assessment made for nuclear security event.

(6) The licensee shall identify on-site areas, off-site areas and locations, where any of the following is warranted:

(a) Precautionary urgent protective actions as prescribed in Schedule II of these regulations;

(b) Urgent protective actions and other response actions as prescribed in Schedule II of these regulations;

(c) Early protective actions and other response actions, as prescribed in Schedule II of these regulations;

(d) Other emergency response actions, such as longer term medical actions, as prescribed in Schedule II of these regulations, and emergency response actions aimed at enabling the termination of the emergency; and

(e) Protection of emergency workers, as prescribed in Schedule III of these regulations.

(7) The licensee shall ensure that the hazard assessment also identifies non-radiation-related hazards that may impair the effectiveness of response actions to be taken.

(8) The licensee shall make provisions for revision of emergency arrangements:

(a) prior to any changes in the facility or activity that may affect the existing hazard assessment; or

(b) when new information becomes available that provides insight into the adequacy of existing arrangements.

9. **Protection Strategy for a Nuclear or Radiological Emergency.**—(1) The licensee shall ensure that protection strategies are developed, justified and optimized at the preparedness stage on the basis of the hazards identified and the potential consequences of a nuclear or radiological emergency, for taking protective actions and other response actions effectively.

(2) The licensee shall develop a protection strategy that includes but not be limited to the following:

(a) consideration of actions to be taken in order to avoid or to minimize severe deterministic effects and to reduce the risk of stochastic effects taking into account the generic criteria as prescribed in Schedule II of these regulations;

(b) evaluation of detriment associated with the occurrence of stochastic effects in individuals in an exposed population shall be evaluated on the basis of the effective dose;

(c) setting of a reference level expressed in terms of residual dose, typically as an effective dose in the range 20-100 mSv, acute or annual, that includes dose contributions via all exposure pathways. This reference level shall be used in conjunction with the goals of emergency response and the specific time frame in which particular goals are to be achieved;

(d) arrangements for the implementation of protective actions and other response actions, either individually or in combination, if the generic criteria as prescribed in Schedule II of these regulations are exceeded; and

(e) derivation of pre-established operational criteria (conditions on the site, EALs and OILs) for taking protective actions and other response actions from the generic criteria given in Schedule II of

these regulations. Arrangements shall be established in advance to revise these operational criteria, as appropriate, in the course of a nuclear or radiological emergency, with account taken of the prevailing conditions as they evolve.

(3) The licensee shall ensure that each protective action, and the protection strategy itself is justified, with account taken of those detriments that are associated with radiation exposure and those associated with impacts of the actions taken on public health, the economy, society and the environment.

(4) The licensee shall involve and consult interested parties, as appropriate, in development of the protection strategy.

(5) The licensee shall ensure that the protection strategy is implemented safely and effectively in emergency response, including but not limited to:

(a) promptly taking urgent protective actions and other response actions with account taken of Schedule II of these regulations, in order to avoid or to minimize severe deterministic effects, if possible, on the basis of observed conditions and before any exposure occurs;

(b) taking early protective actions and other response actions to reduce the risk of stochastic effects with account taken of Schedule II of these regulations;

(c) providing for registration, health screening and longer term medical follow-up, as appropriate, with account taken of Schedule II of these regulations;

(d) taking actions to protect emergency workers, with account taken of guidance values provided in Schedule III of these regulations;

(e) taking actions to mitigate non-radiological consequences, with account taken of Schedule II of these regulations;

(f) assessing the effectiveness of the actions taken and adjusting them as appropriate on the basis of prevailing conditions and available information as well as the reference level expressed in terms of residual dose;

(g) revising the protection strategy as necessary and its further implementation; and

(h) discontinuing protective actions and other response actions when they are no longer justified.

(6) The licensee shall make arrangements so that the magnitude of hazards and the possible development of hazardous conditions are assessed initially and throughout a nuclear or radiological emergency in order to promptly identify, characterize or anticipate, as appropriate, new hazards or the extent of hazards and to revise the protection strategy accordingly. For hazard assessment, the licensee shall also keep in view the lesson learned from already known and reported incident for analysis to establish protection strategy.

FUNCTIONAL REQUIREMENTS

10. **Managing Operations in an Emergency Response.**—(1) The licensee shall ensure that arrangements are in place for managing the response to a nuclear or radiological emergency.

(2) For facilities in Category I, II and III; the licensee shall make arrangements for on-site emergency response to be promptly executed and managed without impairing the performance of the continuing operational safety and security functions, both at the facility and at any other facilities on the same site.

(3) For facilities in Category I, II and III; the licensee shall make arrangements for transition from normal operations to operations under emergency conditions on the site and ensure its effective execution. The licensee shall designate responsibilities of all personnel who would be on the site in an emergency as part of the arrangements for this transition.

(4) The licensee in coordination with off-site response organizations shall make arrangements for an off-site emergency response to be promptly executed and effectively managed.

(5) For a site where several facilities in Category I and II are collocated, the licensee shall make adequate arrangements to manage the emergency response at all the facilities, if each of them is under emergency conditions simultaneously. This shall include arrangements to manage the deployment of and the protection of personnel responding on the site and off the site.

(6) The licensee shall ensure that, as far as practicable, the physical protection or security system remains functional in a nuclear or radiological emergency.

(7) The licensee shall ensure that arrangements for the response to a nuclear or radiological emergency are coordinated and integrated with off-site arrangements for the response to a conventional emergency and to a nuclear security event as per relevant programs or plans. These arrangements shall take into consideration the fact that the initiator of a nuclear or radiological emergency may not be known early in the response.

(8) The licensee shall make arrangements for the establishment and use of a clearly specified and unified command and control system for emergency response under the all-hazards approach as part of the emergency management system. The command and control system shall provide sufficient assurance for effective coordination of the on-site and off-site response. The authority and responsibility for directing the emergency response and for making decisions on emergency response actions to be taken shall be clearly assigned in advance and promptly discharged following a notification of a nuclear or radiological emergency.

(9) The licensee shall make arrangements for obtaining and assessing the information necessary for making decisions on allocation of resources throughout a nuclear or radiological emergency.

(10) For facilities in Category I and II; the licensee shall make arrangements, in coordination with off-site response organizations, for coordinating the emergency response between response organizations within the emergency planning zones and emergency planning distances.

11. **Identifying and Notifying a Nuclear or Radiological Emergency and Activating an Emergency Response.**—(1) The licensee shall ensure that arrangements are in place for the prompt identification and notification of a nuclear or radiological emergency and for the activation of an emergency response.

(2) The licensee shall coordinate with off-site response organizations to ensure that the off-site notification points have been established to receive notification of an actual or potential nuclear or radiological emergency. The notification points shall be:

(a) maintained in a state of continuous availability to receive any notification or request for support and to respond promptly, or to initiate a pre-planned and coordinated off-site emergency response; and

(b) able to initiate immediate communication by suitable, reliable and diverse means with the response organizations.

(3) The licensee, in coordination with off-site response organizations, shall ensure that the off-site notification point is able to initiate immediate communication with the requisite competent authority of the response organization that has been assigned the responsibility of taking decision and to initiate protective actions off the site.

(4) The licensee shall establish an emergency classification system to classify the nuclear and radiological emergencies taking into account all postulated emergencies, including those arising from events with very low

probability of occurrence and giving due consideration to the uncertainty of the available information. The licensee shall establish operational criteria for classification which shall include EALs and other observable conditions and indicators of the conditions at the facility and on the site or off the site. It shall be ensured that any process or action, e.g. rating an event on the International Nuclear and Radiological Event Scale (INES), does not delay the emergency classification or emergency response actions.

(5) The licensee shall make arrangements for prompt recognition and classification of a nuclear or radiological emergency in accordance with Schedule IV of these regulations, taking into account the basis of the hazard assessment.

(6) The licensee shall make arrangements to review the declared emergency class in light of any new information and, as appropriate, to revise it.

(7) The licensee shall make arrangements:

(a) upon classification, to promptly declare the emergency class and to initiate a coordinated and preplanned on-site response;

(b) to notify the appropriate notification points off the site and to provide sufficient information for an effective off-site response; and

(c) upon notification, to initiate a coordinated and preplanned off-site response, as appropriate, in accordance with the protection strategy.

These arrangements shall include suitable, reliable and diverse means of warning persons on the site, of notifying the off-site notification points and of communication between off-site response organizations.

(8) The licensee shall notify the Authority immediately but not later than one (01) hour, after declaration of any of the emergency class specified in licensee's emergency plan. The follow-up notification to the Authority shall also be made immediately upon change in emergency class, plant or facility conditions, implementation of mitigatory actions, protective and other response actions.

(9) The licensee shall make arrangements to promptly share the information with the Authority, as and when required, in respect of notification to the government, for assessment of the emergency situation and in case of a transnational and transboundary emergency to meet the obligations of relevant international conventions.

12. **Taking Mitigatory Actions.**—(1) The licensee shall promptly decide on and take mitigatory actions on the site that are necessary to mitigate the

consequences of a nuclear or radiological emergency involving a facility or an activity under its responsibility.

