**CHAPTER 13. OPERATION**

**CONTENTS**

[Terms and definitions 2](#_Toc27521670)

[13.1 Organizational Structure of Operating Organization 14](#_Toc27521671)

[13.1.1 Management and Engineering Support Structure, Areas of Focus of Operating Organization 14](#_Toc27521672)

[13.1.1.1 The responsibilities of the operating organization at the design, construction and commissioning of the Bushehr-2 NPP Power unit 2 17](#_Toc27521673)

[13.1.1.2 Organizational Structure of operating organization 26](#_Toc27521674)

[13.1.1.3 The requirements to the operating organization management 36](#_Toc27521675)

[13.1.2 Operating Directorate of the Bushehr-2 NPP 36](#_Toc27521676)

[13.1.3 Certification of personnel working at nuclear power plants 72](#_Toc27521677)

[13.2 Training 79](#_Toc27521678)

[13.2.1 NPP Plant Staff Training Program 79](#_Toc27521679)

[13.2.2 Replacement and re-training 95](#_Toc27521680)

[13.2.3 Documents used when preparing Section 13.2 96](#_Toc27521681)

[13.3 Emergency planning 97](#_Toc27521682)

[13.3.1 Preliminary planning (PSR) 97](#_Toc27521683)

[13.3.2 Information about the measures for the population protection (SAR) . 99](#_Toc27521684)

[13.4 Analysis and Revisions 100](#_Toc27521685)

[13.4.1 Site analysis 100](#_Toc27521686)

[13.4.2 Independent analysis 100](#_Toc27521687)

[13.4.3 Audit program 100](#_Toc27521688)

[13.5 Events at the NPP 101](#_Toc27521689)

[13.5.1 Administrative activities 101](#_Toc27521690)

[13.5.2 Commissioning and maintenance 101](#_Toc27521691)

[13.6 Physical Protection 102](#_Toc27521692)

[13.6.1 General Provisions 102](#_Toc27521693)

[13.6.2 Physical protection areas 102](#_Toc27521694)

[Appendix A Thematic plans for training of personnel of the Bushehr-2 NPP 104](#_Toc27521695)

[List of adopted abbreviations 122](#_Toc27521696)