(2) For facilities in Category I, II and III; the licensee shall make arrangements for mitigatory actions to be taken, in particular to:

(a) prevent escalation of an emergency;

(b) return the facility to a safe and stable state; and

(c) reduce the potential, and to mitigate the consequences, of radioactive releases or exposures.

(3) The arrangements, as prescribed in Regulation 12(2) of these regulations, shall take into account the full range of possible conditions affecting the emergency response, including those resulting from conditions in the facility and those resulting from impacts of postulated natural, human-induced or other events and affecting infrastructure or affecting several facilities simultaneously. The arrangements shall include emergency operating procedures and guidance for operating personnel on mitigatory actions for severe conditions for a nuclear power plant, as part of the accident management program and for the full range of postulated emergencies, including accidents that are not considered in the design. The continued operability of physical protection of nuclear material and security of radioactive sources shall be considered in these arrangements.

(4) The licensee shall assess and determine, at the preparedness stage, when and under what conditions assistance from off-site response organizations is required on the site, consistent with the hazard assessment and the protection strategy. Off-site response organizations shall be afforded prompt access to the facility, and shall be informed about on-site conditions and provided with instructions and means for protecting themselves as emergency workers.

(5) For facilities in Category I, II and III; the licensee shall ensure that on-site teams for mitigating the consequences of an emergency such as damage control, firefighting, etc., are available and are prepared to perform actions at the facility. The operating personnel and emergency workers directing mitigatory actions shall be provided with information and technical assistance to allow them to take actions effectively to mitigate the consequences of the emergency.

(6) For facilities in Category I, II and III; the licensee shall ensure that any equipment that is necessary for actions to be taken in response to a nuclear or radiological emergency shall be placed at the most suitable location to ensure its availability at the time of need and to allow safe access to it under the anticipated environmental conditions.

(7) The licensee for activities in Category IV shall make arrangements to:

(a) promptly inform the Authority;

(b) coordinate with the Authority for on-call advice;

(c) dispatch of an emergency team on the site that includes radiological assessor capable of assessing hazards involving radioactive material, assessing radiological conditions, mitigating the radiological consequences and managing the exposure of emergency workers;

(d) initiate a prompt search in the event, if a dangerous source is lost;

(e) take promptly all practicable and appropriate actions to mitigate the consequences of a nuclear or radiological emergency at an unforeseen location; and

(f) provide guidance and training to emergency workers and first responders in an emergency at an unforeseen location.

13. **Taking Urgent Protective Actions and Other Response Actions.**—(1) The licensee shall ensure that arrangements are in place to assess emergency conditions, initially and throughout a nuclear or radiological emergency, and to take urgent protective actions and other response actions effectively.

(2) For facilities in Category I, II and III; the licensee shall make arrangements to promptly assess and anticipate:

(a) abnormal conditions at the facility;

(b) exposures and radioactive releases and releases of other hazardous material;

(c) radiological conditions on the site and, as appropriate, off the site; and

(d) any exposures or potential exposures of workers and emergency workers, the public and, as relevant, patients and helpers in an emergency.

(3) The licensee shall use the assessments, as prescribed in Regulation 13(2) of these regulations:

(a) for deciding on mitigatory actions to be taken by the licensee;

(b) as a basis for emergency classification;

(c) for deciding on protective actions and other response actions to be taken on the site and off the site, including those for the protection of workers and emergency workers; and

(d) to identify those individuals who could potentially have been exposed on the site at levels requiring appropriate medical attention in accordance with Schedule II of these regulations, where appropriate.

(4) The arrangements, as prescribed in Regulation 13(2) of these regulations, shall include the use of pre-established operational criteria in accordance with the protection strategy and provision for access to instruments and gauges displaying or measuring those parameters that can readily be measured or observed in a nuclear or radiological emergency. In these arrangements, the expected response of instrumentation and of structures, systems and components at the facility under emergency conditions shall be taken into account.

(5) The licensee for activities in Category IV shall make arrangements to assess promptly the extent and the significance of any abnormal conditions on the site, any exposures or any contamination. These assessments shall be used:

(a) for initiating the mitigatory actions;

(b) as a basis for protective actions and other response actions to be taken on the site; and

(c) for determining the level for emergency response and for communicating the extent of hazards to the appropriate off-site response organizations.

(6) The arrangements, as prescribed in Regulation 13(5) of these regulations, shall include the use of pre-established operational criteria in accordance with the protection strategy.

(7) The licensee shall make arrangements so that information on emergency conditions, assessments and protective actions and other response actions that have been recommended and have been taken is promptly made available, as appropriate, to all relevant response organizations and to the Authority throughout the emergency.

(8) The licensee in coordination with off-site response organizations shall make arrangements, for taking actions to save human life or to prevent serious injury without any delay on the basis of possible presence of radioactive

material. For an emergency at an unforeseen location, these arrangements shall also include the provision of information or guidance to the first responders on precautionary measures necessary to be taken while providing first aid or transporting possibly contaminated individuals.

(9) For facilities in Category I and II; the licensee in coordination with off-site response organizations shall ensure that arrangements are in place for effective decisions making to take urgent protective actions, early protective actions and other response actions effectively off the site on the basis of a graded approach and in accordance with the protection strategy. The arrangements shall be made with account taken of the uncertainties in and limitations of the information available when protective actions and other response actions have to be taken to be effective, and shall include the following:

(a) The specification of off-site emergency planning zones and emergency planning distances for which arrangements shall be made at the preparedness stage for taking protective actions and other response actions effectively. These emergency planning zones and emergency planning distances shall include:

(i) A Precautionary Action Zone (PAZ), for facilities in Category I, for which arrangements shall be made for taking urgent protective actions and other response actions, before any significant release of radioactive material occurs, on the basis of conditions at the facility (i.e. conditions leading to the declaration of a general emergency), in order to avoid or to minimize severe deterministic effects.

(ii) An Urgent protective action Planning Zone (UPZ), for facilities in Category I and II, for which arrangements shall be made to initiate urgent protective actions and other response actions, if possible, before any significant release of radioactive material occurs, on the basis of conditions at the facility (i.e. conditions leading to the declaration of a general emergency); and after a release occurs, on the basis of monitoring and assessment of the radiological situation off the site, in order to reduce the risk of stochastic effects. Any such actions shall be taken in such a way as not to delay the implementation of precautionary urgent protective actions and other response actions within the PAZ.

(iii) An Extended Planning Distance (EPD) from the facility, for facilities in Category I and II (beyond the UPZ); for which arrangements shall be made to conduct monitoring and assessment of the radiological situation off the site in order to identify areas, within a period of time that would allow the

risk of stochastic effects in the areas to be effectively reduced by taking protective actions and other response actions within a day to a week or to a few weeks following a significant radioactive release.

(iv) An Ingestion and Commodities Planning Distance (ICPD) from the facility, for facilities in Category I and II (beyond the EPD); for which arrangements shall be made to take response actions; for protecting the food chain, water supply and commodities other than food from contamination; and for protecting the public from the ingestion of food, milk, drinking water and from the use of commodities other than foodstuff with possible contamination following a significant radioactive release.

(b) Criteria, based on the emergency classification and on conditions at the facility and off the site, for initiating and for adjusting urgent protective actions and other response actions within the emergency planning zones and emergency planning distances, in accordance with the protection strategy.

(c) Responsibility and authority to provide sufficient and updated information to the off-site notification points at any time to allow for an effective off-site emergency response.

(d) Estimation and periodic re-assessment of the time required to evacuate public from PAZ and UPZ, using updated population data and develop off-site protective action strategies in coordination with off-site response organizations.

(10) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place for taking appropriate protective actions and other response actions effectively within the emergency planning zones and emergency planning distances, promptly upon the notification of an emergency. These arrangements shall be coordinated within all emergency planning zones and distances, and shall include:

(a) prompt exercise of authority and discharge of responsibility for making decisions to initiate protective actions and other response actions;

(b) warning the permanent population, transient population groups and special population groups or those responsible for them and warning special facilities;

(c) taking urgent protective actions and other response actions;

(d) protection of emergency workers and helpers in an emergency; and

(e) provision of services necessary for ensuring public safety, e.g. rescue services and health services for the care of critically ill patients, etc., continuously throughout the emergency, including during the period when protective actions and other response actions are being taken.

(11) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place within emergency planning zones and emergency planning distances for timely monitoring and assessment of contamination, radioactive releases and exposures for the purpose of deciding on or adjusting the protective actions and other response actions that have to be taken or that are being taken. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy.

(12) For facilities in Category I, II and III; the licensee shall make arrangements for the protection and safety of all persons on the site in a nuclear or radiological emergency. These shall include arrangements to:

(a) notify all persons on the site of an emergency;

(b) take appropriate actions immediately upon notification of an emergency for all persons on the site;

(c) account for persons on the site and to locate and recover those persons unaccounted for;

(d) provide immediate first aid; and

(e) take urgent protective actions.

(13) The arrangements, as prescribed in Regulation 13(12) of these regulations, shall also include provision of the following, for all persons present on the site:

(a) suitable assembly points, provided with continuous radiation monitoring;

(b) sufficient number of suitable escape routes; and

(c) suitable and reliable alarm systems and other means for warning and instructing all persons present under full range of emergency conditions.