Terms and definitions

|  |  |
| --- | --- |
| **Absorbed dose** | The value of energy of ionization radiation transferred to matter:  D = de/dm,  where de – the average energy transferred by ionization radiation to matter in a volume element and dm – the mass of matter in the volume element |
| **Acceptance inspection** | An activity intended to make a decision on the availability of products, their completeness, completeness and correctness of the supporting documentation, as well as on the quality of the packaging that ensure the fitness of an item, process or service for supply and/or use |
| **Accident** | A failure in the NPP operation where the release of radioactive substances and/or ionizing radiation exceeds the limits provided by the design for normal operation in quantities exceeding the safe operation limits The accident is characterized by an initiating event, propagating paths and the consequences |
| **Accident conditions** | Deviations from normal operation that could result in unacceptable amount of radioactive materials release in case the relevant engineering safety and protection systems fail to perform their planned functions |
| **Administrative and technical personnel** | Managers, heads of departments, deputies of said individuals, as well as engineers, technicians, foremen who are charged with administrative functions |
| **ALARA** | Fundamental principle of radiation protection is that the level of radiation exposure shall be "As low as reasonably achievable", economic and social factors being taking into account. This approach is based on common sense and means that radiation doses to the employees as well as to the public are kept below prescribed limits |
| **Analysis** | The activity undertaken to determine suitability, adequacy, effectiveness (the implementation progress and planned results achievement of the planned activities) of the evaluated facility in order to achieve the set objectives |
| **Audit** | A documented activity performed by the analysis, testing and evaluation of objective evidence in order to determine compliance and adherence to procedures, instructions, specifications, norms and standards, and administrative work programs and other applicable documents, as well as the effectiveness of their implementation. |
| **Author supervision** | A function of the design contractor, large equipment manufacturer in the process of technical services rendering, providing proper work implementation in accordance with the design and requirements. The adoption and implementation when changes are necessary |
| **Availability** | The property of an item to be able to perform intended function under predetermined conditions at a given time or for a predetermined time interval, providing the necessary external resources supply |
| **Barrier** | An obstruction that prevents the release of radionuclides into the environment. Barriers are leak-tight enclosures of the facilities and storages, equipment and pipelines containing radioactive waste, physical and chemical form of conditioned radioactive waste |
| **Beyond Design Basis Accident** | An accident caused by initial events that have not been considered for design basis accidents or accompanied with extra (as compared to design basis accidents) failures of safety systems in exceedance of a single failure, erroneous decisions of the personnel |
| **Boundary of interaction** | The boundary of the division of responsibilities and activities within one organization, between a group of persons and other organization and group of persons. It includes both external co-operation boundary, which is the boundary dividing the work of various organizations, and the internal one dividing design assemblies of the same organization |
| **Check** | An activity aimed at revision, inspection, testing, verification, auditing and other ways to determine and document the compliance of components, processes, services or documents to the established requirements |
| **Commissioning** | Process by which installed plant assemblies and systems start operation and their compliance with the design documents and operating parameters is checked. This process includes both fuel-related tests and non-fuel related tests |
| **Compulsory population evacuation measures planning zone** | An area of anticipated radiation exposure in case of beyond design basis accidents within which during the initial period of a radiological accident the upper level of the dose criterion for the compulsory evacuation of the critical group of the population established by the existing radiological safety regulations can be achieved or exceeded |
| **Controlled access area** | An area of the NPP site where the impact of radiation factors is possible during normal operation of the NPP |
| **Core** | A part of the reactor where nuclear fuel, moderator, absorber, coolant, reactivity control devices and construction elements, used to provide controlled fission chain reaction and energy transmission to the coolant, are placed |
| **Corrective Actions** | The activities that include screening, repair, rework or acceptance with limits for the non-conforming components, and ensure the elimination of reasons that cause the non-conformities (defects), and prevent their repeated occurrence |
| **Corrective maintenance** | Maintenance performed in case of a failure in order to restore the item to its normal operation |
| **Critical group** | A group from among the public (at least 10 persons) which is homogeneous in one or more characteristics - gender, age, social and professional conditions, place of residence, diet, which is subjected to the greatest radiation exposure on the path of radiation from a radiation source |
| **Principal** | Nuclear Power Plant Department of the Atomic Energy Organization of Iran (NPPD Co) |
| **Data** | Presentation of different information in a form that allows to automate its collection, storage and further processing |
| **Database** | A collection of interrelated data with a minimum redundancy which allows their optimum use for one or more applications in a particular field of human activity |
| **Decommissioning** | Complex of measures taken after removal of nuclear fuel that rules out the use of the power unit as an energy source, and ensuring the safety of the personnel, the population and the environment |
| **Decontamination** | Removal or reduction of contamination from any surface or medium |
| **Defect** | Non-compliance of values of any parameter or characteristics of the equipment with the established requirements |
| **Design Basis Accident** | An accident for which the design provides initiating events and final states, safety systems are provided, which, taking into consideration the single-failure principle of safety systems or one personnel error that does not depend on the initiating event, limit its consequences within the limits established for such accidents |
| **Design Documents** | A set of required documents approved according to an established procedure that include drawings, calculations, mock-ups, diagrams, justification of the adopted decisions, etc. |
| **Design limits** | The values of parameters and characteristics of the condition of systems (elements) and the NPP as a whole established in the design for normal operation and disturbances, including pre-emergencies and accidents, established limits of radiation exposure of the personnel, the population and the environment |
| **Design organization** | An organization that executes the design of equipment or individual assembly components and piping parts |
| **Diagnostics** | Technical observation of systems (elements) in order to determine and/or predict the capability to perform intended functions, using predetermined values of parameters or features |
| **Direct failure cause** | A phenomenon, process or condition disrupting the normal process (e.g., vibration of piping, operating personnel errors in safety features, change in insulation resistance, etc.) |
| **Discharge** | Release of a substance (or mixture of substances) in the gaseous and (or) aerosolized phase into the environment (atmosphere) from the emission sources |
| **Document control** | The procedures to control the preparation, inspection, publication and storage of documents, including calculations, ordered specifications, technical provisions, instructions, procedure, drawings with amendments related to the activities that have an impact on quality |
| **Document maintenance** | The process of document management that includes implementation, defining the terms of start and stop of use, reproduction, completing workplaces and making the personnel aware of documents, analysis of the documents in force related to new, making amendments, putting special marking of uncontrolled copies, storage, controlling the validity period, replacement of obsolete documents, destruction of invalid copies, transfer of documents to the NPP archives, destruction of documents that shall not be kept |
| **Document(ation)** | Written or visual information that describes, defines, establishes, conveys or certifies types of activities, requirements, methods or results |
| **Documents Verification** | The process of technical accuracy confirmation and correctness of records execution |
| **Dose in an organ or tissue** | Average absorbed dose in a certain organ or a tissue of a human body |
| **Emergency Control Room** | A part of an NPP power unit located in a room provided for by the design and intended to safely switch the NPP power unit into subcritical cooled state and keeping it in this state for an indefinite time, actuation of safety systems and obtaining information on the reactor condition in case of the MCR failure |
| **Emergency operating procedures** | Procedures that determine the operating personnel activities required for the elimination of transient processes and emergency situations that cause power unit parameter exceedence, reactor emergency protection system and safety systems trip set points |
| **Emergency protection** | A safety function which means a quick switching of the reactor core to a subcritical state and maintaining it in a subcritical state |
| **Engineering documentation** | A set of documents required and sufficient for direct use at each stage of the product life cycle  Note: The engineering documentation includes documentation for equipment and process documents, technical task for development of products, etc. The engineering documentation can be divided into source, design, working, and information documents |
| **Engineering documents (documentation)** | Graphic or text documents that, individually or collectively, define the composition and structure of an item and contain the necessary data for its development or manufacture, control, acceptance, operation and repair |
| **Equipment failure** | An event of disturbance of the operational condition of equipment |
| **Equipment reliability** | Equipment capacity to maintain continuous operable state |
| **External effects** | Effects of natural phenomena and human activities, including earthquakes, high and low levels of surface and underground waters, storms, accidents on land and water transport etc., which are characteristic of the NPP site |
| **Fire safety arrangements** | A set of standards of behavior for people, rules of work and facility operation aimed at ensuring its fire safety |
| **Fire Safety Rules** | A set of provisions that establish the procedure for complying with the fire safety requirements and standards when operating a facility |
| **Fire-Fighting Operations Plan** | The document that provides for the organization of the fire-fighting activities and performance of the necessary process steps on installations |
| **Goasatomnadzor of Russia** | Federal body of state safety regulation in atomic energy use in Russia |
| **Harmful production factor** | Production factor that can affect a person working in specific conditions and can result in disease, performance impairment and (or) adverse health effects of the offsprings |
| **Health safety** | A safety system that ensures the safety of the personnel's life and health in the course of the labor activities, including legal, socioeconomic, organizational and technical, sanitary and hygiene, medical preventing, after-treatment and other activities |
| **Incoming inspection** | Inspection of supplier's products supplied to the consumer or the Principal and intended to be used for manufacturing, repairing or operating the products |
| **Incoming inspection** | Inspection of supplier's products supplied to the consumer or the Principal and intended to be used when manufacturing, repairing or operating the products |
| **Independent systems (elements)** | The systems (elements) for which a failure of one system (element) does not result in the failure of another system (element) |
| **Indication** | An information feature of a control system which is intended to display information for the operating personnel using automation tools |
| **Individual dosimetric control** | A component of the radiological safety system that ensures provision of the required information on the personnel external exposure and internal contamination |
| **Inspection** | Measures to control quality during which the compliance of materials, subassemblies, structures, processes and methods with the earlier established quality requirements by means of studying, observation or measurement |
| **Introduction**  **of document** | The process of preparation for implementation of an approved document that includes:  - document reproduction of the required number of copies;  - completing workplaces with it;  - document study, briefing, and/or knowledge testing of the personnel;  - making changes to the existing documentation;  - issuing administrative document establishing its introduction date and measures ensuring compliance with the requirements of the introduced document |
| **Iran Nuclear Regulatory Authority** | Iran Nuclear Regulatory Authority (INRA) is an independent national body within the Atomic Energy Organization of Iran (AEOI) authorized for issuing rules, regulations, guides and conducting the licensing and supervisory processes for issuing licenses and thereby regulating nuclear and radiation safety for siting, design, equipment manufacturing, construction, commissioning, operation and decommissioning of the nuclear industry facilities or specific aspects thereof. INRA is also responsible for the regulation of issues related to national radiation protection and national system of accounting and control of nuclear materials, radioactive substances and physical protection (safeguards). |
| **Iranian Safety Criteria and Requirements** | Guidance safety standards and requirements published by the Iran Nuclear Regulatory Authority |
| **License** | A written permit issued to a licensee by a regulatory authority for performing certain types of activities related to the siting, construction, commissioning, operation or decommissioning of an NPP |
| **Main Control Room** | NPP unit part located in the premises specially provided by NPP design and intended for centralized automated process control implemented by operating management personnel and automation facilities |
| **Main equipment** | Equipment of the BNPP‑2 main installations: reactor plant (RP), steam-turbine plant, turbine generator, and main transformer, whose technical maintenance and repair are performed only when the BNPP‑2 equipment is taken out of service |
| **Maintenance** | A set of operations to maintain operability and serviceability of the facility (systems and elements) in the course of its intended use, in the standby mode, during storage and transportation |
| **Manufacturer** | An enterprise that manufactures equipment and piping, their assembly components and parts |
| **MCR engineering room** | Engineering panels and rooms located outside the area where the MCR operators' stations control is not performed (outside the direct visibility area) |
| **MCR operator** | A person from among the operating personnel who has completed comprehensive training and has been allowed to control a power unit unassisted |
| **Measurement** | Establishing the value of the physical quantity empirically by means of special technical aids |
| **Metrology** | A science for measurements, methods and aids intended to ensure the consistency of measurements, and the ways to achieve the required precision of measurements |
| **National Nuclear Safety Department (NNSD)** | INRA's regulating functions for nuclear installations are performed by the National Nuclear Safety Department (NNSD) that is a subdivision of the Iran Nuclear Regulatory Authority (INRA) |
| **Natural background radiation** | An equivalent dose of ionization radiation created by the cosmic rays and radiation of naturally distributed radionuclides in the top layers of the Earth, lowest atmospheric layers, food products, water and human body |
| **Non-conformity** | A documented deviation from the quality requirements that makes the quality of a product or a service non-conforming or uncertain |
| **Non-conformity analysis** | Identification of reasons for non-compliance in order to take a corrective action |
| **Normal operation** | NPP operation within the operational limits and conditions established by the NPP design |
| **Normal operation systems (elements)** | Systems (elements) designed to perform normal operation |
| **NPP Administration (administrative management)** | NPP managers and other officers authorized by the operating organization for the rights, duties and responsibilities at all stages of NPP construction, commissioning, operation and decommissioning |
| **NPP life cycle stages** | Planning, siting, design, manufacture, construction, commissioning, operation and decommissioning of the NPP |
| **NPP operating experience** | Accumulated collective knowledge on the operation of NPP power units within their full life cycle |
| **NPP physical security** | Technical and procedural safety features intended to provide preservation of nuclear materials and radioactive substances at the NPP, prevent trespassing the NPP site, prevent unauthorized access to nuclear materials and radioactive substances and timely identification and interception of acts of sabotage and terrorism that threaten the NPP security |
| **NPP safe operation limits** | The values of process flow parameters when a deviation may result in an accident |
| **Nuclear and radiation safety of nuclear power station** | NPP capability in normal operation and abnormal conditions, including accidents, to limit radiation exposure to the personnel, the population and the environment within the established limits |
| **Nuclear fuel** | Any material capable of producing energy through self-sustained chain of nuclear fission processes |
| **Nuclear materials** | The materials that contain or are capable of reproducing nuclear fission substances |
| **Nuclear Power Plant (NPP)** | A nuclear power plant intended for electricity production [without the temporary structures (including township) and construction machines] |
| **Nuclear power plant water chemistry** | Standards, specifications and operating parameters of BNPP‑2, which determine the state of the coolant and operating media, the formation of deposits on the equipment and pipelines, corrosion of internal surfaces of equipment and pipelines |
| **On-the-job training** | A training period when trainees acquire knowledge and skills required to perform professional duties at the relevant workplace of the Principal's NPP (BNPP‑2) under the direction of the Contractor's Operating Directorate |
| **Operating limits** | The values of the parameters and characteristics of the condition of systems (elements) and the NPP established by the design for normal operation |
| **Operating organization** | The organization that INRA has assigned to perform either by itself or through engaging other companies (organizations) in the activities at all stages of the NPP life cycle, and that has the INRA license for performing such activities |
| **Operating personnel** | The personnel from among managers, specialists and workers who are on duty as part of a shift, and for whom it is permitted to control the NPP processes and/or switching |
| **Operation** | All activities intended to safe achievement of the objective of the NPP construction, including power operation, startups, shutdowns, testing, maintenance, repair, refueling, inspections during the operation or other related activities |
| **Operational capability** | A state of a facility when the value of all parameters that characterize the capability of performing the set functions complies with the requirements of the regulatory technical documents and/or design documents |
| **Operational condition** | A condition of a facility when it complies with all the requirements of regulatory technical documents and/or design documents |
| **Operational Documentation** | Documentation intended to describe, control, monitor and document the operations related to the BNPP‑2 operation |
| **Operational Directorate** | The operating organization created for coordinate work during the design, construction, commissioning and operation during the commissioning of the Bushehr-2 NPP Power Unit 2 (according to the Contract article 17.6 - Operation Subdivision of the Principal for Commissioning period) |
| **Operator documentation** | The documents used by the operating personnel when performing their activates in order to record the events, performed activities, as well as the parameters of the operating mode and the condition of equipment and systems |
| **Organizational documents** | Documents that establish the obligations, authority, relations and their structure for an organization or a type of activities |
| **Organizational Framework** | Distribution of responsibility, authority and relations among managers and workers |
| **Plant Director** | Director of Operational Directorate |
| **Permissible discharge** | The reference level of radionuclide activities removed within a calendar year into the atmospheric air through the ventilation system established for BNNP-2 |
| **Permissible dumping** | The reference level of radionuclide activities removed within a calendar year into the atmospheric air through the ventilation system established for BNNP-2 |
| **Primary circuit** | The circuit, taken together with the pressurizing system, within which the coolant circulates through the core under the operating pressure |
| **Procedure** | A document that regulates the ways and operating procedures that ensures performance of the works, as well as the procedure for and ways to control the work results |
| **Procedure Verification** | An element of procedure introduction process that defines the correspondence between the procedure and its source documents through evaluation of such characteristics as correctness of writing and technical accuracy |
| **Procedure Validation** | Confirmation process of the applicability and correctness of procedures |
| **Product identification** | A procedure that establishes the compliance of the assessed products with the requirements provided for such type of products (in the regulatory or technical documents, product descriptions) |
| **Protection Safety Systems (Elements)** | Systems (elements) intended to perform the functions to prevent or limit damage to nuclear fuel, fuel cladding, equipment and pipelines containing radioactive substances |
| **Protective measures planning zone** | An area around an NPP within which exposure effect is possible in case of beyond design basis accidents and the measures to protect the population provided for by the existing radiological safety regulations are planned. Taking the measures to protect the population is not required outside this area |
| **Certification** | Knowledge and skills assessment of trainees carried out at the training completion. The certification shall be carried out in the presence of the Principal's authorized representative. Certificates are issued upon the qualification results |
| **Qualification** | The level of training of a person included into the NPP personnel, including basic vocational training, professional expertise and skills, as well as work experience, which ensure the quality and safety of NPP operation when performing job duties |
| **Qualified person** | The person who meets the specific requirements and certain conditions, and is officially appointed to perform certain duties |
| **Quality** | The sum of properties and characteristics of a product or a service that make it able to comply with stipulated or assumed requirements |
| **Quality assurance** | Planned or regular activities aimed at providing certainty with respect to an item's or service's compliance with the established quality requirements. This concept is implemented using the Quality Assurance Programme |
| **Quality Assurance Program** | A set of documents for an NPP that have been developed in order to plan and conduct the organizational and technical activities to achieve the required quality of products and services related to the NPP safety, and to confirm that the required quality is achieved and maintained when such activities are performed |
| **Quality control** | The procedures to ensure the quality that allow to control physical characteristics of a material, structure, equipment or a system, control the quality of a material, structure, equipment or a system in compliance with the established requirements |
| **(Quality) records** | Documents that contain objective data on the quality of products or services and the activities affecting the quality |
| **Quality surveillance** | Continuous monitoring and inspection of the condition of procedures, methods, performance conditions, processes, products and services, as well as the analysis of the obtained results as compared to the established parameters in order to confirm that the requirements are complied with |
| **Quality system** | All organizational structure, responsibilities, procedures, processes and resources, that ensure general quality management |
| **Quality system analysis** | Necessary assessment of the quality system and its compliance with the quality policy and new objectives conditioned by changing requirements. This assessment is carried out by the organization management |
| **Radiation accident** | Loss of control over a radiation source caused by equipment failure, incorrect actions of the employees (personnel), natural disasters or other causes which could or have resulted in people exposure beyond the permissible limits or radioactive contamination of the environment |
| **Radiation safety of the population** | A state of protection of the existing and future generations from harmful exposure to ionizing radiation |
| **Radiation survey** | Obtaining information about the radiation situation at a power plant, in the environment and the exposure level of people |
| **Radioactive contamination** | Radioactive substances on surfaces, or within material, in the air, human body or other places, in the amount exceeding the levels established by the radiological safety rules and regulations |
| **Radioactive waste collection** | Placing radioactive waste in special, properly equipped facilities |
| **Radioactive waste disposal** | Safe placement of radioactive waste without the intention to retrieve it again |
| **Radiological accident area** | An area where the occurrence of a radiological accident has been established |
| **Reactor core refueling** | Nuclear-hazardous works at the RP for loading, removing and transporting fuel assemblies (fuel elements), tools impacting the reactivity, and other components that affect the reactivity, for the purpose of their repair, replacement or disassembly |
| **Record**  **(of control/inspection)** | A form for recording the operation mode controlled settings, conditions of systems and equipment |
| **Record** | Information captured on a physical storage media in compliance with the established procedure and format |
| **Registration of documents** | Filing through entering the information about a document or a record into official databases with subsequent marking with an inventory number and registration date that will be put onto its copies |
| **Regulatory Document** | A document defining rules, general principles or properties related to different activities or their results |
| **Reliability** | An item's property to maintain through time and within the specified limits the values of all parameters that characterize the ability to properly function within the set modes and conditions of application, maintenance, storage and transportation |
| **Remote control** | Control over a facility from a distance that can be implemented manually or automatically |
| **Repair** | Works required to recover elements or systems ensuring safety and operational requirements with the design requirements being observed |
| **Responsible personnel (responsible person)** | A manager or a specialist who has been appointed as the person responsible for ensuring and/or controlling the performance of some work (activity) |
| **Root Cause** | The main cause of a non-conformity whose elimination prevents repeated occurrence of the non-conformity or factors/trends that affect the quality of operation |
| **Russian Rostekhnadzor** | The Russian Federal Service for Ecological, Technological and Atomic Supervision |
| **Russian-Iranian Training Advisory Board** | Any joint body consisting of the representatives of both parties established in the course of training needed for personnel selection, examination, appointments, quality assessment, etc. The decision to establish an Advisory Board shall be made by the Heads of the Training |
| **Safe labor conditions** | Working conditions under which the effects of dangerous and harmful production factors are excluded or do not exceed the maximum permissible limits |
| **Safe operating conditions** | The minimal conditions set by the design documents to specify the quantity, characteristics, state of operability, and condition for maintenance of systems (elements) which are critical for safety, with which safe operation limits and/or safety criteria are met |
| **Safety culture** | Qualification and psychological fitness of all persons, for which ensuring NPP safety is a priority aim and inner need resulting in self-consciousness of responsibility and self-control when performing all works affecting safety |
| **Safety function** | A peculiar specific objective and actions that ensure its achievement and aimed at preventing accidents or limiting their consequences |
| **Safety of personnel and population** | Protection of the personnel, the population and the environment against harmful radiation and other harmful effects |
| **Safety signs** | Signs intended to warn workers about a potential hazard, need to use proper protective devices, and also to permit or prohibit certain actions |
| **Safety Systems (Elements)** | Systems (elements) designed to perform safety functions |
| **Safety-related systems (elements)** | Safety systems (elements) and normal operation systems (elements), whose failures impair NPP's normal operation or hinder the elimination of abnormal conditions and can result in design basis and beyond design basis accidents |
| **Sanitary protection zone** | An area around BNNP-2 where the exposure level for people during normal operation of the facility can exceed the established quota limit of the annual population exposure |
| **Scope of tests** | Characteristic of the tests determined by quantity of the objects and kinds of the tests, and also by total duration of the tests |
| **Supervised area** | An area outside the sanitary protective zone for which radiological monitoring is performed |
| **System** | A set of NPP elements intended to perform the pre-set functions |
| **Technical condition** | A condition that in certain moment of time is characterized, under certain environmental conditions, by the parameter values established in the engineering documentation for the element |
| **Temporary modifications (changes)** | Changes in BNPP‑2 design, systems or their components, software and documentation, provided for a limited period of time |
| **Test data** | The values of characteristics, properties of an item and (or) conditions of tests, operating time, and also other parameters recorded during testing and that are used as source values for subsequent treatment |
| **Testing** | Experimental determination of quantitative and/or qualitative characteristics, properties of the tested item as the result of its exposure during operation, item modeling and/or impacts |
| **Testing method** | Organizational and methodological document obligatory for implementation, including the method of tests, means and conditions of the tests, sampling, algorithms to carry out operations to determine one or several interrelated characteristics, properties of the item, a data reporting form and estimate precision estimation, authenticity of the results, and the requirements for safety and environment protection |
| **Testing programme** | Organizational and methodological document being obligatory for fulfillment, establishing the object and objectives of the tests, kinds, sequence and scope of the tests to be conducted, succession, conditions, place and terms to conduct the tests, provision and reporting on them, safety measures when carrying out the tests, and also responsibility for provision and conduct of the tests |
| **Time Schedules** | All documentation which defines the date of execution of certain activities or events related to the NPP operation |
| **Training programme** | A document that defines the required level of knowledge and skills, the list of courses and training modules when training for a specific position, the criteria and ways to assess the knowledge and skills, within one or several training courses |
| **Trials** | Functional testing of systems and equipment |
| **Type of nuclear materials** | Nuclear materials, isotopic composition of which is in a define area. Types of nuclear materials are established by regulatory documents of the nuclear power use control body, which records and controls nuclear materials at the national level |
| **Unserviceable condition** | A condition of a facility when it does not comply with at least one requirement of regulatory technical documents and/or design documents |
| **Verification** | Confirmation through objective evidence that established requirements have been fulfilled |
| **Withdrawal from operation** | The process of final termination of NPP operation |
| **Work site** | The location of continuous or temporary presence of the personnel required for performing operations functions under the conditions of ionization radiation exposure for more than a half of the working hours or two subsequent hours. |
| **Workplace shadowing** | A form of training aimed at mastering and confirming, within the relevant training programme, the ability to perform works at a certain workplace unassisted, especially handling the process equipment of a power plant during its operation. The equipment is handled under direct, continuous and immediate supervision of an instructor |

1. Organizational Structure of Operating Organization
2. Management and Engineering Support Structure, Areas of Focus of Operating Organization

This Chapter 13 of the Bushehr-2 NPP PSAR in accordance with the requirements of the Guideline RG 1.70, confirms that the plans of the operating organization for the operation stage of the Bushehr-2 NPP are implemented or are being implemented.

The operating organization is an organization established in accordance with the Law on Nuclear Power of the Republic of Iran, and recognized by the Atomic Energy Organization of Iran (AEOI) suitable for the operation of a nuclear unit, radiation source or storage facility, and performance of the activities on designing, siting, construction, operation, and decommissioning of the nuclear installation, radiation source or storage facility, as well as other activities on handling nuclear and radiation materials without or with subcontractors. In order to perform such types of operations, the operating organization should have the permissions (licenses) for operation in the field of nuclear power use issued by the Atomic Energy Organization of Iran and the Department for Nuclear Safety of the Iranian Nuclear Regulatory Authority (INRA). Nuclear Power Production and Development (NPPD Co) Company of Iran is such organization.

The operating organization shall perform its management functions on the Bushehr-2 NPP site, to ensure safe and reliable operation of the Bushehr-2 NPP. The operating organization has the authority, financial, material, and other resources which are sufficient for it to perform its functions.

The operating organization shall be fully responsible for the Bushehr-2 NPP safety in accordance with the acts of legislation of the Republic of Iran.

The operating organization is responsible for the division of responsibilities and transfer of authority within the operating organization, development and control over performance of the program of the directorate that meets the requirements for the personnel training.

The operating organization is also responsible for observance of the Quality Assurance Program at Bushehr-2 NPP. The quality assurance includes scheduled and systematic measures which are required to have a firm assurance of the fact that structures, systems, and components perform their respective safety functions.

The policy of the operating organization on assuring the safety of the Bushehr-2 NPP is based on treating safety as the top priority, and managing safety is an integral part of the quality management system. The means used to reach the top level of safety assure high standards (including all the procedures prepared to operate the Bushehr-2 NPP) by finding the most efficient ways to reach them and meet the requirements of legal and regulating bodies.

The management structure, duties, and responsibility for safety have been clearly determined by the operating organization and supporting organizations.

Besides, the recommendations of IAEA were taken into account.

The safety critical operations are determined and planned, and the risks to health and safety are assessed. The permits for performing operations are issued subject to the importance of such operations in terms of safety, and such operations are further monitored. As such permit is issued, the personnel qualification required to perform operations safely and effectively is assessed.

Efficient co-operation and support of the personnel are provided so that the workers could obtain the necessary information, advice and assistance they need; and the experience sharing (feedback) within the organization is provided. The top and medium managers stimulate and maintain the practice (methods) of safe operation performance and adjust unsatisfactory performance methods.

In order to maintain and improve safety standards, the operating organization shall continuously monitor the operations performed to ensure safety. The efficiency of the general safety assurance operation of the organization is assessed by conducting audits and inspections both in-house and by independent agencies to determine the potential for improvement. Following the results of such audits and inspections, adjusting measures are determined and performed to enable continuous improvement.

The operating organization is not relieved from its responsibility due to the independent operation and responsibility of the organizations which perform operations and render services for the Bushehr-2 NPP Power Unit 2, as well as the governmental safety regulation bodies.

In order to ensure the safe operation of the Bushehr-2 NPP Power Unit 2, the operating organization performs the following functions:

1. carries out independently or with the help of other organizations during all the stages of the Bushehr-2 NPP Power Unit 2 life cycle: functions on siting, designing, constructing, commissioning and decommissioning;
2. obtain the licenses and special permits from the respective executive bodies in according to the requirements of the regulatory technical documents for the operations which can be performed only if such documents are available;
3. ensures the safety of the Bushehr-2 NPP Power Unit 2, personnel, and the public, and protecting the environment during all the stages of the Bushehr-2 NPP Power Unit 2 life cycle in accordance with the requirements of the regulatory technical documents and terms and conditions of the license;
4. develops together with the governmental monitoring bodies the special regulating documents on the interaction between the operating organization of the Bushehr-2 NPP Power Unit 2, and governmental supervision and monitoring bodies for specific types of operations as the safety of operations is ensured;
5. ensures the preparation of the Technical specification of safe operation with the help of the Bushehr-2 NPP and RP designers in accordance with the design documents for the Bushehr-2 NPP Power Unit 2 and the Bushehr-2 NPP PSAR and includes them into the package of the documents which are submitted to obtain operation licenses;
6. submits the results of Bushehr-2 NPP Power Unit 2 safety monitoring inspections and regular reports on Bushehr-2 NPP Power Unit 2 safety state to the respective executive bodies;
7. informing the respective executive bodies on all the cases of breaching the limits and conditions for safe operation, and handing over systematized data to them on all the cases of breaching normal operations of safety systems, and safety critical systems and elements;
8. ensures continuous monitoring of all the operations which are critical for Bushehr-2 NPP Power Unit 2 safety;
9. provides Bushehr-2 NPP Power Unit 2 with the necessary financial resources, materials and equipment, regulatory technical resources, regulatory technical documents, and scientific technical support;
10. provides scientific technical support of nuclear power plants, organizing the registration and consolidation of the accumulated experience in operating of the Bushehr-2 NPP-2 Power Unit 2 in the design documents prepared for new NPPs, extending the required finances, and organizing the performance of research and design operations to improve the safety, reliability, and efficiency of the Bushehr-2 NPP Power Unit 2 operation;
11. ensures the development and implementation of the programs for assuring high quality during all the stages of the Bushehr-2 NPP Power Unit 2 life cycle, and for these purposes elaborating the program for assuring high quality, and monitoring the operations of the organizations which perform operations or render services for the Bushehr-2 NPP (survey, design, engineering, research, construction, assembly organizations, suppliers of systems and elements, manufacturers of equipment for the Bushehr-2 NPP, etc.);
12. takes measures to prevent accidents at the Bushehr-2 NPP Power Unit 2 and reduce their consequences, recording and storing nuclear materials and radioactive substances, protecting the environment and monitoring its condition in the sanitary protected zone and monitoring zone;
13. prepares and implements the program for commissioning of the Bushehr-2 NPP Power Unit 2, develops the decisions related to reconstructing, upgrading, and decommissioning of the Bushehr-2 NPP;
14. creates the organization structure which is required to ensure safe operation of the Bushehr-2 NPP Power Unit 2;
15. develops and ensures the performance of the program of the personnel training of the operating organization and Bushehr-2 NPP Power Unit 2, including the assessment of knowledge of rules and standards;
16. organizes for the licensing of the Bushehr-2 NPP Power Unit 2 personnel;
17. ensures the creation of the regulatory nuclear fuel reserve which is required and sufficient to operate the Bushehr-2 NPP Power Unit 2;
18. elaborating the program for handling radioactive wastes, including processing, storing, transporting, and removing radioactive wastes;
19. organizes the shipment of spent fuel from Bushehr-2 NPP Power Unit 2;
20. ensuring the performance of large-scale repairs, replacements, and upgrades of equipment;
21. organizes the physical security and fire protection of Bushehr-2 NPP Power Unit 2;
22. performs the timely collection, systematization, and qualitative analysis of the information on equipment failures and personnel errors;
23. elaborating the radiation protection program to plan any operations related to radiation impact and providing proper radiation monitoring;
24. organizes the operations to reduce individual personnel radiation doses and provide medical aid for the Bushehr-2 NPP Power Unit 2 personnel and population;
25. develops the documents which determine the expected levels of radioactive emissions, as well as the methods and procedures for monitoring and control of such parameters;
26. maintains contacts with governmental bodies and public organizations, organizing the distribution of the information on the Bushehr-2 NPP Power Unit 2 operation in printed media and other mass media;
27. submits the materials and information on the Bushehr-2 NPP Power Unit 2 operation to governmental bodies and public organizations upon their request;
28. participating in adjusting tariffs for electric power for sale;
29. ensures field supervision by the General Designer, Chief Structural Engineer, Scientific Adviser;
30. performs its management functions at the Bushehr-2 NPP Power Unit 2 site to ensure safe and reliable operation;
31. performs other functions of the operating organization provided by regulations related to nuclear power use.
32. The responsibilities of the operating organization at the design, construction and commissioning of the Bushehr-2 NPP Power unit 2
33. **Activities Aimed at Designing and Construction of the Bushehr-2 NPP Power Unit 2**

The operating organization created the NPP Operational Directorate of the Bushehr-2 NPP before the start of construction and installation to coordinate work during the design, construction, commissioning and operation.

The ~~Managing~~ Plant Director is the representative of the operating organization at the Bushehr-2 NPP site. He is responsible for the performance of the functions and duties assigned to him by the operating organization, compliance with the legal requirements and requirements of the Supervisory Authorities of Iran.

The activities of the operating organization during the design and construction of the Bushehr-2 NPP Power Unit 2 are as follows:

1. providing development of regulatory documents for the investment process;
2. preparing the program for maintenance, testing, inspection and examination of safety-related structures, systems and components;
3. co-operating with the state supervision authorities and controlling the design and construction of the Bushehr-2 NPP;
4. arranging for design works in meteorology, geology, seismology, hydrology, demographics and study of the impact on the environment has from the Bushehr-2 NPP Power Unit 2;
5. analysis and coordination of projects at the Bushehr-2 NPP;
6. provision of research and development work in the field of safety, the effective use of investment during the construction of the Bushehr-2 NPP Power unit 2;
7. provision of the development of executive projects on the construction of the Bushehr-2 NPP and expert evaluation of these projects;
8. provision of procurement of materials and equipment;
9. provision of processes of management and control of the progress of construction and installation.

The general contractor of the Bushehr-2 NPP is JSC ASE EC.

1. **Pre-operational activities**
2. The activities of the operating organization during the preparation for the operation of the Bushehr-2 NPP Power unit 2 include the following:
3. effective control over the execution of contractual work on commissioning of the Bushehr-2 NPP Power unit 2;
4. ensuring the development, checks and coordination of the procedure for commissioning of the Bushehr-2 NPP Power unit 2;
5. provision of the development and approval of a package of post-installation and purge programs, commissioning programs for the Bushehr-2 NPP Power unit 2, as well as programs and test methods and operational procedures;
6. development of the procedure for submission to the supervisory authorities of the necessary documentation at the established stages and in accordance with the requirements;
7. development of the necessary documentation for coordinating of activities, taking into account the views of construction, commissioning and operation groups, as well as other participants (employees of design organizations, developers and manufacturers, consulting companies and employees responsible for quality assurance);
8. provision of the readiness of the Bushehr-2 NPP Power unit 2 to carry out works on commissioning of the Bushehr-2 NPP Power unit 2;
9. creation of a warning and emergency response system;
10. provision of the presence in the construction, commissioning and operation groups of trained and qualified employees who have received special permits;
11. receiving and distribution of information and regulatory documentation from regulatory authorities;
12. implementation of measures established by scientific and technical guidance and organizations that carry out state supervision;
13. organization of the practical work of the Main Acceptance Commission, the Operational Commission and the Start-up Management Group;
14. timely consideration and approval of the reporting documentation for commissioning of the Bushehr-2 NPP Power unit 2 and the exchange of documentation with the Main Acceptance Commission, the Operational Commission and the Start-up Management Team;
15. receiving of permits for the physical and energy start-up of the Bushehr-2 NPP Power unit 2;
16. financing of works;
17. The operational directorate of the Bushehr-2 NPP Power unit 2 will ensure to develop the document on the periodic technical maintenance of the equipment of the Bushehr-2 NPP Power unit 2 (technical maintenance and repair documentation).
18. During the preparation for commissioning of the Bushehr-2 NPP Power unit 2, the general program of preliminary testing of the Bushehr-2 NPP Power unit 2 is being developed (the “Commissioning program for the Bushehr-2 NPP Power unit 2”, which contains the description of the volumes and logical sequence of commissioning of the Bushehr-2 NPP Power unit 2.
19. The commissioning process of the Bushehr-2 NPP Power unit 2 includes the following steps, in accordance with the practice of starting up of NPP with VVER-1000 reactors, as well as the practice of NPP operation in the IAEA member countries:
20. Stage A (pre-start commissioning activities):

* substage A-0 (pre-start commissioning activities);
* substage A-1 (equipment tests and run-up);
* substage A-2 (hermetic enclosure testing);
* substage A-3 (reactor plant cold-hot functional test);
* phase A-3.1 ("cold" phase - hydraulic tests and circulation flushing of the primary circuit);
* phase A-3.2 (“hot” phase - hot functional test).
* substage A-4 (revision of the main equipment of the reactor unit);

1. Stage B (Physical startup)

* Substage B-1 (reactor loading with nuclear fuel and tests in under-critical state);
* substage B-2 (achieving critical state of the reactor and testing in a critical state);

1. Stage C (Power startup)
2. Stage D of pilot commercial operation.

* substage D-1 (Subsequent mastering of NPP unit power capacity);
* substage D-2 (Comprehensive testing of the NPP unit at rated power).

During the commissioning of the NPP unit one or more scheduled repairs can be carried out during the implementation of the sub-stage A-3, stages C and D.