(14) For facilities in Category I, II and III; the licensee shall ensure that suitable, reliable and diverse means of communication are available at all times, under full range of emergency conditions, for use in taking protective actions and other response actions on the site and for communication with off-site response organizations responsible for taking protective actions and other response actions.

14. **Managing Nuclear or Radiological Emergency at an Unforeseen Location.**—(1) The responsible person and response organizations having role in emergency preparedness and response to a nuclear or radiological emergency at an unforeseen location in the areas of Category IV shall establish and maintain appropriate arrangements for preparedness and response.

(2) The responsible person and response organization having role in emergency preparedness and response to a nuclear or radiological emergency at an unforeseen location (e.g., scrap metal processing facilities, public places, transportation routes, border crossing points, seaports, airports etc.), where there is a significant likelihood of encountering a dangerous source, contaminated commodity and other nuclear and radioactive material that is not under regulatory control, shall make necessary arrangements for:

(a) detection of nuclear and radioactive material;

(b) notification to and coordination with the Authority and other response organizations for seeking assistance and advice;

(c) providing basic instructions and training to workers and response personnel and making them aware of the indicators of a potential radiological emergency;

(d) promptly taking all practicable and appropriate protective actions and other response actions to mitigate the consequences of a nuclear or radiological emergency; and

(e) promptly conducting radiation monitoring and assessment of contamination of public, workers, edible items and, as appropriate, of commodities other than edible items with the aim of mitigating the consequence of a nuclear or radiological emergency and reassurance of the public.

15. **Providing Instructions, Warnings and Relevant Information to the Public for Emergency Preparedness and Response.**—(1) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place to provide the members of public and interested parties, who are affected or are potentially affected by a nuclear or radiological emergency, with

information and advice that is necessary for their protection, to warn them promptly and to instruct them on actions to be taken.

(2) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that arrangements are made to provide the permanent population, transient population groups and special population groups or those responsible for them and special facilities within the emergency planning zones and emergency planning distances, before operation and throughout lifetime of the facility, with information on response to a nuclear or radiological emergency. This information shall:

(a) include information on the potential for a nuclear or radiological emergency, on nature of the hazards, on how people would be warned or notified, and on the actions to be taken in such an emergency; and

(b) be provided in languages mainly spoken by the population residing within the emergency planning zones and emergency planning distances.

(3) The effectiveness of the arrangements for public information as prescribed in Regulation 14(2) of these regulations shall be periodically assessed.

(4) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place to register those members of the public in special population groups and, as appropriate, those responsible for them, and to promptly issue them and the permanent population and transient population groups, as well as special facilities in the emergency planning zones and emergency planning distances, with a warning and with the instructions to be followed upon declaration of a general emergency.

(5) For facilities in Category III and activities in Category IV; the licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place to provide the public with information and instructions in order to identify and locate people who may have been affected by a nuclear or radiological emergency and who may need response actions such as decontamination, medical examination or health screening, etc. These arrangements shall include measures for issuing a warning to the public and providing information in the event such as presence of a dangerous source in the public domain as a consequence of its loss or theft.

16. **Protecting Emergency Workers and Helpers in an Emergency.**—(1) The licensee shall ensure that arrangements are in place to protect emergency workers and helpers in an emergency.

(2) The licensee shall make arrangements to ensure that emergency workers are, to the extent practicable, designated in advance and are fit for the intended duty. These arrangements shall include health surveillance of emergency workers for the purpose of assessing their fitness and continuing fitness for their intended duties.

(3) The licensee shall make arrangements to register and to integrate into operations in an emergency response those emergency workers who were not designated as such in advance of a nuclear or radiological emergency and helpers in an emergency. This shall include designation of the organization responsible for ensuring protection of emergency workers and helpers in an emergency.

(4) The licensee shall determine the anticipated hazardous conditions, both on and off the site, in which emergency workers might have to perform response functions in a nuclear or radiological emergency in accordance with the hazard assessment and the protection strategy.

(5) The licensee shall ensure that arrangements are in place for the protection of emergency workers and helpers in an emergency for the range of anticipated hazardous conditions in which they might have to perform response functions. These arrangements, as a minimum, shall include:

(a) training of emergency workers, who have been designated in advance, in relevant areas including radiation protection;

(b) providing instructions to emergency workers, not designated in advance, and helpers in an emergency on how to perform the duties under emergency conditions immediately, before the conduct of their specified duties;

(c) managing, controlling and recording the doses received;

(d) provision of appropriate specialized protective equipment and monitoring equipment;

(e) provision of iodine as thyroid blocking agent, if exposure due to radioactive iodine is possible;

(f) obtaining consent to perform specified duties after informing associated risks; and

(g) medical examination, longer term medical actions and psychological counselling, as appropriate.

(6) The licensee shall ensure that all practicable means are used to minimize exposure of emergency workers and helpers in an emergency, working

in response to a nuclear or radiological emergency, and to optimize their protection.

(7) The licensee shall ensure that in case of a nuclear or radiological emergency, the relevant requirements for occupational exposure in planned exposure situations as established in the Regulations on Radiation Protection - (PAK/904) are applied, on the basis of a graded approach, for emergency workers, except as prescribed in Regulation 16(8) of these regulations.

(8) The licensee shall ensure that no emergency worker is subject to an exposure in an emergency that could give rise to an effective dose in excess of 50 mSv, other than:

(a) for the purposes of saving human life or preventing serious injury;

(b) when taking actions to prevent severe deterministic effects or actions to prevent the development of catastrophic conditions that could significantly affect people and the environment; or

(c) when taking actions to avert a large collective dose.

(9) The licensee shall ensure that in the exceptional circumstances as prescribed in Regulation 16(8) of these regulations, guidance values for restricting the exposure of emergency workers are applied as given in Schedule III of these regulations.

(10) The licensee shall ensure that emergency workers who undertake emergency response actions, in which doses received might exceed an effective dose of 50 mSv, do so voluntarily; that they have been clearly and comprehensively informed in advance of associated health risks as well as of available protective measures; and that they are, to the extent possible, trained in actions that they might be required to take.

(11) The licensee shall ensure that emergency workers not designated as such in advance shall not be the first emergency workers chosen for taking actions that could result in their doses exceeding the guidance values of dose for lifesaving actions, as given in Schedule III of these regulations.

(12) The licensee shall ensure that helpers in an emergency shall not be allowed to take actions that could result in their receiving doses in excess of an effective dose of 50 mSv.

(13) The licensee shall make arrangements to assess, as soon as practicable, the individual doses received in a response to a nuclear or radiological emergency by emergency workers and helpers in an emergency and, as appropriate, to restrict further exposures in response to the emergency.

(14) The licensee shall make arrangements for provision of appropriate medical attention to emergency workers and helpers in an emergency for doses received in response to a nuclear or radiological emergency.

(15) The licensee shall ensure that emergency workers who receive doses in a response to a nuclear or radiological emergency shall not be prohibited from incurring further occupational exposure. However, qualified medical advice shall be obtained before any further occupational exposure occurs if an emergency worker has received an effective dose exceeding 200 mSv.

(16) The licensee shall provide information on the doses received in a response to a nuclear or radiological emergency and information on any consequent health risks, as soon as practicable, to emergency workers and to helpers in an emergency. The record of doses received by emergency workers shall be maintained, and provided to the Authority, if so required.

17. **Managing Medical Response in a Nuclear or Radiological Emergency.**—(1) The licensee shall ensure that arrangements are in place for the provision of appropriate medical screening and triage, medical treatment and longer term medical actions for those people who could be affected in a nuclear or radiological emergency.

(2) For facilities in Category I, II and III; the licensee shall ensure that arrangements are made for the provision of appropriate medical treatment of contaminated or overexposed in a nuclear or radiological emergency. These arrangements shall include provision of:

(a) first aid to affectees;

(b) transport services;

(c) management and treatment of contaminated or overexposed individuals at pre-designated facilities;

(d) estimation of doses;

(e) specialized medical treatment; and

(f) instructions to medical personnel on universal precautions in health care against infection when treating individuals with possible contamination.

(3) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place for areas within emergency planning zones, for performing medical screening and triage and for assigning, to a pre-designated medical facility, any individual

exposed at levels exceeding the criteria as given in Schedule II of these regulations. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy.

(4) The licensee, as appropriate, in coordination with relevant off-site response organizations, shall ensure that arrangements are made for the identification of individuals who are in those population groups that are at risk of sustaining elevated incidence of cancers as a result of radiation exposure in a nuclear or radiological emergency. Arrangements shall be made to take longer term medical actions to detect radiation induced health effects among such population groups in time to allow for their effective treatment. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy.

(5) The licensee of activity in Category IV shall ensure that arrangements are made for provision of appropriate medical attention to the individuals with possible contamination in a nuclear or radiological emergency. These arrangements shall include provision of:

(a) transport services, where needed;

(b) instructions to medical personnel on universal precautions in health care against infection when treating individuals with possible contamination; and

(c) notification to the Authority on the presentation by an individual of clinical symptoms of radiation exposure or other indications associated with a possible nuclear or radiological emergency.

(6) For facilities in Category I and II; the licensee, in coordination with relevant off-site response organizations, shall ensure that arrangements are made for medical personnel, both general practitioners and emergency medical staff, to be made aware of the clinical symptoms of radiation exposure, and of the appropriate notification procedures and other emergency response actions to be taken in emergency planning zones and distances if a nuclear or radiological emergency arises or is suspected.

18. **Communicating with the Public throughout a Nuclear or Radiological Emergency.**—(1) The licensee shall ensure that arrangements are in place for communication with the public throughout a nuclear or radiological emergency.

(2) The licensee shall ensure that arrangements are in place for providing useful, timely, factual, clear and appropriate information in plain and understandable language to the public in a nuclear or radiological emergency,

with account taken of the possibility that the usual means of communication might be damaged in the emergency or by its initiating event such as, by an earthquake, by flooding, etc., or overburdened by demand for its use.

(3) The licensee shall ensure that arrangements are in place for communication with the public in a nuclear or radiological emergency on the basis of a strategy to be developed at the preparedness stage, integrated with the protection strategy. Arrangements shall be made to adjust this strategy in the emergency response on the basis of prevailing conditions.

(4) The licensee, in coordination with off-site response organizations, shall make arrangements to ensure that information provided to the public is coordinated and consistent throughout a nuclear or radiological emergency. The information provided to the public shall be shared in parallel with the Authority.

(5) The licensee shall develop and implement a system for putting radiological health hazards in perspective, in a nuclear or radiological emergency to:

(a) support informed decision making concerning protective actions and other response actions to be taken;

(b) ensure that actions taken do more good than harm; and

(c) address public concerns regarding potential health effects.

In the development of such a system, due consideration shall be given to pregnant women and children as the individuals who are most vulnerable with regard to radiation exposure.

(6) The licensee shall make arrangements to explain the public any changes in the recommended protective actions and other response actions.

(7) The licensee shall make arrangements to identify and address, to the extent practicable, misconceptions, rumors, incorrect and misleading information that might be circulating widely in a nuclear or radiological emergency, in particular those that might result in actions being taken beyond those emergency response actions that are warranted.

(8) The licensee shall make arrangements to respond to enquiries received from the public, news media and the Authority in a timely manner.

(9) The licensee shall make arrangements to rate the nuclear or radiological event in accordance with the INES and provide necessary information to the Authority for its subsequent rating by the INES National Officer.

19. **Taking Early Protective Actions and Other Response Actions.**—(1) The licensee shall ensure that arrangements are in place to take early protective actions and other response actions effectively in a nuclear or radiological emergency.

(2) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that, within the EPD, arrangements are made for effective relocation that may be required following a significant radioactive release and for the prevention of inadvertent ingestion, in accordance with the protection strategy. These arrangements shall include:

(a) provision of instructions and advice to prevent inadvertent ingestion;

(b) prompt monitoring and assessment;

(c) use of pre-established operational criteria in accordance with the protection strategy;

(d) the means for accomplishing relocation and for assisting those persons who have been relocated; and

(e) provisions to extend monitoring and assessment and actions beyond the EPD, if necessary.

(3) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that, for areas within the ICPD, arrangements are made for prompt protection in relation to, and for restriction of, non-essential local produce, forest products, milk from grazing animals, drinking water supplies, animal feed and commodities with contamination or possibly with contamination following a significant radioactive release, in accordance with the protection strategy. These arrangements shall include:

(a) provision of instructions and advice to: protect the food chain, water supply and commodities from contamination; prevent ingestion of food, milk and drinking water with contamination or possibly with contamination; and prevent use of commodities with contamination or possibly with contamination;

(b) prompt monitoring, sampling and analysis;

(c) use of pre-established operational criteria in accordance with the protection strategy;

(d) means to enforce the restrictions; and

(e) provisions to expand monitoring and assessment and actions beyond this distance, if necessary.

(4) The licensee, in coordination with off-site response organizations, shall ensure that within the emergency planning zones and the inner cordoned off area, arrangements shall be made for monitoring the levels of contamination of people, vehicles and goods moving out of areas with contamination, in order to control the spread of contamination and, as applicable, for the purpose of decontamination in accordance with the protection strategy. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy and shall take into consideration that some vehicles and items potentially with contamination, as well as members of the public and emergency workers, might have left these areas before the establishment of contamination control points and boundaries.

(5) The licensee, in coordination with off-site response organizations, shall ensure that arrangements shall be made for access control and enforcing of restrictions for areas in which evacuations and relocations would be carried out within emergency planning zones, the EPD and the inner cordoned off area, in accordance with the protection strategy. Returns to these areas, for short periods of time, shall be permitted if justified such as to feed animals left behind etc., and provided that those individuals entering the area are:

(a) subject to controls and to dose assessment while in the area;

(b) instructed on how to protect themselves; and

(c) briefed on the associated health hazards.

(6) The licensee shall ensure that arrangements are made to evaluate methods of decontamination before their general use and to assess their effectiveness in terms of dose reduction.

(7) The licensee shall ensure that monitoring in response to a nuclear or radiological emergency is carried out on the basis of a strategy, which is to be developed at the preparedness stage in line with the protection strategy. Arrangements shall be made to adjust the monitoring in the emergency response on the basis of prevailing conditions.

(8) The licensee shall ensure that arrangements are made to carry out assessment of exposure of members of the public in a nuclear or radiological emergency, and to make the results of these assessments publicly available, as appropriate. The assessments shall be based on the best available information, shall be put into perspective in terms of the associated health hazards and shall be promptly updated in light of information that would yield substantially more accurate results.

20. **Managing Radioactive Waste in a Nuclear or Radiological Emergency.**—(1) The licensee shall ensure that radioactive waste is managed

safely and effectively, arising from a nuclear or radiological emergency, in accordance with the Regulations on Radioactive Waste Management - (PAK/915).

(2) The licensee shall ensure that radioactive waste, that might arise from protective actions and other response actions, has been taken into account in the protection strategy.

(3) The licensee shall ensure that radioactive waste arising in a nuclear or radiological emergency, including radioactive waste arising from associated protective actions and other response actions taken, is managed in a manner that does not compromise the protection strategy, with account taken of the prevailing conditions.

(4) The licensee shall ensure that due consideration is given to the management of deceased person and animal bodies with contamination as a result of a nuclear or radiological emergency, with due account taken of religious and cultural practices.

21. **Mitigating Non-Radiological Consequences of a Nuclear or Radiological Emergency and of an Emergency Response.**—(1) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place for mitigation of non-radiological consequences of a nuclear or radiological emergency and of an emergency response.

(2) The licensee shall give due consideration to non-radiological consequences of a nuclear or radiological emergency and of an emergency response in deciding on the protective actions and other response actions to be taken.

(3) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are made for mitigating the non-radiological consequences of an emergency and those of an emergency response and for responding to public concern in a nuclear or radiological emergency. These arrangements shall include measures for providing affected people with:

(a) information on any associated health hazards and clear instructions on any actions to be taken;

(b) medical and psychological counselling, as appropriate; and

(c) adequate social support, as appropriate.

22. **Requesting and Receiving International Assistance for Emergency Preparedness and Response.**—The licensee, in coordination with relevant off-site response organizations, shall ensure that adequate arrangements

are in place to request and receive international assistance for emergency response for a nuclear or radiological emergency.

23. **Terminating a Nuclear or Radiological Emergency.**—(1) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place and are implemented for the termination of a nuclear or radiological emergency, with account taken of the need for the resumption of social and economic activity.

(2) The licensee, in coordination with off-site response organizations, shall ensure that adjustment of protective actions and other response actions and of other arrangements that are aimed at enabling the termination of an emergency are made by a formal process that includes consultation of interested parties, as appropriate.

(3) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place for communication with the public in a nuclear or radiological emergency which include arrangements for communication on the reasons for any adjustment of protective actions and other response actions and other arrangements aimed at enabling the termination of the emergency. This shall include providing the public with information on the need for any continuing protective actions following termination of the emergency. Arrangements shall be made, during this period, to closely monitor public opinion and the reaction in the news media in order to ensure that any concerns can be promptly addressed. These arrangements shall ensure that any information provided to the public puts health hazards in perspective.

(4) The licensee shall ensure that the termination of a nuclear or radiological emergency is based on a formal decision and shall include prior consultation with interested parties, as appropriate. Both radiological and non-radiological consequences shall be considered in deciding on the termination of an emergency, as well as in the justification and optimization of protection strategy as necessary.

(5) The licensee shall ensure that transition of emergency exposure situation to an existing exposure situation or to a planned exposure situation is made in a coordinated and orderly manner, by making any necessary transfer of responsibilities and with the increased involvement of relevant response organizations and interested parties.

(6) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are in place for the termination of a nuclear or radiological emergency taking into account the fact that the termination of an emergency might be at different times in different geographical areas. The planning process shall include, as appropriate:

(a) the roles and functions of organizations;

(b) methods of transferring information;

(c) means for assessing radiological and non-radiological consequences;

(d) conditions, criteria and objectives to be met for enabling the termination of a nuclear or radiological emergency;

(e) review of the hazard assessment and of the emergency arrangements;

(f) establishment of guidelines and procedures for the termination of an emergency;

(g) arrangements for continued communication with the public, and for monitoring of public opinion and the reaction in the news media; and

(h) arrangements for consultation of interested parties.