The detailed description of the stages is provided in the Chapter 14 of the PSAR.

1. The procedure for the works and the volume of tests at individual stages/sub-stages is determined by the NPP unit commissioning program, stage NPP unit commissioning programs. A complete list of the programs is given in PSAR Chapter 14.
2. Operational procedures, modes, simultaneous operation of system components, periods of recording of results, completion criteria, etc. are identified in the programs and methods of tests of individual systems and equipment of the Bushehr-2 NPP Power unit 2.

The specified programs establish the volume of tests of the systems and elements of the 1, 2 and 3 of safety classes necessary to provide the compliance of the Bushehr-2 NPP Power unit 2 with the design and performance characteristics.

The volume of tests of auxiliary elements, systems and facilities of the 4 safety class is determined by general industrial rules and regulations, standards, industrial programs and factory documentation.

1. The volume of tests of each piece of equipment and systems includes the following items:
2. adjustment works in combination with the construction and installation works and providing individual tests;
3. pre-commissioning of installed equipment;
4. complex testing of equipment and systems.
5. The operational directorate of the Bushehr-2 NPP Power unit 2 ensures the development by the contractor of operational procedures, and this documentation should be validated in the highest possible volume within the commissioning program.

Operational procedures and test procedures should be verified, that guarantees their technical accuracy, as well as validated, that ensures their applicability to the installed equipment and control systems. Verification and validation of procedures are carried out in such a way as to ensure their applicability and quality and, as far as possible, should be performed prior to the beginning of fuel loading at the facility. This process continues during the commissioning stage. General operation procedures are also verified and validated.

1. The main works performed during commissioning of the Bushehr-2 NPP Power unit 2 can be divided into three categories:
2. the works related to the final stage of the construction of the Bushehr-2 NPP Power Unit 2 and installation of the equipment;
3. the works aimed at meeting the requirements of the "Program of Bushehr-2 NPP Power Unit 2 Commissioning";
4. the works related to the operation of the Bushehr-2 NPP Power Unit 2.
5. These works at the Bushehr-2 NPP Power unit 2 are performed by the following organizations:
6. JSC Engineering Company ASE and its subcontractors;
7. JSC Atomtechexport and its subcontractors;
8. JSC Orgenergostroy and its subcontractors;

The representatives of the developers (General Designer, developer of the reactor unit, start-up research engineer) and equipment manufacturers take part in the commissioning of the Bushehr-2 NPP Power unit 2.

To ensure the safe and effective commissioning of the Bushehr-2 NPP Power unit 2, administrative departments of the Bushehr-2 NPP were formed to manage operation, accept completed work, and control and manage the commissioning of the Bushehr-2 NPP Power unit 2. The commissioning of the Bushehr-2 NPP is described in Chapter 14, PSAR.

1. The following organizations carry out general coordination of organizations involved in the commissioning of the Bushehr-2 NPP Power unit 2:
2. The operating organization (NPPD Co.) and its subdivisions;
3. specialized subdivisions of JSC Engineering Company ASE.

The detailed information on the commissioning of the Bushehr-2 NPP Power unit 2, as well as the corresponding pre-commissioning, physical and energy start-up programs with a list of potentially hazardous activities and accident prevention measures are provided in the Chapter 14, PSAR.

1. Prior to the start of operation of the Bushehr-2 NP, the Operational directorate of the Bushehr-2 NPP Power unit 2 ensures to develop of documents for the periodic technical maintenance of the equipment of the Bushehr-2 NPP Power unit 2 (technical maintenance and repair documentation).

This technical maintenance and repair documentation also regulates testing, checks and inspections of structures, systems and equipment important for the safe operation of the Bushehr-2 NPP Power unit 2.

1. The operating organization organizes effective periodic checks, tests and inspections by qualified personnel using the necessary equipment and methods.

Operational limits, conditions and other regulatory requirements of the Technical Specification for Safe Operation are taken into account in the documentation for technical maintenance and repair, testing, checks and inspections. The technical specification also establishes the rules and basic methods for the safe operation of the Bushehr-2 NPP Power unit 2, as well as the general procedure for performance of works related to the safety of the Bushehr-2 NPP Power unit 2.

The technical maintenance and repair documentation should regulate the works on planned technical maintenance and repairs. The works on planned technical maintenance include general technical maintenance and repairs of any category.

The Operational directorate of the Bushehr-2 NPP may involve a specialized organization for the development and implementation of the requirements of technical maintenance and repair documentation, while the Operational directorate is fully responsible for the work transferred to the contract.

1. The Bushehr-2 NPP power unit No. 2 shall be equipped with a main control room (MCR) from which the service staff controls technological equipment of normal operating systems and safety systems during normal operation, disturbance of normal operation conditions and emergencies.

The project justifies sufficiency of the proposed measures to ensure durability, habitability and normal functioning of MCR in control of the Bushehr-2 NPP power unit No. 2 in all modes, including design and off-design basis accidents.

During the MCR design, optimal solutions for HMI systems have been developed. Parameters required for operative provision of the MCR staff with precise information on observance of the limits and conditions of safe operation of the Bushehr-2 NPP power unit No. 2, as well data on identification and diagnostic of automatic activation and functioning of safety systems were selected and are shown in MCR.

The MCR circuit of the Bushehr-2 NPP Power unit 2 was developed on the basis of operating experience of other power units with VVER reactors, as well as modern technologies connected with human factor, ergonomics and warning system. The MCR components and the basic principles for the selection of components, including the types of checks, are described in detail in the Chapter 7 of the PSAR.

1. The program for the selection and training of service personnel of the operational directorate of the Bushehr-2 NPP Power unit 2 for provision of preparedness for the operational stage of the Bushehr-2 NPP Power unit 2 is described in detail in the Section 13.2 of the Chapter 12 of the PSAR and in the Annex I to the Contract.
2. The MCR includes:
3. means of control and management of nuclear fuel fission processes in all modes and in any conditions of the core during normal operation (including the subcritical mode during nuclear fuel reloading);
4. indicators of the position of exposure agents on radioactivity, automatic monitoring of absorber concentrations and status indicators of other factors affecting radioactivity;
5. information support systems for the operator, including systems for operational support of personnel with generalized information on the current safety conditions of Bushehr-2 NPP Power unit 2 as a whole.

Commands of remote control of technological mechanisms, formed by the automatic control system or via the remote key of the MCR panels, are registered automatically.

1. The Bushehr-2 NPP Power unit 2 is equipped with an emergency control room (ECR).

ECR implements the following functions:

1. control of safety systems;
2. bringing the reactor into a subcritical state;
3. keeping the reactor in subcritical state;
4. removing heat from the reactor;
5. monitoring of reactor unit condition.

The independence of the emergency control room from the MCR is provided, the sufficient longevity and viability of the ECR is justified.

The project implements technical solutions designed to eliminate the probability of failure of the MCR and ECR for a common reason.

1. The operational directorate of the Bushehr-2 NPP Power unit 2 is responsible for the timely and high-quality staff training.

The operating organization has developed a program for staff selection, training and licensing. The program determines the schedule of staff recruitment for the Bushehr-2 NPP Power unit 2 in accordance with the staffing table of the operational directorate of the Bushehr-2 NPP Power unit 2, based on the need to prepare and obtain a work permit. The program determines the types and duration of training and establishes positions in the operational directorate of the Bushehr-2 NPP Power unit 2, for which employees need a license. The program provides the completion of the selection, training and licensing phase of personnel prior to the beginning of the operation of the Bushehr-2 NPP Power unit 2. The performance control is imposed to the operating organization.

1. The operating organization should take appropriate measures during the commissioning stage to ensure that maintenance personnel are involved in commissioning as early as possible. The safety culture, for example, a culture of employee involvement should be formed at the pre-operational stages in order to make it the norm at subsequent stages of operation.
2. Depending on the level of influence of certain employees on the safety of the Bushehr-2 NPP Power unit 2 and the implementation of a differentiated approach to organization of training and re-training of employees, the personnel of the Bushehr-2 NPP Power unit 2 is divided into the following main categories:
3. the 1 category of employees - managers, heads of departments, subdivisions, as well as engineers, foremen, quality assurance specialists and instructors;
4. the 2 category of employees - employees engaged in the management of technological processes of the Bushehr-2 NPP Power unit 2 and equivalent personnel in terms of the impact on the safety of the Bushehr-2 NPP Power unit 2;
5. the 3 category of employees - technical staff engaged in operational control and maintenance of equipment and systems of the Bushehr-2 NPP Power unit 2.
6. The training of specialists who are directly responsible for the reliable and safe operation of the Bushehr-2 NPP Power unit 2, is carried out as part of production and technical courses organized on the basis of specialized institutes or universities. The management personnel responsible for the technical management of the operation of the Bushehr-2 NPP Power unit 2 should be licensed in accordance with the requirements of INRA “Requirements for licensing of shift staff of the Bushehr-2 NPP”.

Information on the training of service personnel responsible for nuclear, radiation, and general industrial safety is provided in the Section 13.2 of this Chapter 13 of the PSAR.

Training is carried out directly at the plant in the form of training courses agreed by INRA.

1. All employees from the operational staff whose work is related to safety issues should undergo a medical examination at the time of employment and subsequently at specified intervals so that their health status should correspond to their tasks and job responsibilities. All plant employees who may be exposed to radiation during the work at the Bushehr-2 NPP Power unit 2 should undergo a regular medical examination in accordance with the established procedure:

The primary medical examination solves the following tasks:

1. receiving the baseline data on the state of health of an employee necessary for making a decision on the nature and causes of possible deviations from the norm;
2. personnel whose contact with an ionizing radiation source may cause a risk to health or strengthen and aggravate a previously existing disease should not be allowed to work;
3. persons with contraindications, according to the list of diseases and physical disorders, should not be allowed to work.
4. The employees from among the operating personnel responsible for the safe operation of the Bushehr-2 NPP Power unit 2 should undergo professional, psychological and psychophysical check at the time of hiring and in the case of transfer to another position and then annually. The list of such professions is approved by the operating organization and the health organization.

Professional, psychological and psychophysical checks are carried out by specially trained employees using modern technical means and methods.

1. Personnel training and maintaining the professional level of employees during the subsequent operation of the Bushehr-2 NPP Power unit 2 is carried out on the basis of the training base. The personnel training center carries out initial personnel training, organizes the implementation of training programs.

Employees are trained by specially trained instructors with technical and educational skills, as well as nuclear power plant operating experience. The instructor should have experience in the workplace where he carries out training, as well as psychological and pedagogical training. To maintain his qualifications the instructor should be periodically present at the appropriate workplace during the power unit operation.

The training process is provided with the necessary educational and training materials and technical training tools for the implementation of training programs in full.

1. Work shifts of the contractor’s service personnel should be fully formed before the start of the pre-operational tests. Before proceeding to independent work, service personnel should pass:
2. verification of knowledge of actual rules and regulations of the nuclear industry, instructions on technological processes, production instructions and job descriptions, as well as instructions on labor protection;
3. verification of the performance of duties at the workplace (internship at the workplace under the supervision of a mentor).
4. The operating organization ensures development and approval of the list of necessary start-up documents. Start-up documentation is developed by the Contractor (a subcontractor of JSC Atomtechenergo). The operating organization controls the process of development, coordination and approval of start-up documentation. The composition of the start-up documentation is determined by the List of organizational and technical documentation on organization of work for commissioning of Bushehr-2 NPP Power unit 2. The start-up documentation regulates the works on commissioning of the Bushehr-2 NPP Power unit 2 and establishes the criteria for their implementation. Information on the start-up documentation is presented in the Chapter 12 of the Bushehr-2 NPP PSAR.
5. **Technical support of operation**

The structure of the operating organization should provide the creation of a structural subdivision (group) of technical support of the Bushehr-2 NPP operation which will perform all the administrative, technical and managerial functions necessary to provide the control of material and technical resources and technical maintenance of the Bushehr-2 NPP.

Technical support of the operation of the Bushehr-2 NPP begins at the design stage and continues throughout the life cycle of the Bushehr-2 NPP. It includes technical support of the operation of the systems of the Bushehr-2 NPP Power unit 2 at the time of commissioning, the components of the Bushehr-2 NPP Power unit 2 in case of completion of their installation without completing the installation of the entire system.