(7) The licensee shall ensure that once the emergency is terminated, all the workers shall be subject to the relevant requirements for occupational exposure in planned exposure situations or existing exposure situation as prescribed in the Regulations on Radiation Protection - (PAK/904).

24. **Analyzing the Nuclear or Radiological Emergency and the Emergency Response.**—(1) The licensee shall ensure that the nuclear or radiological emergency and the emergency response are analyzed in order to identify actions to be taken to avoid other emergencies and to improve emergency arrangements.

(2) The licensee shall make arrangements to document, protect and preserve, in an emergency response, to the extent practicable, data and information important for an analysis of the nuclear or radiological emergency and the emergency response. Arrangements shall be made to undertake a timely and comprehensive analysis of the nuclear or radiological emergency and the emergency response with the involvement of interested parties, as appropriate. These arrangements shall give due consideration to the need for making contributions to relevant internationally coordinated analysis and for sharing the findings of the analysis with relevant response organizations. The analysis shall give due consideration to:

(a) reconstruction of the circumstances of the emergency;

(b) root causes of the emergency;

(c) general implications for safety including the possible involvement of other sources;

(d) general implications for security, as appropriate; and

(e) necessary improvements to emergency arrangements.

(3) The licensee, in coordination with off-site response organizations, as appropriate, shall make arrangements to enable comprehensive interviews on the circumstances of the nuclear or radiological emergency to be conducted with those involved.

(4) The licensee, in coordination with relevant off-site response organizations, shall make arrangements to acquire the international expertise necessary to conduct an analysis of the circumstances of the nuclear or radiological emergency.

(5) The licensee shall make arrangements to take actions promptly on the basis of an analysis to avoid other emergencies, including the provision of information to other relevant facilities.

INFRASTRUCTURAL REQUIREMENTS FOR EMERGENCY PREPAREDNESS AND RESPONSE

25. **Authorities and Responsibilities.**—(1) The licensee shall ensure that authorities and responsibilities for preparedness and response for a nuclear or radiological emergency are clearly established and assigned.

(2) The licensee shall ensure that the involvement of all off-site response organizations in the performance of the functions as prescribed in these regulations is documented as part of the emergency plans. The documentation shall specify their roles, functions, authorities and responsibilities in emergency preparedness and response. Incompatibility and overlapping in roles and responsibilities shall be identified and resolved at the preparedness stage through coordinating mechanism.

(3) The licensee shall ensure that the authorities and responsibilities for making decisions on response actions to be taken on-site and off-site and for communication with the public are clearly assigned.

(4) The licensee, in coordination with off-site response organizations, shall ensure that arrangements are made for:

(a) designation of a position in the response hierarchy in each organization having the authority and responsibility to direct and to coordinate response actions;

(b) clearly assigning the authority and responsibility for directing the entire response and coordination with off-site response organizations and for the prevention and resolution of conflicts, if arise;

(c) assigning the authority and responsibility to an on-site position for notifying the appropriate off-site response organizations of an emergency and for taking immediate actions on the site; and

(d) not assigning any other responsibility to personnel with authority and responsibility of performing response functions in an emergency response.

(5) The licensee shall ensure that arrangements for delegation and transfer of authority are specified in the relevant emergency plans, together with arrangements for notifying all concerned on and off the site.

26. **Organization and Staffing.**—(1) The licensee shall ensure that on-site organization for preparedness and response for a nuclear or radiological emergency is clearly specified and staffed with sufficient and qualified personnel.

(2) The licensee shall establish organizational relationships and interfaces for preparedness and response for a nuclear or radiological emergency with off-site response organizations.

(3) The licensee shall ensure that emergency response personnel are assessed for their initial and continuing fitness for their intended duties.

(4) The licensee shall ensure that appropriate number of suitably qualified personnel are available at all times, as necessary, following the declaration and notification of a nuclear or radiological emergency. Appropriate number of suitably qualified personnel shall also be available to take mitigatory actions, protective actions and other response actions for the long term, as necessary.

(5) For a site where multiple facilities in Category I and II are collocated, the licensee shall ensure that an appropriate number of suitably qualified personnel are available to manage an emergency response at all facilities if each of the facilities is under emergency conditions simultaneously.

27. **Coordination Arrangements.**—(1) The licensee shall ensure that arrangements are in place, as appropriate, for the coordination of emergency preparedness and response and of protocols for operational interfaces with off-site response organizations. Arrangements shall be clearly documented and the

documentation shall be made available to all relevant parties. Arrangements shall be put in place to ensure an effective working relationship among all the relevant organizations, both at the preparedness stage and in an emergency.

(2) The licensee shall ensure that when several different organizations are involved in response to an emergency, arrangements for coordination are put in place to improve consistency of the assessments of the situation, including assessments of contamination, doses and radiation-induced health effects and any other relevant assessments made in a nuclear or radiological emergency, so as not to give rise to confusion. These arrangements include developing tools, procedures and criteria, etc.

28. **Plans and Procedures for Emergency Response.**—(1) The licensee shall ensure that plans and procedures necessary for an effective response to a nuclear or radiological emergency are established. These plans shall specify how responsibilities for managing operations in an emergency response are to be discharged on the site, off the site and at the national level, as appropriate.

(2) The license shall ensure that plans, procedures and other arrangements including coordinating mechanisms, letters of agreement or Memoranda of Understanding (MoUs) are in place for effective coordination of the emergency response. Consideration shall be given in these plans, procedures and other arrangements to protect information that might be confidential. The arrangements shall:

(a) specify the organization responsible for the development and maintenance of the arrangements; and

(b) describe the coordination between these arrangements and the arrangements for response to a conventional emergency and to a nuclear security event.

(3) The licensee shall prepare an on-site or facility emergency plan for performing their assigned functions as prescribed in these regulations and in accordance with the hazard assessment and the relevant protection strategy.

(4) For facilities in Category I and II; the licensee, in coordination with off-site response organizations, shall ensure that an off-site emergency plan is developed that integrates all relevant plans for emergency response in a coordinated manner and is consistent with all-hazards approach.

(5) The licensee shall ensure that the on-site or facility emergency plan is integrated and coordinated with other plans and procedures that may be implemented in a nuclear or radiological emergency, to ensure that the

simultaneous implementation of the plans would not reduce their effectiveness or cause conflicts. Such other plans and procedures shall include, but not limited to:

(a) physical protection program;

(b) procedure for the investigation of a nuclear security event;

(c) evacuation plan;

(d) firefighting plan, etc.

(6) The licensee shall prepare and submit emergency plans to the Authority for approval. These plans shall include written consent of off-site response organizations that have responsibilities in a nuclear or radiological emergency.

(7) The licensee shall review and update the emergency plan periodically, at least once in every five (05) years, taking into account any change in the assessed hazards, experience and lessons learnt from research, operation, emergency response and exercises, technological developments and experience feedback.

(8) The licensee shall ensure that the necessary procedures and analytical tools are in place for an effective emergency response. Procedures and analytical tools shall be tested under simulated emergency conditions and shall be validated prior to initial use. Any arrangements for the use of analytical tools early in an emergency response for supporting decision making on protective actions and other response actions shall be made in due recognition of the limitations of such analytical tools and in a way that would not reduce the effectiveness of response actions. These limitations shall be made clear to, and shall be recognized by, those responsible for decision making.

29. **Logistical Support and Facilities for Emergency Response.**—(1) The licensee shall ensure that adequate logistical support and facilities are in place to enable emergency response functions to be performed effectively in a nuclear or radiological emergency.

(2) The licensee shall ensure that adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation such as procedures, checklists, manuals, telephone numbers, email addresses, etc., are provided for performing the functions prescribed in these regulations. These items and facilities shall be selected or designed to be operational under radiological conditions, working conditions and environmental conditions that could be encountered in the emergency response, and to be compatible with other procedures and equipment for the response, as appropriate. These items and facilities shall be located or provided in a manner that allows their effective use under the emergency conditions postulated.

(3) For facilities in Category I and II; the licensee shall ensure that as a contingency measure, alternative supplies, such as water and electrical power for taking on-site mitigatory actions, including any necessary equipment are in place.

(4) The licensee, in coordination with off-site response organizations, shall ensure that emergency response facilities or locations to support an emergency response under the full range of postulated hazardous conditions are designated and assigned the following functions, as appropriate:

(a) Receiving notifications and initiating the response;

(b) Coordination and direction of on-site response actions;

(c) Providing technical and operational support to those personnel performing tasks at a facility and those personnel responding off the site;

(d) Direction of off-site response actions and coordination with on-site response actions;

(e) Coordination of communication with the public;

(f) Coordination of monitoring, sampling and analysis;

(g) Managing those people who have been evacuated, including reception, registration, monitoring and decontamination, as well as provision for meeting their personal needs, including for housing, food and sanitation;

(h) Managing the storage of necessary resources; and

(i) Providing individuals who have undergone exposure or contamination with appropriate medical attention including medical treatment.

(5) For facilities in Category I and II; the licensee shall establish an on-site Emergency Control Centre (ECC), which is responsible for sending emergency notifications of an actual or potential nuclear or radiological emergency. The ECC shall be made continuously available to send or receive any notification or request for assistance and to respond promptly or to initiate an off-site response.

(6) For facilities in Category I; the licensee shall make arrangements for availability of information about important facility parameters, including meteorological data and radiological conditions in the facility and its immediate

surroundings, in the ECC and to the Authority. The licensee shall make arrangements for installation of fixed radiation monitoring equipment with a high level of detection capabilities at pre-selected on-site and off-site locations for rapid assessment of an emergency situation and to take protective and other response actions in a timely manner.

(7) The ECC shall have means of communication with the main control room, emergency control room and other important points in the facility, and with the on-site and off-site emergency response organizations so that:

(a) technical support is provided to the operating personnel in the control room during an emergency (from a technical support centre);

(b) operational control by personnel performing tasks at or near the facility can be maintained from an operational support centre; and

(c) the on-site emergency response is managed.

(8) The emergency response facilities, as prescribed in Regulation 29(6) and 29(7) of these regulations, shall operate as an integrated system in support of the emergency response, without conflicting with one another's functions, and shall provide reasonable assurance of being operable and habitable under a range of postulated hazardous conditions, including conditions not considered in the design. Appropriate measures shall be taken to protect the occupants for a protracted time against hazards resulting from a severe accident.

(9) For facilities in Category III and activities in Category IV; the licensee shall establish a notification point, which is responsible for sending emergency notifications of an actual or potential nuclear or radiological emergency. The notification point shall be made continuously available to send or receive any notification or request for assistance and to respond promptly or to initiate an off-site response.

(10) For facilities in Category I and II; the licensee in coordination with off-site response organizations, shall ensure that arrangements are in place for performing appropriate and reliable analyses of samples including environmental, biological, etc. and measurements of internal contamination for the purposes of emergency response and health screening, as appropriate. Such arrangements shall include the designation of laboratories that would be operational under postulated emergency conditions.

(11) The licensee shall make arrangements to obtain appropriate support from off-site response organizations for logistics, communication, social welfare and other relevant areas.

30. **Training, Drills and Exercises for Emergency Preparedness and Response.**—(1) The licensee shall ensure that emergency response personnel take part in regular training, drills and exercises at least once a year so that they can perform their assigned response functions effectively in a nuclear or radiological emergency.

(2) The licensee shall identify the knowledge, skills and abilities necessary to perform the functions prescribed in these regulations. Arrangements shall be made for training of emergency response personnel including arrangements for continuing refresher training according to an appropriate schedule to ensure that they have the requisite knowledge, skills and abilities to perform their assigned response functions.

(3) The licensee, in coordination with off-site response organizations, shall ensure that both on-site and off-site response personnel are trained for performing their assigned tasks and functions through conduct of training, drills and exercises.

(4) For facilities in Category I, II and III; the licensee shall make arrangements to ensure that all the persons on the site are instructed about their actions to be taken on declaration of a nuclear or radiological emergency.

(5) The licensee shall develop and implement exercise program as a part of emergency plan to ensure that all specified functions required to be performed for emergency response and interfaces with off-site response organizations are tested. The exercise program shall be developed by considering the following:

(a) For facilities in Category I, II, and III and activities in Category IV; periodic exercises shall be conducted at least once in a calendar year or at suitable interval as agreed by the Authority. The types of emergency exercises shall be included in the emergency plans and agreed by the Authority.

(b) Review and revision of exercise program shall be made in the light of experience gained from conduct of emergency exercises and responses to real emergencies.

(c) Exercises shall be conducted in different seasons and timings to check the continuous availability of resources both on and off the site and implementation of response and protective measures based on possible accident scenarios including natural disasters and nuclear security events.

(d) Exercise scenario or plan shall be submitted to the Authority at least thirty (30) days before the conduct of exercise for review and approval or at suitable intervals as agreed in emergency plans.

(6) The licensee shall ensure, as appropriate, participation of all the response organizations, representatives of news media and people who would be potentially affected in some of the exercises.

(7) The licensee shall ensure that communication arrangements are being tested with all off-site response organizations and with the Authority at a pre-defined frequency.

(8) The licensee shall ensure that officials of response organizations, who are responsible for making decisions on protective actions and other response actions and communication with the public, are trained and regularly participate in exercises.

(9) The licensee shall ensure that all such exercises are evaluated against pre-established objectives of emergency response to demonstrate that identification, notification, activation and response actions are performed effectively to achieve the goals of emergency response. Some of these exercises may be evaluated by the Authority.

31. **Repeal.**—The "Regulations on Management of a Nuclear or Radiological Emergency - (PAK/914) (Rev.0)" notified vide S.R.O. 912(I)/2008 dated 24th July, 2008 and Regulation No. 39(1)(c), 40, 41(1), 41(2)(c), 41(3), 42, 44(c) and 44(e) of Pakistan Nuclear Safety and Radiation Protection Regulations, 1990 notified vide S.R.O. 957(I)/90 are hereby repealed.

Schedule I

Emergency Preparedness Categories

Category	Description
I	Facilities, such as nuclear power plants, for which on-site events including those not considered in the design are postulated that could give rise to severe deterministic effects off the site that would warrant precautionary urgent protective actions, urgent protective actions or early protective actions, and other response actions to achieve the goals of emergency response, or for which such events have occurred in similar facilities.
II	Facilities, such as some types of research reactors, for which on-site events are postulated that could give rise to doses to people off the site that would warrant urgent protective actions or early protective

Category	Description
	actions and other response actions to achieve the goals of emergency response, or for which such events have occurred in similar facilities. Category II (as opposed to Category I) does not include facilities for which on-site events including those not considered in the design are postulated that could give rise to severe deterministic effects off the site, or for which such events have occurred in similar facilities.
III	Facilities, such as industrial irradiation facilities or some hospitals, for which on-site events are postulated that could warrant protective actions and other response actions on the site to achieve the goals of emergency response, or for which such events have occurred in similar facilities. Category III (as opposed to Category II) does not include facilities for which events are postulated that could warrant urgent protective actions or early protective actions off the site, or for which such events have occurred in similar facilities.
IV	Activities and acts that could give rise to a nuclear or radiological emergency that could warrant protective actions and other response actions to achieve the goals of emergency response in an unforeseen location. These activities and acts include: (a) Transport of nuclear or radioactive material and other authorized activities involving mobile dangerous sources such as industrial radiography sources, nuclear powered satellites or radioisotope thermoelectric generators; and (b) Theft of a dangerous source and use of a radiological dispersal device or radiological exposure device. This category also includes: i. detection of elevated radiation levels of unknown origin or of commodities with contamination; ii. identification of clinical symptoms due to exposure to radiation; and iii. a transnational emergency that is not in Category V arising from a nuclear or radiological emergency in another State.
V	Areas within emergency planning zones and emergency planning distances in Pakistan for a facility in Category I or II located in a neighbouring country.

Schedule II

Generic Criteria for Use in Emergency Preparedness and Response

(1) This schedule provides generic criteria for:

(a) doses for which protective actions and other response actions are expected to be taken under any circumstances in a nuclear or radiological emergency to avoid or to minimize severe deterministic effects;

(b) doses for which protective actions and other response actions are expected to be taken, if they can be taken safely, in a nuclear or radiological emergency to reasonably reduce the risk of stochastic effects;

(c) doses for which restriction of international trade is warranted in a nuclear or radiological emergency, with due consideration of non-radiological consequences; and

(d) doses for use as a target dose for the transition to an existing exposure situation.

(2) This Schedule includes examples of associated protective actions and other response actions. These generic criteria and associated protective actions and other response actions shall be taken into account in the development of the protection strategy, including generic criteria.

(3) If protective actions in the context of the protection strategy are to be taken when doses are below the generic criteria given in this schedule, careful consideration is necessary to ensure that such actions are justified (i.e. they do more good than harm) and that they are optimized in accordance with the protection strategy.

(4) Table 1 provides generic criteria for doses received within a short period of time for which protective actions and other response actions are expected to be taken under any circumstances in a nuclear or radiological emergency to avoid or to minimize severe deterministic effects.

(5) Table 1 provides generic criteria for AD_{fetus} as 0.1 Gy. There would be only a very small probability of severe deterministic effects to the fetus at this dose and only during certain periods post-conception, e.g. between eight (08) and fifteen (15) weeks of in utero development, and only if the dose is received at high dose rates. During other periods, post-conception and for lower dose rates, the fetus is less sensitive. There is a high probability of severe deterministic effects at 1 Gy. Therefore, 1 Gy is used as the generic criterion for doses to the fetus received within a short period of time for:

(a) hazard assessment to identify facilities and activities, on-site areas, off-site areas and locations for which a nuclear or radiological emergency could warrant precautionary urgent protective actions to avoid or to minimize severe deterministic effects;

(b) identifying situations in which exposure is dangerous to health; and

(c) making arrangements for applying decisions on urgent protective actions and other response actions to be taken off the site to avoid or to minimize the occurrence of severe deterministic effects, e.g. establishing a PAZ.