The technical maintenance of the Bushehr-2 NPP Power unit 2 is performed in accordance with the documents specified in the List of Maintenance and Repair Manuals of the Bushehr-2 NPP Power unit 2. To perform technical maintenance, the operating organization provides the following resources to the power unit Bushehr-2 NPP Power unit 2:

1. nuclear fuel required for loading and/or reloading of the core and means of nuclear fuel delivery;
2. construction materials, installations, components and machinery of technological equipment;
3. electrotechnical devices, equipment and materials;
4. control and measurement tools, automation tools, their installations and components;
5. chemical reagent required for creation and maintenance of water chemistry conditions of the Bushehr-2 power unit 2;
6. tools and materials necessary to provide radiation safety and protection from radiation;
7. tools, materials, medicines necessary to provide medical assistance to employees of the Bushehr-2 NPP Power unit 2;
8. transportation of technological equipment, mechanisms necessary for the delivery, loading and reloading of nuclear fuel;
9. preparation of spare parts;
10. training of personnel responsible for maintenance and repair;
11. any necessary measures for the modernization of systems, equipment and programs that are needed at the moment of operation and taking into account the operating conditions.
12. **Obligations and Functions of Operating Organization in Operation of Bushehr-2 NPP**

At this stage, the operating organization performs the following functions:

1. according to the established procedure receives a license of state supervisory authorities providing the safety for the NPP operation. Performs the license and terms of its validity, assigns responsible persons, provides the observation of the license validity conditions;
2. in certain cases during the NPP operation it provides preparation of documents for justification of the introduction of changes or expansion of the license conditions;
3. provides the development and coordination of quality assurance programs at the operation stage, including also performance of repairs, modernization of NPP systems and equipment;
4. provides for safe operation of NPP. Establishes the factors of quality of operation and estimated operation of the NPP in accordance with the requirements of safety documentation and the project;
5. provides the compliance with the requirements of legislative acts and regulatory documents on safety, as well as fulfillment of license conditions and instructions of the state safety regulatory authorities responsible for safety;
6. provides the preparation and issue of reports on safe operation of the NPP;
7. informs state authorities, local authorities, supervisory authorities responsible for safety, and the public about the state of the nuclear power plant, following the established procedure;
8. provides continuous analysis and control or changes in the characteristics of the NPP site;
9. provides planning of works on the selection and training of specialists, licensing, issuing of work permits, as well as maintenance and improvement of the skills of the personnel of the operating organization and the nuclear power plant;
10. provides for planning and performance of overhauls, equipment modernization and NPP reconstruction;
11. provides for and controls the works on technical service of constructions, systems, equipment and pipelines and their technical examination;
12. provides the organization and performance of operational control of metal and welded connections of equipment and pipelines, analysis of the results, development and implementation of measures on elimination of the identified defects;
13. provides the radiation control in the NPP premises and in the controlled area, tracking of individual doses of radiation of the NPP personnel and employees of contractors;
14. develops and implements the dose reduction measures;
15. provides the update of operational and technological documentation, its timely actualization, adjustment and scaling;
16. controls the work of supervising and controlling services of the NPP, organizes and carries out inspections and checks of the NPP, as well as issues of work safety provision;
17. provides control of equipment life, including consideration of operating modes and justification of the residual life after the specified equipment life;
18. performs the selection, evaluation and involvement of organizations in the performance of work and rendering of services in accordance with the established procedure, controls their work, determines the procedure and criteria for acceptance of performed work;
19. on the basis of and in accordance with the requirements of safety regulatory documents, determines the procedure for provision to state authorities, local authorities, safety supervisors, as well as other organizations and the public of information about the NPP operation failures;
20. in accordance with the established procedure, transfers the relevant information to independent organizations investigating (or participating in the investigation) the accident and the NPP operation failures;
21. provides the identification of the reasons and conditions that have led to accidents or troubles in the NPP operation, their analysis, development and implementation of measures for elimination of the reasons of disorders and their prevention;
22. keeps records of detected failures in the NPP operation, breaks and failures of equipment and its components, as well as problems of operation of other nuclear power plants. Makes the necessary adjustments to the probabilistic safety analysis and determines the level of risk change due to such problems;
23. provides the IAEA with data on the NPP operation failures in accordance with the established procedure;
24. provides overload safety, examines and approves the core overload cards;
25. organizes and carries out emergency response exercises with the involvement of the necessary resources to eliminate the consequences of an accident, to protect personnel, population and environment. Analyzes and evaluates the exercises, the readiness of the bodies of the organization, resources and means to act in an emergency situation;
26. controls readiness of resources and facilities for elimination of emergency consequences. Determines the procedure and procedures of control of the exercises of personnel behavior in the post-accident period by the NPP administration, including the use of technical means;
27. controls the NPP discharges and emissions into the environment, changes in the background radiation in the control zone, as well as the safe transportation of fresh and spent nuclear fuel, radioactive substances and radioactive waste, conditions of storage facilities and the degree of their filling;
28. fulfills contractual obligations to remove spent nuclear fuel from the NPP to the country of the supplier, as well as all obligations to interact with the IAEA in this regard;
29. organizes and carries out systematic checks and inspections of the NPP safety status, observance of the requirements of safety regulatory documents, license conditions, as well as observance of the instructions of the state supervisory authorities responsible for safety. Takes measures to eliminate any deficiencies, if any. Notifies the safety supervisors on the results of such checks and inspections, as well as the taken measures;
30. provides and creates conditions for carrying out of checks and inspections by the state safety regulatory authorities responsible for safety, takes measures for elimination of identified defects, as well as the reasons and conditions that have led to such defects;
31. analyzes the results of the NPP operation, carries out checks and inspections and draws up relevant reports, including measures to improve the level of safety of the nuclear power plant, reduce personnel radiation doses, discharges and emissions. Transmits such reports to the state supervisory authorities responsible for safety;
32. guarantees the collection, evaluation and study of operating experience of nuclear power plants, including foreign ones, the analysis and application of these data to improve safety and prevent failures during the NPP operation.
33. make technical decisions, if necessary, in conjunction with the National Nuclear Safety Department (NNSD), if necessary (in cases related to safety).
34. Organizational Structure of operating organization
    1. **General description**

The organizational structure of NPPD Co. is developed, areas of responsibility and authorities are set, documented and assigned so that the workers and subdivisions can perform all the required works efficiently, including the works related to quality. All this is achieved on the basis of guidelines of the Chairman of the Board and ~~Managing~~ Plant Director, who is responsible for all technical, functional and administrative issues, and who uses in his/her work assistance of the quality department, management support and development department, planning and systematic development department, engineering department. The structural diagram of the Nuclear Power Production and Development (NPPD Co.) of Iran is presented in the figure 13.1.1.2.1-1.

**General Association**

**Board of directors**

**Vice-President of the Atomic Energy Organization of Iran (AEOI), Plant Director**

**Project managers**

**Management Systems and Nuclear Supervision Service**

**Licensing & Safeguards Department**

**Department for the Contract and Legal Matters**

**Department for the Training and Human Resourcing of Nuclear Power Plants**

Engineering division

Operation Management

Design and Technology Issues Management

Nuclear Safety Issues Management

Technical Support Issues Management

Equipment Supply and Localization Issues Management

Planning and Development division

Planning and Control Issues Management

IT Issues Management

Economy and Budget Issues Management

Scientific Communication and Social Advancement Issues Management

Division for Human Resourcing and Development of Managers

Financial Issues Management

Administrative Issues and Business Logistics Management

Figure 13.1.1.2.1-1 The structural diagram of the Nuclear Power Production and Development (NPPD Co.) of Iran

* 1. **Functions and responsibilities of the Vice-President of the Atomic Energy Organization of Iran, the ~~Managing~~ Plant Director**

The Vice-President of the Atomic Energy Organization of Iran, the ~~Managing~~ Plant Director bears the general responsibility for planning, management and supervision of the design, construction, commissioning, operation and decommissioning, for the safety of nuclear power plants, as well as of provision with the necessary trained personnel within the rules and requirements of AEOI directs and manages the above works through the development of programs for the construction of nuclear power plants, receiving of the necessary licenses from state Regulatory bodies, INRA, and, if necessary, from other state organizations, the conclusion of the necessary contracts and supervision of their implementation in accordance with the laws of the Republic of Iran.

The Vice President of the Atomic Energy Organization of Iran, the ~~Managing~~ PlantDirector, has the following main areas of responsibility:

a) ensure planning, management and control of assessments, selection of site, design, construction, operation, selection of qualified staff and safe decommissioning of NPP;

b) ensure review and preparation of the required proposals in relation to strategies, policies and middle-term and long-term programs for nuclear industry for their submission to relevant management departments;

c) management and control of implementation of strategies, policies and programs of AEOI in compliance with the Company's goals, fulfillment of provisions approved by the Board of Directors and General Association of the Company;

d) ensure preparation of operating programs, annual Budget and financial statement of the company for their submission to the Board of Directors;

e) support and cooperation for manufacturing of equipment, instruments, tools and other means required for nuclear power plants in the country;

f) ensure proper conduction of research and detailed analysis in nuclear power industry, investments, cooperation, management, control, risk acceptance, financial support and loans, trade and commercial activities and any type of transactions, import and export of services, equipment, parts and devices from the nuclear power sector;

g) management and control of investments in production sector, transmission and sale of electrical energy generated by nuclear power plants inside the country and abroad;

h) management and control of financial support and investments, and provision of incentives for performance of research and detailed analyses in the area of transmission of technologies of power plants and nuclear energy facilities;

i) management and control of financial support and investments in the operation, and required research and detailed analysis in development of nuclear fuel for NPP in accordance with all relevant rules and norms;

j) management and control of receipt of credits, loans and financial aid provided by national and foreign sources, provision of bonds and certificate of cooperation, and other methods of receiving financial support through permits from official organizations;

k) ensure supply, development and management and financial resources, including public and other sources, and optimal use of these resources through provision of funds, and circulation of financial resources, management, approval and planning of management of commercial and technical resources, and their allocation in accordance with the policy of the government and AEOI;

l) ensure establishment of connections through execution of contracts with international organizations, national and foreign companies and institutions engaged in nuclear power plants industry for peaceful use of nuclear energy in accordance with the international norms and rules, as well as the rules and norms of the Iranian Nuclear Regulatory Authority;

m) ensure preparation and enactment of the required norms, standards and procedures for corresponding administration of activities/works and optimal use of nuclear power facilities, and their submission to the relevant organizations for approval;

n) ensure support, investments and encouragement of educational and research activities in specialized areas of nuclear industry;

o) ensure training of expert specialists who are required inside the country and abroad, conduction of required on-job training and training courses through execution of contracts for education and on-job training with physical and legal bodies inside the country and abroad within the framework of the current laws;

p) ensure performance of all engineering works, design, construction, installation, disposal and operation of demineralization plant based on nuclear technology, achieved inside the country;

q) ensure conduction of all financial activities, transactions and cooperation with other companies and institutions, the type of activities of which is related to the Company's activities within the framework of the current laws;

r) ensure planning, support and investments in supply of nuclear fuel required for NPP in accordance with the rules and norms;

s) ensure necessary planning and arrangement of proper management of nuclear waste;

t) ensure execution of contracts and control of their subsequent performance in accordance with the rules and norms of the Republic of Iran.

u) management and control of received credits and financial aid from national and foreign sources;

v) ensure the use of proper methods for transfer and stabilization of knowledge in nuclear engineering on the stages of site selection, design, construction, commissioning, operation of NPP and their decommissioning;

w) management and control of development of organization's infrastructure, including qualified and competent trained staff, equipment and other means;

x) ensure organization of "Crisis Management" and provision for required measures in case on an emergency situation in NPP, as well as cooperation with other relevant organizations;

y) to ensure receipt of the required permissions from the government officials, Iranian Nuclear Regulatory Authority and other state organizations, if needed;

z) ensure establishment of connections and cooperation with other countries, organizations and IAEA for construction, operation and transfer of nuclear technology with accordance with the government rules and norms;

aa) ensure provision of funds and taking of proper measures for physical protection of production department, nuclear plants and nuclear materials for NPP;

bb) ensure provision of funds and taking of proper measures for protection of the staff, population and environment from ionizing materials;

cc) management and control of proper conduction of all technical, financial, administrative and HR activities of the company;

dd) ensure creation and efficient functioning of quality assurance system and compliance with the rules of nuclear safety on all stages of construction, operation of NPP, and their decommissioning;

ee) ensure provision of the required means for informing and notification of staff and population, if needed.

* 1. **Functions and responsibilities of the planning and development department**

1. analysis and development of proposals for the vision, policy and medium-term and long-term programs of the nuclear industry;
2. development of the plans for long-term, middle-term and short-term (annual) programs for the NPP, taking into consideration such issues as time management, risk and prime cost, in cooperation with other relevant departments of the company;
3. provision of control, evaluation and revision of approved programs with consideration of the said objectives;
4. provision of planning for stabilization of management of the technology for the NPP development;
5. provision of the development of operational plans for the construction of a new NPP (BNPP 2 and 3) and their timely implementation;
6. carrying out of the analysis and economic evaluation and provision of funds for investments, taking into account the successive plans for the NPP development;
7. proposal of rules and regulations, taking into account the company's policy regarding the NPP development within the framework of established duties;
8. support, management and definition of the financial resources required for NPP development;
9. management of sales of electricity produced by the NPP based on state norms and rules;
10. provision of creation of computerized systems in the Company and all its subdivisions in accordance with the standards, rules and norms;
11. approval of procedures and instructions at the level of Deputy Director for Planning and Systematic Development;
12. provision of timely updating of the documents on the quality system with consideration of changes in the deputy director activities;
13. membership and participation in meetings and committees in accordance with the Company's goals;
14. carrying out of interdepartmental meetings on improvement of the technological process and on definition of the most suitable solutions and control of their execution;
15. participation in the quality audit programs and planning for elimination of discrepancies identified in the course of an audit.
    1. **Functions and responsibilities of the engineering and technical department**

The engineering and technical department organizes its functions and duties on the basis of established requirements and standards, as described below, in this regard, it clarifies, defines and refines its functions and responsibilities within the Iran Nuclear Energy Production and Development Company's management system and does everything depending on it.

The engineering and technical department, which is under the direct control of the Director of the Nuclear Energy Production and Development Company of Iran of Iran, is responsible for:

1. observance at the implementation of engineering and technical actions of norms, rules and standards established by the Organization for Nuclear Regulation of Iran, national and international centers, in order to guarantee the NPP safe and reliable operation, as well as to protect the population and the NPP workers during the NPP service life;
2. determination of the strategy, development of requirements and control of:
   * the NPP design, feasibility study, site analysis, construction, installation, commissioning and decommissioning;
   * nuclear safety, radiation safety, fire safety, industrial safety, environmental monitoring, emergency response planning, risk management at operating NPPs, fuel supply, fuel accounting and control and nuclear-physical calculations, recycling and disposal of nuclear waste;
   * the organization of technical maintenance and repair, the organization of technical support, the organization of the implementation of modifications and upgrades;
   * the transition from the stage of commissioning to the stage of operation, management of planning of outages in the process of operation, improvement of the NPP performance indicators, documentation;
   * the manufacture and supply of the NPP equipment and components during construction, at the stages of commissioning and operation;
3. provision of planning and implementation of:
   * the works on the NPP design and construction;
   * the works on the check of the project and the implementation of modifications;
   * the works on the improvement of structures, systems and components, operating conditions and limits, documents and organizational structures at the NPP, nuclear safety, protection of the population, environment and workers;
   * the works on the improvement of planning and planning methods and management of actions in crisis situations, the supply of equipment, components and consumables, fuel supply, the works connected with the NPP operation;
   * the works on the application of compensatory measures at the NPP on the basis of the inspection of international organizations.
4. conduct technical decisions in required cases and if needed together with the National Nuclear Safety Department (NNSD) (in safety related cases);
   1. **The functions and areas of responsibility of the department of provision and development of managerial personnel**
5. keeping of all financial and related administrative and personnel records;
6. ensuring the observance of company rules and approved administrative and personnel procedures;
7. support and management of costs, funds, resources in national and foreign currency and credits within the approved budget;
8. securing credits for plans and projects within the approved budget;
9. control of financial status of blocks, plans and corresponding projects;
10. development of a reporting system for the provision of financial information and financial accounting and management;
11. responses to requests from the controlling organization on the activities of the deputy director for management support and development;
12. introduction and implementation of the bases of recruitment, procedures and other rules and regulations on personnel issues;
13. hiring of personnel in accordance with the goals of the Company and personnel programs, as well as receipt of corresponding permissions within the framework of the norms and rules.
14. management and control of the assessment of positions and employees in accordance with personnel decisions, norms and procedures;
15. carrying out of organizational assessments and study of activities of the deputy director for management support and development and presentation of proposals on improvement;
16. work with the personnel department, including the issues of well-being, employment, insurance and pensions;
17. support for all administrative and auxiliary services;
18. approval of procedures and instructions at the level of the deputy director;
19. membership and participation in meetings and committees in accordance with the Company's goals;
20. carrying out of interdepartmental meetings on improvement of the technical process and on definition of the suitable strategies and control of their execution;
21. inclusion in the quality audit programs and planning for elimination of discrepancies identified in the course of an audit.
    1. **The functions and responsibilities of the Licensing & Safeguards Department**
22. ensure the performance of all INRA requirements in NPPD Co., NPPs and subcompanies;
23. ensure of timely request/receipt of licenses, registrations, permits from INRA and supervision over provision of their validity conditions for retaining their validity;
24. ensure of removing the conflictions observed in INRA inspections of NPPs;
25. ensure of receiving the NPPs' operator's license in control room;
26. ensure of solving the problems related to the NPP'S safety with coordination of other NPPD departments;
27. ensure the establishment and support the system of accounting for and control of nuclear material;
28. supervision of providing and investigating the NPPs declarations according to additional protocol to comprehensive safeguards agreement (CSA);
29. ensure implementation of CSA on NPPs and coordination with NNSG;
30. awareness of perspective, policies, stated strategies and responsibilities;
31. study guidelines and procedures of NPPD Co., circulars and issued notifications and their accurate performance;
32. planning and coordination of polices, goals, programs and established policies related to the area of expertise;
33. provide the procedures, work instructions and action plans in the relevant department;
34. ensure the performance of quality management requirements and institutionalizing them in the relevant department;
35. programming and necessary measures for effective management of the related employees;
36. participating in committees, internal conferences and meetings;
37. advising the stakeholders in the area of expertise and responding to their questions.
    1. **The functions and areas of responsibility of the Department of contractual and legal affairs**
38. Participation in the preparation and drafting of domestic and international tender documents and the implementation of all processes leading to the conclusion of contracts. Carrying out of domestic and international tenders based on existing rules and regulations and drawing up of contracts based on tender conditions and job descriptions and company standards, observance of the international trade rules and regulations when executing international agreements, as well as internal regulations and procedures when executing local agreements.
39. Check of domestic and international tender documentation for compliance with the terms of the tender and implementation of tender procedures based on domestic and international rules and regulations, ensuring observance before, during and after the contract is fulfilled, of its provisions and the obligations set therein, such as receiving of guarantees from the contractor of the fulfillment of the contract and the guarantee of the advance payment, as well as the transfer of land parcels, comparison of the physical progress of the fulfillment of the contracts with the corresponding financial conditions, enforcement of guarantees, etc.
40. Study, evaluation and determination of the capabilities and effectiveness of Iran and foreign contractors, consultants and suppliers on the basis of existing domestic and international rules and regulations and the execution of contract-related formalities by government bodies and winners of tenders and auctions and proposal and management and tender commission, a qualified contractor for participation in tenders.
41. Study and analysis of prices offered by national and international contractors, manufacturers, suppliers and consultants from the financial and contractual points of view, as well as the analysis and preparation of required reports.
42. Preparation of final variants of letters of intention in relation to national and foreign contracts taking into consideration all relevant procedures, circular letters and laws and receipt of the required permits, as well as execution of formalities related to exchange of contracts;
43. Consideration and approval of invoices issued by contractors, assessment of the cost of new projects proposed by national and foreign contractors, and approval of contractors based on the assessment and approval by consulting engineers and relevant departments, as well as informing of contractors on the results by relevant government bodies.
44. Control of observance of the agreed deadlines, calculation of fines for delays based on the provisions of the contracts in cooperation with the financial department and preparation of detailed reports for the relevant authorities.
45. Clarification and justification of the quality policy for personnel and management and maximization of their participation in quality management, as well as archivation and control of quality records.
46. Preparation and provision of the necessary documents for quality management and taking of the necessary measures to eliminate inconsistencies.
47. Evaluation and provision of an opinion on reports, legal and contractual claims of contractors and consultants, as well as control of the reaction on their claims within the frame of contracts and corresponding rules and norms.
48. Preparation and drafting of protocols, annexes, amendments and agreements during negotiations and meetings in connection with the contracts.
49. Preparation and updating of database on payments to national and foreign contractors, consultants and suppliers.
50. Determination of the need for training the personnel of the Office of legal affairs and contracting. Collaboration and issuing of the necessary instructions to other company managers, related organizations and project managers for the implementation of contracts, including negotiating with contractors under contracts.
51. Control over the negotiations with Iran and foreign contractors, consultants and manufacturers and ensuring that the company's interests are respected.
    1. **The functions and areas of responsibility of the NPP department of training and staffing**
52. Creation of personnel training and personnel management policies for the Nuclear Energy Production and Development Company of Iran, the BNPP and its subsidiaries, and supervision of their introduction and implementation.
53. Planning, training, development and management of personnel work, knowledge management and management of other personnel processes in the Company for the production and development of nuclear energy of Iran.
54. Control over the timely hiring and selection of competent employees in the Nuclear Energy Production and Development Company of Iran, the BNPP and its subsidiaries and taking of other measures to support them.
55. Formation of personnel potential through interaction with national and international organizations, such as the IAEA, the World Association of Nuclear Operators and the Ministry of Science, Research and Technology of Iran to strengthen personnel, including technological cooperation, exchange of work experience, etc.
    1. **The Functions and Responsibilities of Project Managers**
56. to take into consideration the policy of branches and other economic corporations in relation to social and economic goals and policies of countries for preparation of proposals on general middle-term and long-term policies;
57. ensuring the necessary inspections related to the status of government companies in the economic system of the country;
58. ensuring required inspections and mastering of operational and financial systems of branches and provision of corresponding proposals to the relevant companies and government authorities;
59. review and issue of proposals on designs, acts, approvals and other proposed instructions, issued by the ~~Managing~~ PlantDirector in relation to the branches;
60. collection and centralization of information on branches and proposal of consulting services to corresponding ~~Managing~~ PlantDirector;
61. collection of all procedures controlled by the branches and ensuring coordination between them;
62. coordination during issue of approved questions at a Meeting of the Board of Directors, circular letters and orders to the branches.
63. registration of minutes of negotiations conducted by the Board of Directors of branches, and follow-up on their fulfillment;
64. participation in meeting of general assemblies of branches as a secretary;
65. participation in technical and specialized committees arranged by general assemblies of branches for fulfillment of certain tasks;
66. follow-up on implementation of corrective measures in relation to the Articles of Association, duties and changes in the Board of Directors of branches in law enforcement authorities;
67. registration of correspondence between the ~~Managing~~ PlantDirector and the Board of Directors of subsidiaries and branch offices;
68. assessment and analysis of performance of branch offices;
69. control of activities along with the duties that were defined by the Board of Directors or general assembly for the branches;
70. preparation of a design and follow-up on instructions issued by the ~~Managing~~ PlantDirector and the Board of Directors;
71. expert assessment of financial statements of branches and provision of reports on inspection by the General Assembly of the Company;
72. submission of proposals on the reports received in relation to programs of the general assemblies of branch offices;
73. review and control of the company's operations related to the duties of the general assembly, and assistance in the decision making process;
74. evaluation of report provided by the Board of Directors of branches, forwarding of these reports to relevant deputies for review and preparation of proposals, and their subsequent submission to members of the General Assembly of the Company;
75. provision of reports on verification and control of reports of accountant and legal inspector of branches, and presentation of strategies for elimination of identified problems and difficulties;
76. provision of expert consultation to branch offices on financial issues, rules and norms;
77. informing on permission documents,, as well as duties vested on the branch offices by the general assembly;
78. control of implementation of permission documents by a general assembly of a branch office, and evaluation of regular reports on the measures taken with consideration of the duties assigned by the general assembly;
79. participation in interdepartmental meetings on improvements of the process and fulfillment of obligations assigned during meetings;
80. control of preparation of reports on modification and monitoring of company affairs management processes;
81. preparation of documents of the quality system and their updating with consideration of changes in the management's activities;
82. carrying out of public hearings;
83. participation in training courses related to activities of management for improvement of the knowledge level;
84. conduct of the meetings for public hearings.
    1. **Qualification of the operating organization personnel**

The requirements for the qualification of the operating organization personnel are determined by the tasks to be performed by the operating organization. When establishing the requirements for the personnel qualification it should be considered that:

1. during designing, construction, commissioning and operation of the Bushehr-2 NPP, as well as during equipment manufacture, a sophisticated technology is used that is constantly being improved and changing;
2. ensuring the vital processes of the Bushehr-2 NPP at all stages of its life cycle is a complex organizational problem; during transitional processes at the Bushehr-2 NPP, as well as in the event of a critical situation, expert opinions are promptly required from the relevant subdivisions of the operating organization.

It is necessary that the qualifications, training and experience of all operating organization personnel are consistent with its duties and performed work.

The management of the operating organization and leading specialists shall have higher education and practical work experience in subordinate and similar organizations within their job descriptions.

The management personnel and leading experts of the operating organization (NPP SS, USS, RC SS, TC SS, RCE, and TCE) must obtain the license before admission for an independent work.

Particular attention should be paid to training and qualification of managers and specialists involved in solving the issue of ensuring the Bushehr-2 NPP safety and obliged to organize work on overcoming critical situations at Bushehr-2 NPP in case of accidents.

1. The requirements to the operating organization management
   1. **The requirements to the management on engineering and technical support**

A person with a higher technical education and 8-10 years of practical work experience in nuclear power industry in positions with increasing responsibility, of which no less than 4 years at nuclear power stations in positions not lower than the chief (deputy) of the main process division (management, department) is appointed to the position of the head of engineering and technical support. It is allowed to have work experience at thermal power stations, provided that the candidate receive training and on-the-job training in the field of "Nuclear Power Industry" specialization in educational institutions that have the right to conduct appropriate training.

* 1. **The requirements to the management on planning and control issues**

A person with a higher technical education and 8-10 years of practical work experience in nuclear power industry in positions with increasing responsibility, having the skills to carry out planning and contractual work, is appointed to the position of the head on planning and control issues.

* 1. **The requirements to the management on administrative issues and logistics**

A person with a higher technical education and 8-10 years of practical work experience in nuclear power industry in positions with increasing responsibility, having management skills, experience of human resources management, and economic training, is appointed to the position of the head of management on administrative issues and logistics.

* 1. **The requirements operational management**

The persons with a higher technical education and 8-10 years of practical work experience in nuclear power industry in positions with increasing responsibility, of which no less than 4 years at nuclear power stations in positions not lower than the chief (deputy) Quality Management department or chief (deputy) of the main process division (management, department) are appointed to the position of the operational management. It is allowed to have work experience at thermal power stations, provided that the candidate receive training and on-the-job training in the field of "Nuclear Power Industry" specialization in educational institutions that have the right to conduct appropriate training.

1. Operating Directorate of the Bushehr-2 NPP
2. **Organizational Structure of the Bushehr-2 NPP operating Directorate**

To perform work related to safe and reliable operation of Bushehr-2 NPP the Operating organization creates a structural unit directly on Bushehr-2 NPP site - Bushehr-2 NPP Operating Directorate, defines the authority and responsibilities of its administration and supplies it with the required financial and material resources, regulatory documents and scientific and technical support, ensures selection and training of staff, arranges physical and fire protection of Bushehr-2 NPP. The Operating organization carries out continuous control of activities of Bushehr-2 NPP Operating Directorate, aimed at ensuring safety and reliability in operation of Bushehr-2 NPP.

Organizational Structure of the Bushehr-2 NPP operating Directorate is shown in the figure 13.1.2.1.1.

The main goal of Bushehr-2 NPP Operating Directorate is generation of electricity with unconditional provision for safe, reliable, accident-free and economically effective operation of Bushehr-2 NPP.