Table 1: Generic Criteria for Doses to Avoid or to Minimize Severe Deterministic Effects

Acute External Exposure (<10 h)		
$AD_{red\ marrow}$[a]	1 Gy	If the dose is projected: i. Take precautionary urgent protective actions immediately (even under difficult conditions) to keep doses below the generic criteria; ii. Provide public information and warnings; and iii. Carry out urgent decontamination.
AD_{fetus}	0.1Gy	
AD_{tissue}[b]	25 Gy at 0.5 cm	
AD_{skin}[c]	10 Gy to 100 cm^2	
Acute Internal Exposure due to an Acute Intake (Δ = 30 d[d])		
$AD(\Delta)_{red\ marrow}$	0.2 Gy for radionuclide with atomic number $Z \geq 90$ 2 Gy for radionuclide with atomic number $Z \leq 89$	If the dose has been received: i. Perform immediate medical examination, medical consultation and indicated medical treatment; ii. Carry out contamination control; iii. Carry out immediate decorporation[e] (if applicable); iv. Conduct registration for longer term medical follow-up; and v. Provide comprehensive psychological counselling.
$AD(\Delta)_{thyroid}$	2 Gy	
$AD(\Delta)_{lung}$	30 Gy	
$AD(\Delta)_{colon}$	20 Gy	
$AD(\Delta^f)_{fetus}$	0.1Gy	

[a] AD represents the average Relative Biological Effectiveness (RBE) weighted absorbed dose to internal tissues or organs (e.g. red marrow, lung, small intestine, gonads, thyroid) and to the lens of the eye from exposure in a uniform field of strongly penetrating radiation.

[b] Dose delivered to 100 cm^2 at a depth of 0.5 cm under the body surface in tissue due to close contact with a radioactive source.

[c] The dose is to 100 cm^2 dermis (skin structures at a depth of 40 mg/cm^2 (or 0.4 mm) below the surface).

[d] AD(Δ) is the RBE weighted absorbed dose delivered over a period of time Δ by the intake that will result in a severe deterministic effect in 5% of exposed individuals.

[e] Decorporation is the action of the biological processes, facilitated by chemical or biological agents, by means of which incorporated radionuclides are removed from the human body. The generic criterion for decorporation is based on the projected dose without decorporation.

[f] For this particular case, 'Δ' refers to the period of in utero development of the embryo and fetus.

(6) Table 2 provides generic criteria for taking protective actions and other response actions in a nuclear or radiological emergency to reduce the risk of stochastic effects.

Table 2: Generic Criteria for Protective Actions and Other Response Actions to Reduce the Risk of Stochastic Effects

Generic Criteria		Protective Actions and Other Response Actions
Projected dose that exceeds the following generic criteria:		Take following urgent protective actions and other response actions:
$H_{thyroid}$	50 mSv[g] in the first seven (07) days	Iodine thyroid blocking[h]
E[i]	100 mSv in the first seven (07) days	Sheltering[j]; evacuation; prevention of inadvertent ingestion; restrictions on food, milk and drinking water[k] and restrictions on the food chain and water supply; restrictions on commodities other than food; contamination control; decontamination; registration; reassurance of the public.
H_{fetus}[l]	100 mSv in the first seven (07) days	
Projected dose that exceeds the following generic criteria:		Take, following early protective actions and other response actions:
E	100 mSv in the first year	Temporary relocation; prevention of inadvertent ingestion; restrictions on food, milk and drinking water and restrictions on the food chain and water supply; restrictions on commodities other than food; contamination control; decontamination; registration; reassurance of the public.
H_{fetus}[l]	100 mSv for the full period of in utero development	
Dose that has been received and that exceeds the following generic criteria:		Take following longer term medical actions to detect and to effectively treat radiation induced health effects:
E	100 mSv in a month	Health screening based on equivalent doses to specific radiosensitive organs (as a basis for longer term medical follow-up)[m], registration, counselling.
H_{fetus}	100 mSv for the full period of in utero development	Counselling to allow informed decisions to be made in individual circumstances.

[g] The equivalent dose to the thyroid ($H_{thyroid}$) only due to exposure to radioiodine.

[h] This generic criterion applies only for administration of iodine thyroid blocking. For the thyroid, iodine thyroid blocking is an urgent protective action that is prescribed:
(a) if exposure due to radioactive iodine is involved;
(b) before or shortly after a release of radioactive iodine; and
(c) within only a short period before or after the intake of radioactive iodine.

[i] Effective dose

[j] As a less disruptive protective action, sheltering may be ordered at lower doses as long as justified and optimized.

[k] Restrictions on food, milk and drinking water using these generic criteria are to be applied before sampling and analysis of food, milk and drinking water is carried out. Such restrictions apply as long as replacements of food, milk and drinking water or other alternatives are available to ensure they would not result in severe malnutrition, dehydration or other severe health impacts.

[l] H_{fetus} is the equivalent dose to the fetus, derived as the sum of the dose from external exposure and the maximum committed equivalent dose to any organ of the embryo or fetus from intake to the embryo or fetus for different chemical compounds and different times relative to conception.

[m] When results of the health screening indicate that the criteria in Table 2 are exceeded, then appropriate medical attention on the basis of Schedule II is necessary.

(7) Table 3 provides generic criteria for taking protective actions and other response actions to reduce the risk of stochastic effects from the ingestion of food, milk and drinking water and from the use of other commodities in a nuclear or radiological emergency.

(8) A value of 1/10 of the generic criteria given in Table 2 for early protective actions and other response actions is established as generic criteria for restrictions on food, milk and drinking water and on other commodities to ensure that the dose via all exposure pathways, including ingestion, will not exceed the generic criteria given in Table 2 for early protective actions and other response actions.

(9) If restrictions on food, milk or drinking water would result in severe malnutrition or dehydration because replacements are not available, food, milk or drinking water with concentration levels of radionuclide that are projected to result in doses above the generic criteria given in Table 3 may be consumed until replacements are available provided that this would not result in doses from all exposure pathways above the generic criteria given in Table 2; otherwise, the people affected may be relocated.

Table 3: Generic Criteria for Food, Milk and Drinking Water and Other Commodities to Reduce the Risk of Stochastic Effects

Generic Criteria		Protective Actions and Other Response Actions
Projected dose from ingestion of food, milk and drinking water and from the use of other commodities that exceeds the following generic criteria:		Take following protective actions and other response actions:
E	10 mSv in the first year	Restrict consumption, distribution and sale of non-essential[n] food, milk and drinking water[o] and restrict the use and distribution of other commodities. Replace essential food, milk and drinking water as soon as possible or relocate the people affected if replacements are not available. Estimate the doses of those who might have consumed food, milk and drinking water or used other commodities to determine whether this may have resulted in doses warranting medical attention in accordance with Table 2.
H_{fetus}	10 mSv for the full period of in utero development	

[n] Restricting essential food, milk or drinking water could result in dehydration, severe malnutrition or other severe health impacts; therefore, essential food, milk and drinking water is to be restricted only if alternatives are available.

[o] These criteria for taking actions on food, milk and drinking water are applied once the sampling and analysis of food, milk and drinking water is carried out. This would also provide a basis for discontinuing restrictions imposed on food, milk and drinking water as a precaution on the basis of the generic criteria in Table 2.

(10) Table 4 provides generic criteria for taking protective actions and other response actions to reduce the risk of stochastic effects arising from the use of vehicles, equipment and other items from an area affected by a nuclear or radiological emergency.

(11) A value of 1/10 of the generic criteria given in Table 2 for early protective actions and other response actions is established as generic criteria for vehicles, equipment and other items from an affected area, to ensure that the dose via all exposure pathways, including the use of such vehicles, equipment and other items, would not exceed the generic criteria given in Table 2 for early actions for a member of the public.

(12) Restricting the use of vehicles, equipment and other items from an affected area could interfere with taking urgent protective actions and other response actions or with providing services essential to public health or well-being, e.g. restricting the use of vehicles for transferring individuals requiring critical medical treatment or preventing a ship or an aircraft that has left an affected area from reaching its final destination. Such vehicles, equipment and other items whose use would give rise to a projected dose to their users above the generic criteria given in Table 4 may be used until replacements are available, provided that:

(a) their use will not result in doses from all exposure pathways that exceed the generic criteria given in Table 2 for members of the public or the guidance values given in Schedule III for restricting the exposure of emergency workers, or the restriction set for exposures of helpers in an emergency in these regulations; and

(b) actions are taken to manage and control the exposure of the user as an emergency worker, a helper in an emergency or a member of the public, as appropriate.