To achieve the main goal mentioned above the administrative management of Bushehr-2 NPP Directorate ensures management of implementation of engineering and technical activities aimed at fulfillment of the following main goals during Bushehr-2 NPP operation:

1. receipt of permits (licenses) for performance of licensed types of activities in accordance with the current laws of IRI;
2. planning of production activities of Bushehr-2 NPP staff that ensure fulfillment of electricity generation plan;
3. efficient generation and supply of electricity to consumers, maintenance of normal quality of supplied energy, regulated frequency and voltage;
4. ensuring safe, reliable, accident-free operation of equipment, structures, devices of control systems;
5. observance of safe operation limits and conditions of Bushehr-2 NPP;
6. maintenance and gradual enhancement of the degree of safe operation in accordance with the design bases and requirements of current norms, rules and standards on safety, as well as fulfillment of conditions of issued permits;
7. ensuring nuclear, radiation safety, continuous control and forecasting of release of radioactive substances outside of a nuclear plant or facility designed for handling of radioactive waste in case of an accident;
8. preparation and implementation of measures for protection of the staff in case of an accident on the Bushehr-2 NPP power unit 2 in accordance with the requirements of "Emergency plan for Bushehr-2 NPP personnel protection in case of in-plant accident", maintenance of continuous readiness and implementation of the above mentioned "Emergency plan...";
9. ensuring physical protection of nuclear materials, nuclear plant and facilities designed for handling of radioactive waste;
10. preparation, maintenance and enhancement of qualification of the staff, provision for licensing of the staff in accordance with the requirements of regulatory documents;
11. creation and provision for efficient functioning of new and spent nuclear fuel (SNF) handling system;
12. creation and provision for efficient functioning of radioactive waste collection and processing system, development and implementation of radioactive waste handling program;
13. ensuring efficient operation of Bushehr-2 NPP through reduction of production costs, improvement of the efficiency of use of installed equipment, implementation of energy saving measures;
14. implementation and mastering of new equipment, repair and operation technologies, efficient and safe production and labor organization methods, positive experience in NPP operation;
15. collection, processing, analysis, storage of information on failure of equipment and erroneous actions of the staff;
16. investigation of disorders in the Bushehr-2 NPP operation, development and implementation of corrective measures that prevent repeated violations;
17. modernization of equipment based on the results of reliability analysis of its work, performance of regular safety analyses;
18. development of a quality assurance system, ensuring its efficient implementation during operation of Bushehr-2 NPP.

The organizational structure of Bushehr-2 NPP Directorate is presented in the Figure 13.1.2.1-1.

The main principles related to the organizational structure and staff number of the Directorate are as follows:

1. the management structure provides for independence of operation personnel that ensures safe realization of technological process from the administrative personnel in fulfillment of its duties related to operation of Bushehr-2 NPP power unit 2;
2. personnel of MCR (SSU, SSRC, SSTH, **SRO**, **STO**) that ensures safe operation of Bushehr-2 NPP power unit 2 have special permits (licenses) for their activities in accordance with the requirements of regulatory document " Requirements for Obtaining License by Shift Personnel of the BNPP-2” and its document number (INRA- NS-RE-053-35/02-0-Aug.2015);
3. staff of the Bushehr-2 NPP power unit 2 continuously improve their knowledge and experience, undergo training, retraining and qualification enhancement to ensure the required level of qualification during operation of the Bushehr-2 NPP;
4. technological processes have a high degree of automation with wide application of computing equipment for optimization of operation, for calculation of process parameters, production, technical and economic parameters;
5. quality assurance control is implemented on all stages of Bushehr-2 NPP power unit 2 operation;
6. the repair staff of Bushehr-2 NPP power unit 2 carries out maintenance and current repair of equipment; for this purpose Bushehr-2 NPP power unit 2 shall include the required workshops;
7. scheduled repairs of equipment and systems of Bushehr-2 NPP power unit 2 when shutdown for repairs with refueling are carried out by specialized companies on service basis, or specialized repair companies;
8. acceptance of the repaired main and auxiliary equipment is carried out by department personnel of equipment owner in cooperation with M&R department;
9. the scope and the term of the equipment repair are set forth in accordance with special programs and schedule;
10. the Bushehr-2 NPP power unit 2 has implemented around-the-clock duty of operating staff (shift of operating staff), which objectives are:
11. maintaining equipment operation mode in accordance with "Technical specification of safe operation";
12. performance of switching;
13. prevention of accidents and mitigation of their consequences;
14. preparation of equipment for repair works.
15. a structure is provided for operational staff shifts, where the operational staff of a shift is subordinated to the Bushehr-2 NPP shift supervisor in the operational activities;
16. rotation of shift of operating staff is divided into three work periods (morning, night, day), consisting of three days with 8 hours of continuous work in each shift;
17. work conditions of operational and repair staff are similar to the ones in place in NPP in Russia:
18. duration of work day based on forty hour work week;
19. provision of annual vacation.

All operational staff is divided into six shifts. Five shifts are always at work, one shift is in reserve (vacation, illness). Operational staff (NPP SS, SSU, SSRC, SSTH, SRO, STO) who has to receive and execute measures for validity of license (training, practical training at work, piggyback training) is divided into eight shifts. Bushehr-2 NPP Administration arranges the shifts order in such a way that all the staff passes courses and/or advanced training within a year. Duplication must be undergone by NPP operating personnel after training for the position and primary knowledge test or work-break.

The minimum duration of doubling (piggyback training) after primary assessment of knowledge, job and production descriptions should be not less than 12 working shifts.

The duration of piggyback training for operational personnel of NPP, that used to have a break in workflow, should depend on the duration of the break:

* from 2 weeks to 2 months– during one-two working shifts;
* from 2 to 6 months–during three-six working;
* over six months– during not less than 12 working shifts.

Operation Directorate shall perform all activities related to switching, scheduled maintenance, and operation during Commissioning of each Unit according to the relevant documents and instructions submitted by the Contractor and under supervision and responsibility of the Contractor.



Figure 13.1.2.1.1 Organizational Structure of the Operating Directorate of the Bushehr-2 NPP

1. **Organizational Structures and Functions of Main Subdivisions of the Bushehr-2 NPP**
   1. **The Production Department**

The department includes the following units and divisions:

1. process engineering management;
2. shift affairs;
3. reactor management;
4. turbine management.

The structural diagram of the Production Department is presented in the Fig. 13.1.2.2.1.1

  
Fig. 13.1.2.2.1.1 The Structural Diagram of the Production Department

Provides compliance of technical status and operation level of NPP equipment and systems with operational limits and conditions, including conditions of safe work performance, measures on nuclear, radiation, industrial and fire safety during NPP operation. Supervises the work of NPP operating personnel. Supervises the implementation of load-carrying schedules in order to implement the state plan-order on the electric energy output. Arranges development of schedules of NPP equipment operation and check of safety systems, schedules of shutdown, startup of power units, controls their implementation. Arranges analysis of results of the NPP safety systems check. Considers and approves technical solutions, test programs, check methods, schedules of current repairs and major overhauls of the main equipment. Takes decisions on requests for equipment take-down to repairs, which do not require a permission from the power grid dispatcher, accepts equipment after repair and reconstruction. Arranges measures on improvement of technical and economic indicators of equipment operation. Periodically controls the status of workplaces, equipment, operation documentation. Arranges development of technical documentation on equipment operation, investigation of non-scheduled equipment switch-offs and deviations from normal operation, develops measures aimed at exclusion of similar cases. Approves operation instructions and control timeliness of their revision. Arranges work on training and qualification sustainment of NPP operating personnel. Arranges emergency and fire drills. Arranges works on labor protection of subordinate personnel. Participates in consideration of innovatory proposals, elaboration and implementation of labor protection measures reducing effect of ionizing radiation on the personnel. Controls observation of labor protection rules, implementation of necessary measures on environment protection. Ensures supervision of study and improvement of working conditions of NPP personnel. Participates in special assessment of labor conditions. Arranges the work with NPP operating personnel on development of safety culture, strengthening labor discipline, compliance with the labor code, internal labor routine regulations; provides safe labor conditions of the subordinate personnel.

* 1. **The Department of maintenance and repair**

The department includes the following units and divisions:

1. the M&R planning and organization unit;
2. the M&R preparation and provision unit;
3. the unit of M&R of the mechanical equipment of the controlled access zone;
4. the unit of M&R of mechanical equipment of the free access zone.

The structural diagram of the maintenance and repair department is presented in the fig. 13.1.2.2.2.1

  
Fig. 13.1.2.2.2.1 The Structural Diagram of the Department of maintenance and repair

Supervises preparation and organization of repairs, maintenance, improvement of reactor compartment equipment. Provides a high technical level of repair work in accordance with the requirements of the norms and rules and in the field of the use of atomic energy, specifications and other regulatory documents. Participates in the emergency response forces work. Ensures the creation of safe conditions for repair work. Coordinates the repair work performance by all organizations involved in the repair. Provides solution to organizational and technical problems related to repair and improvement of equipment, buildings and structures of the reactor compartment, participates in the resolution of issues related to their reconstruction. Manages the elaboration of prospective, annual and monthly schedules of planned preventive maintenance, plans for the improvement of equipment, controls their implementation. Participates in the work of the commission on the delivery of basic equipment to repair and acceptance from repairs. Manages the application writing for materials, spare parts and equipment, oversees their implementation. Demand for spare parts in a properly time before repairs performance, provision and preparatory arrangements for fixing places for repairs performance. Controls observance of the correct operating conditions of the equipment. Takes part in the preparation of proposals for the improvement of equipment and reconstruction of buildings and structures of the reactor compartment, introduction of new equipment, in elaboration of plans to improve production efficiency. Takes part in the elaboration and implementation of measures to increase the inter-maintenance periods, improve the maintenance quality. Participates in elaboration and implementation of labor protection measures, reducing impact of ionizing radiation on the personnel of the reactor compartment. Controls observation of labor protection rules, implementation of measures on environment protection. Participates in the investigation of the causes of accidents, increased wear and downtime of equipment, takes measures to prevent them. Participates in testing and acceptance of equipment for industrial operation. Participates in the work of the committees for the investigation of injuries occurring during the repair of equipment. Executes established documentation on equipment repair and issues reporting. Controls the repair results, amends and makes changes in passports and relative technical documentation. Ensures training and qualification sustainment of subordinate personnel.

Organize work for achieve permits and special permits in a properly time before repairs performance.

* 1. **The Department of Common Facilities**

The department includes the following units and divisions:

1. chemical engineering management;
2. radioactive waste management;
3. chiller and ventilation management;
4. joint system management.

The structural diagram of the department of common facilities is presented in the Fig. 13.1.2.2.3.1

  
Fig. 13.1.2.2.3.1 The structural diagram of the Department of Common Facilities

Provides compliance of technical status and operation level of common NPP equipment and systems with operational limits and conditions, including safe work, measures on nuclear, radiation, industrial and fire safety during NPP operation. Supervises the work of NPP operating personnel. Considers and approves technical solutions, test programs, check methods, schedules of current repairs and major overhauls of the main equipment. Takes decisions on requests for equipment take-down to repairs, which do not require a permission from the power grid dispatcher, accepts equipment after repair and reconstruction. Periodically controls the status of workplaces, equipment, operation documentation. Arranges development of technical documentation on equipment operation, investigation of non-scheduled equipment switch-offs and deviations from normal operation, develops measures aimed at exclusion of similar cases. Approves operation instructions and control timeliness of their revision.. Arranges work on training and qualification sustainment of NPP operating personnel. Arranges emergency and fire drills. Arranges works on labor protection of subordinate personnel. Controls observation of labor protection rules, implementation of necessary measures on environment protection.

* 1. **The Engineering and Technical Department**

The department includes the following units and divisions:

1. equipment and system performance analysis management;
2. modernization and technical support management;
3. technical control and metal management;
4. calibration laboratory management;
5. building and structure management;
6. technical documents planning management.

The structural diagram of the engineering and technical department is presented in the Fig. 13.1.2.2.4.1

  
Fig. 13.1.2.2.4.1 The structural diagram of the engineering and technical department

Manages the work and implementation of measures for engineering support and modernization of systems and equipment of a nuclear power plant (NPP). Elaborates and implements the promising, annual and monthly plans for the modernization of systems and equipment in accordance with the requirements of existing rules and regulations in the field of the use of nuclear energy. Provides engineering support in the management of operational and emergency modes. Manages the scheduling of modernization of the NPP systems and equipment, the preparation of proposals for the reconstruction of NPP systems and equipment, technical improvement, development of measures to improve production efficiency, and monitors their implementation. Performs work on the analysis of implemented modernization of systems and equipment of the NPP in order to verify compliance with the safety requirements of the NPP. Provides interaction with scientific, design and engineering organizations on the improvement of systems and equipment. Coordinates engineering solutions, process instructions, changes to the operational documentation of the NPP, test programs of newly installed equipment, the program of modernization of the NPP systems and equipment. Manages continued surveillance over the implementation of plans and schedules for the improvement of systems and equipment of the NPP. Manages the elaboration of technical documentation related to engineering support and improvement of systems and equipment of the NPP. Provides the introduction of advanced domestic and foreign experience in engineering support and improvement of systems and equipment of the NPP. Takes measures to provide conditions for the re-equipping of working places. Coordinates the work of subordinate subdivisions of the NPP. Manages the work on preparing and maintaining the qualifications of employees of subordinate subdivisions of the NPP. Controls observation of labor protection rules by the subordinate personnel, implementation of necessary measures on environment protection. Periodically controls the state of workplaces, equipment, operation documentation.