Table 4: Generic Criteria for Vehicles, Equipment and Other Items to Reduce the Risk of Stochastic Effects

Generic Criteria		Protective Actions and Other Response Actions
Projected dose from the use of vehicles, equipment or other items from an affected area that exceed the following generic criteria:		Take following protective actions and other response actions:
E	10 mSv in the first year	Restrict non-essential[P] use. Use essential vehicles, equipment and other items from an affected area until replacements are available provided that:
H_{fetus}	10 mSv for the full	

[P] Restricting the use of vehicles, equipment and other items from an affected area could interfere with taking urgent protective actions and other response actions or with providing services essential to public health or well-being (e.g. restricting the use of vehicles for transferring individuals requiring critical medical treatment).

	period of in utero development	i. their use will not result in doses from all exposure pathways exceeding the generic criteria given in Table 2 for a member of the public or the guidance values given in Schedule I of these regulations for restricting the exposure of emergency workers, or the restriction for exposures of helpers in an emergency in these regulations; and ii. actions are taken to control the dose to the user as an emergency worker, helper in an emergency or a member of the public, as appropriate. Estimate doses to those emergency workers, helpers in an emergency and members of the public who may have used a vehicle, equipment or other item from an affected area to determine whether this could have resulted in a dose warranting medical attention in accordance with Table 2.

(13) Table 5 provides generic criteria aimed at the effective implementation of response actions to reduce the non-radiological consequences of a nuclear or radiological emergency by providing a basis for the continuation or the resumption of international trade.

(14) Values that exceed the generic criteria in Table 5 may be acceptable under emergency (temporary) conditions.

(15) The generic criteria for food traded internationally derive from the level used by the Joint Food and Agriculture Organization of the United Nations (FAO)/World Health Organization (WHO) Codex Alimentarius Commission. These generic criteria, and generic criteria for other commodities traded internationally that could contain radionuclide following a nuclear or radiological emergency, are established at 1/100 of the generic criteria given in Table 2 for early protective actions and other response actions to ensure that doses to the public would be a small fraction of those for which actions are warranted to reduce the risk of stochastic effects.

(16) For food traded internationally that could contain radionuclides following a nuclear or radiological emergency, the operational criteria (i.e. guideline levels) as published by the Joint FAO/WHO Codex Alimentarius Commission may ultimately be used.

(17) If restricting trade in food and other commodities could result in severe health impacts or other detrimental effects in another State, then the food and other commodities that would give rise to a projected dose that exceeds the generic criteria in Table 5 may be traded, if the trade is justified, until replacements are available, provided that:

(a) the trade is approved with the receiving State;

(b) the trade will not result in doses that exceed the generic criteria for the public given in Table 2 and Table 3;

(c) actions are taken to manage and control exposures during shipping; and

(d) actions are taken to control the consumption of food and use of other commodities and to reduce the exposure of members of the public.

(18) Generic criteria shall be established in terms of the projected dose for the implementation of protective actions and other actions aimed at enabling the termination of a nuclear or radiological emergency and the subsequent transition to an existing exposure situation with due consideration of, and verification of the fulfillment of, the conditions set out in Requirement 19 of Schedule II of these regulations.

(19) These criteria are established as 1/5 of the generic criteria for the early protective actions and other response actions given in Table 2 and are:

(a) an effective dose of 20 mSv per year; and

(b) an equivalent dose to a fetus of 20 mSv for the full period of in utero development.

(20) The decision to terminate the nuclear or radiological emergency and the subsequent transition to an existing exposure situation is to be taken after:

(a) justified actions have been taken to reach the generic criteria for enabling the transition to an existing exposure situation and it has been confirmed that any further actions to reach these criteria would do more harm than good;

(b) confirmation that the source of exposure is fully characterized for all members of the public living as normal in the area;

(c) the situation with regard to exposure has been understood and has remained stable;

(d) any restrictions on normal living conditions are limited and provisions are in place to confirm compliance with such restrictions; and

(e) confirmation that interested parties, including the public, have been consulted and are being kept informed about the basis for the

adjustment of emergency response actions and for the transition, with the associated health hazards put into perspective.

Table 5: Generic Criteria for Food and Other Commodities Traded Internationally

Generic Criteria		Other Response Actions
Projected dose from food and other commodities that exceed the generic criteria:		Take following response actions to restrict international trade:
E	1 mSv per year	Restrict non-essential[q] international trade. Trade essential food and other commodities until replacements are available if: i. trade is approved with the receiving State; ii. trade will not result in doses to the public that exceed the generic criteria given in Table 2 for all exposure pathways and in Table 3 for the respective pathways; iii. actions are taken to manage and control the dose during shipping; and iv. actions are taken to control the consumption and use of food and other commodities and to reduce the exposure of members of the public.
H_{fetus}	1 mSv for the full period of in utero development	

Schedule III

Guidance Values for Restricting Exposure of Emergency Workers

(1) This schedule provides guidance values as a basis for operational guidance for restricting the exposure of emergency workers.

(2) Table 6 of these regulations provides guidance values for restricting the exposure of emergency workers in an emergency response in terms of personal dose equivalent Hp(10) from external exposure to strongly penetrating radiation. Hp(d) is the dose equivalent in soft tissue at an appropriate depth "d", below a specified point on the human body. Hp(10) is an operational quantity for individual monitoring for the assessment of effective dose. The values for Hp(10) in Table 6 assume that every effort has been made for protection against external exposure to weakly penetrating radiation and against exposure due to intakes or skin contamination.

(3) The total effective dose and the Relative Biological Effectiveness (RBE) weighted absorbed dose to a tissue or organ via all exposure pathways (i.e. both dose from external exposure and committed dose from intakes) need to be

[q] Restricting the trade of essential commodities and food could result in severe health impacts or other detrimental conditions in another State.

estimated as early as possible in a nuclear or radiological emergency. Table 6 also provides guidance on the effective dose and the RBE weighted absorbed dose to a tissue or organ for consideration in restricting further exposure in the response to a nuclear or radiological emergency once these doses have been estimated.

(4) Severe deterministic effects to a fetus could possibly occur following an equivalent dose to the fetus of greater than 100 mSv. Consequently, in the response to a nuclear or radiological emergency, female workers who are aware that they are pregnant or who might be pregnant need to be:

(a) informed of this risk; and

(b) excluded from taking actions that might result in an equivalent dose to the embryo and fetus exceeding 50 mSv for the full period of in utero development of the embryo and fetus.

(5) These guidance values are set to be two to ten times lower than the generic criteria in Table 1 of these regulations and they apply for:

(a) the dose from external exposure to strongly penetrating radiation for Hp(10). Doses from external exposure to weakly penetrating radiation and from intake or skin contamination need to be prevented by all possible means. If this is not feasible, the effective dose and the RBE weighted absorbed dose to a tissue or organ (values of RBE weighted absorbed dose to a tissue or organ is provided in Table 1 of these regulations) have to be limited to minimize the health risk to the individual in line with the risk associated with the guidance values given here; and

(b) the total effective dose (E) and the RBE weighted absorbed dose to a tissue or organ AD_T via all exposure pathways (i.e. both dose from external exposure and committed dose from intakes) which are to be estimated as early as possible in order to enable any further exposure to be restricted as appropriate.

Table 6: Guidance Values for Restricting Exposure of Emergency Workers

Tasks	Guidance Value		
	Hp(10)	**E**	**AD_T**
Lifesaving actions	<500 mSv	<500 mSv	<1/2 AD_T
	This value may be exceeded, with due consideration of the generic criteria in Table 1 of these regulations, under circumstances in which the expected benefits to others clearly outweigh the emergency worker's own health risks, and the emergency worker volunteers to take the action and understands and accepts these health risks.		

Actions to prevent severe deterministic effects and actions to prevent the development of catastrophic conditions that could significantly affect people and the environment	<500 mSv	<500 mSv	<1/2 AD_T
Actions to avert a large collective dose	<100 mSv	<100 mSv	<1/10 AD_T

Schedule IV

Classification of a Nuclear or Radiological Emergency

Emergency Class	Applicable to Categories	Actions to be Taken
General Emergency	I and II	Upon declaration of this emergency class, appropriate actions shall promptly be taken, on the basis of the available information relating to the emergency, to mitigate the consequences of the emergency on the site and to protect people on the site and off the site.
Site Area Emergency	I and II	Upon declaration of this emergency class, actions shall promptly be taken to: i. mitigate the consequences of the emergency on the site and to protect people on the site; ii. increase the readiness to take protective actions and other response actions off the site if this becomes necessary on the basis of observable conditions, reliable assessments and results of monitoring; and iii. conduct off-site monitoring, sampling and analysis.
Facility Emergency	I, II and III	Upon declaration of this emergency class, actions shall promptly be taken to mitigate the consequences of the emergency and to protect people at the facility and on the site. Emergencies in this class do not present an off-site hazard.
Alert	I, II and III	Upon declaration of this emergency class, actions shall promptly be taken to assess and to mitigate the potential consequences of the event and to increase the readiness of the on-site response organizations.
Nuclear or Radiological Emergency at an Unforeseen Location	IV	Upon declaration of this emergency class and the level of emergency response, actions shall promptly be taken to mitigate the consequences of the emergency on the site, to protect those in the vicinity (e.g. workers, emergency workers and the public) and to determine where and for whom protective actions and other response actions are warranted.

NAVEED MAQBUL,
Member (Corporate).

PRINTED BY THE MANAGER, PRINTING CORPORATION OF PAKISTAN PRESS, ISLAMABAD.
PUBLISHED BY THE DEPUTY CONTROLLER, STATIONERY AND FORMS, UNIVERSITY ROAD, KARACHI.