Calibration laboratory management must organized and achieves license to calibrate equipment from authorized organizations.

* 1. **The Department of APCS and Electrical Equipment**

The department includes the following units and divisions:

1. I&R Management;
2. electricity management.

The structural diagram of the Department of APCS and electrical equipment is presented in the Fig. 13.1.2.2.5.1

  
Fig. 13.1.2.2.5.1 The structural diagram of the Department of APCS and electrical equipment

Provides compliance of technical status and operation level of NPP equipment and systems with operational limits and conditions, including conditions of safe work performance, measures on nuclear, radiation, industrial and fire safety during NPP operation. Supervises the work of NPP operating personnel. Considers and approves technical solutions, test programs, check methods, schedules of current repairs and major overhauls of the main equipment. Takes decisions on requests for equipment take-down to repairs, which do not require a permission from the power grid dispatcher, accepts equipment after repair and reconstruction. Periodically controls the status of workplaces, equipment, operation documentation. Arranges development of technical documentation on equipment operation, investigation of non-scheduled equipment switch-offs and deviations from normal operation, develops measures aimed at exclusion of similar cases. Approves operation instructions and control timeliness of their revision. Arranges work on training and qualification sustainment of NPP operating personnel. Arranges emergency and fire drills. Arranges works on labor protection of subordinate personnel. Controls observation of labor protection rules, implementation of necessary measures on environment protection.

* 1. **The Department of Support and Development**

The department includes the following units and divisions:

1. administrative and logistic management;
2. commerce and equipment management;
3. research and development management;
4. planning and resource control management;
5. financial management.

The structural diagram of the Department of support and development is presented in the Fig. 13.1.2.2.6.1

  
Fig. 13.1.2.2.6.1 The structural diagram of the Department of support and development

Ensures efficient work of subordinate subdivisions. Ensures implementation of the functions and tasks assigned to the subdivision, safe conditions of the subordinate personnel’s work.

Conducting tenders, auctions and any other related legal issues. Confirmation of financial statements of contractors.

Conclude and support “employer’s liability insurance contracts” during whole period of operation of facility.

* 1. **The Safety Department**

The department includes the following units and divisions:

1. nuclear safety and fuel management;
2. radiation safety management;
3. environment protection and environmental monitoring laboratory management;
4. emergency conditions planning management;
5. occupational health and industrial safety management.

The structural diagram of the Safety Department is presented in the Fig. 13.1.2.2.7.1

  
Fig. 13.1.2.2.7.1 The structural diagram of the Safety Department

Ensures the safe carrying out of nuclear and radiation hazardous work at the NP. Organizes the development of plans and measures to improve nuclear and radiation safety, protect the environment from radioactive contamination, and monitors their implementation

Takes measures to eliminate violations of the rules and regulations in terms of nuclear and radiation safety and reliability. Organizes the accounting and analysis of violations in the equipment of safety systems and the development of technical solutions aimed at improvement of its reliability. Provides the calculation of loading and the implementation of modes of refueling of fuel assemblies and absorbers in reactors, constant control of the state of fuel elements, the reactor vessel and the internals. Provides optimal use of nuclear fuel, controls compliance with safety regulations in operations with fresh and spent nuclear fuel. Organizes timely ordering of fuel for operating NPP units, accounting and control of nuclear materials and documentation for fuel shipped out of the NPP. Organizes the development and adjustment of the component parts of the process regulations for the operation of NPP units. In the event of a radiation accident, manages the work of the personnel in assessing the emergency. Carries out the organization of labor protection work of subordinate personnel. Organizes work to ensure the preparation and maintenance of staff qualifications of subordinate units of the NPP. Organizes work to ensure the accounting and control of radioactive substances and radioactive waste, quarterly and annual reports from the monitoring of the release of radioactive into the environment. Organization of safe storage and transfer of liquid radioactive waste after decontamination and washings.

Accompany the inspection teams expedited from regulatory body for necessary coordination.

Organizes work with subordinate personnel on the formation of safety culture, strengthening of labor discipline, compliance with the labor code, and internal labor regulations.

* 1. **The Department Human Capital Asset Development and Learning**

The department includes the following units and divisions:

1. Training Management;
2. Training Planning Management;
3. HR Development Management;
4. Simulator Training Management;

The structural diagram of the Department human capital asset development and learning is presented in the Fig. 13.1.2.2.8.1

  
Fig. 13.1.2.2.8.1 The structural diagram of the Department human capital asset development and learning

Organizes work with personnel in accordance with the personnel policy of the enterprise. Provides staffing of the enterprise. Selects personnel, holds interviews with persons applying for a job. Organizes staff training, coordinates work on staff development and development of their business career. Organizes the assessment of the results of labor activity of employees, certification, competitions for filling vacant positions. Together with heads of structural divisions, he/she participates in decision-making on hiring, transfer, promotion, demotion, imposing administrative penalties, and dismissal of employees. Consults managers at various levels on the organization of personnel management. Takes part in planning the social development of the collective, resolving labor disputes and conflicts. Draws up and issues employment contracts, keeps personal files of employees and other personnel documentation.

Organizes work on the training, maintenance and advanced training of nuclear power plant (NPP) personnel. Ensures development of training programs for a position, qualification sustainment programs for NPP personnel and training materials.

Developing and implementation the training programs for update instructors knowledge and scales properly.

Organizes work on public hearing programs in coordination with Principal (NPPD) and legislating organizations.

Conducting exhibitions and providing warning information to public for emergencies.

Performs analysis of the effectiveness and quality of training of personnel of the NPP and the improvement of its training system. Ensures implementation of a systematic approach to training of NPP personnel, arranges on-the-job-training and practical training at NPP for students of educational institutions. Ensures obtaining of licenses (permits) of the state safety regulatory authorities and specialized organizations for NPP personnel training in the NPP training center, observation of license validity conditions. Ensures the operation of technical training aids and the timely implementation of their modernization. Organizes and controls the educational process in the NPP training unit, the development of emergency training programs for NPP personnel using technical training tools and their implementation. Ensures training for a position for the NPP personnel in compliance with the annual plan schedule for work with the personnel. Provides NPP personnel being sent to study in special educational institutions. Participates in arrangement of professional competitions among the NPP employees, performs the work on the training improvement of the NPP personnel, occupational orientation of the young population and implementation of safety culture. Provides interaction with educational institutions on the issues of training, supporting and qualification upgrade of NPP personnel. Arranges the work on study, summarizing and distribution of modern domestic experience on professional training and qualification improvement of NPP personnel. Participates in arrangement and conduct of seminars, conferences and meetings on the training and qualification sustainment of NPP personnel, work of qualification commissions, commissions on investigation of violations in the NPP equipment operation. Ensures correct expenditure of material and financial resources in compliance with the cost estimates approved. Controls observation of labor protection rules by the subordinate personnel, implementation of necessary measures on environment protection. Periodically holds inspection of workplaces of employees of the NPP training unit. Participates in special assessment of labor conditions. Supervises the subordinate personnel.

* 1. **The Fire Department**

The Fire Department provides fire protection for NPP based on a deeply layered approach that takes into account the direct effects of flames, radiated heat and explosiveness and the potential release of hazardous combustion products in a fire and the potential for potential releases of water and other fire extinguishing agents contaminated by fire fighting.

It provides the fire protection compliance function at the plant, which consists in consulting and assisting the management of the nuclear power plant in fulfilling its obligations established by law regarding the prevention, occurrence and elimination of fires and fires in the territory, equipment and technological systems of nuclear power plants in all operating modes.

NPP fire protection is implemented by developing and planning the following activities:

- taking protective measures to minimize the likelihood of a fire;

- ensuring early detection and timely firefighting;

- reducing the consequences of a fire by localizing it within the boundaries of fire zones;

- separation of buildings and premises into fire compartments;

- the use of flame retardant materials.

* 1. **The Department of information and communication technologies**

Manages the development and implementation of projects to improve the management of the production of a nuclear power plant (NPP) based on the use of economic and mathematical methods, modern computer equipment, communications, and new information technologies. Supervises the development of instructions, methodological and regulatory documents related to the information support of the CAM system (coding products, materials, finished products, parts, preparing the necessary reference books, decoders, etc.), organizing the subsystem reference information, ensuring the correctness of the transfer of source data to machine carriers. Ensures the smooth operation of the CAM system and taking of operational measures to eliminate the violations arising in the course of operation. Organizes the control of the timeliness of receipt of primary documents provided for by the document management system, the correctness of their execution, transfer to the appropriate NPP subdivisions, ensures their processing. Analyzes cases of malfunctions in the operation of the CAM system and its subsystems, ensures the development of measures to improve the quality and reliability of the CAM system. Organizes the work on training and sustainment of employees of the information and communication technology department. Supervises the staff of the information and communication technology department.

* 1. **The Department of management and inspection system**

Organizes work to control the provision of nuclear, radiation, industrial, environmental, energy and fire safety of a nuclear power plant (NPP), sanitary and epidemiological well-being of the population, safety when handling nuclear materials and radioactive substances. Supervises the implementation of duties by the NPP personnel to ensure safety and labor protection at all stages of the plant life cycle. Runs employees of subordinate units of the NPP.

Provides functioning and improvement of the NPP quality management system. Guides the work on determination of quality assurance policy, its main directions in compliance with the NPP development strategy and its realization. Arranges and coordinates development of the quality management documents necessary for its functioning and maintenance. Coordinates quality plans development, ensures systematicity of the works conducted. Organizes internal audits of the quality management system and external audits at the suppliers’ quality systems. Participates in preparation and conduct of external and certification audits. Analyzes efficiency of the NPP quality management system. Supervises the work on prevention of the product issue and execution of the works not complying with requirements of standards, specifications and technical conditions, design and technical and process documentation, approved samples (references), conditions of supply and contracts. Organizes the work of the production and technical department, licensing department, quality assurance department, information and communication technology department. Ensuring observing the license validation conditions in each operational activity. All of the “quality assurance activities” shall be changed to “integrated management system activities”. Ensures development and improvement of a technical inspection system in compliance with requirements of the NPP quality management system. Arranges works on strengthening of industrial and process discipline aimed at assurance of necessary quality of works. Supervises control of tests, measurements, parameters of NPP systems and equipment, processes, indicators of environment state and standardization and certification works. Coordinates the work of NPP subdivisions on quality management. Arranges the NPP personnel training in the fundamentals of quality management. Issues reports on the quality management system work and measures on its improvement.

1. **The Duties and Powers of Operational Personnel**

The rights and obligations of management during the operation of the Bushehr-2 NPP should be clearly determined by the operating organization and described in the job descriptions”.

The stipulated job description for the Operational subdivision does not in any way relieve the Contractor from his contractual obligations and responsibilities in accordance with the content of the Contract and its Annexes.

* 1. **~~Managing Director (~~Plant Director~~)~~**

The NPP management is carried out by ~~the chief executive officer -~~ the Plant Director, acting on the basis of the “Provision on the Operational Management of the Bushehr-2 NPP” and in accordance with conditions of the contract concluded with him.

For matters within competence under the contract and the law, the Plant Director shall act on the principles of one-man management.

The Plant Director is the chief administrative officer of the nuclear power plant. He shall be personally responsible for the nuclear safety of the NPP and provide general governance to ensure it.

During temporary absence of the Plant Director (when in business trip, vacation, or disabled) the his duties shall be performed by one of the Bushehr-2 NPP managers who has successfully passed knowledge verification in accordance with established procedure to have the right to substitute the Bushehr-2 NPP director and received the corresponding permit to have the right to substitute the Plant Director. Temporary performance of the duties of the Plant Director by an official who substitutes him is executed by the order on the Bushehr-2 NPP.

Duties: Guides industrial and financial-economic activities of the NPP Provides general guidance on ensuring compliance with requirements for nuclear, radiation, fire, technical and environmental safety of NPP, safe and reliable operation of equipment, facilities systems of NPP control at the stages of siting, design, construction, commissioning, operation and decommissioning of nuclear facilities, as well as during the handling of nuclear materials and radioactive substances. Arranges control for observation at NPP of requirements and conditions of obtained licenses. Exercises rights and duties of the employer in accordance with the law. Provides selection, training and supporting of NPP personnel qualifications.

According to the established order, arranges material and technical support to operation and maintenance of NPP systems, equipment, buildings and facilities. Arranges production and economic activities of NPP based on the application of scientifically proven planning, normative standards of material, financial and labor costs. Arranges development of provisions, instructions, regulations on operation of systems and equipment, programs, schedules of maintenance and repair, tests, checks of safety-important systems and equipment, instructions for accounting and control, programs for nuclear materials measurement in the material balance areas, radioactive substances and radioactive wastes, other organizational and administrative documents related to NPP production activities. Controls implementation of plans of the NPP economic and production activity. Ensures safety of nuclear materials, a nuclear installation, radioactive sources, storage facilities for nuclear material and radioactive substances, and other facilities providing operation of NPP and its subdivisions. Ensures activity of the in-house safety service at the nuclear facilities. Arranges radiation monitoring at NPP, in the sanitary protection area and in the radiation control area, as well as control and accounting of individual exposure of NPP employees. Arranges the work on establishment and development of the material and technical base for the NPP training center and its equipping with technical training aids. Issues an order with observation of the established procedure an individual work permit for NPP employees, including those who received a permit from Rostechnadzor for work in the nuclear power area. Approves the NPP staff schedule, labor protection instructions, provision on NPP subdivisions and job descriptions of NPP employees, reports for accident investigations and occupational diseases. Distributes duties between the NPP chief engineer, its deputies and deputies of the chief engineer. Ensures safe labor conditions and labor protection for NPP employees in compliance with with the law. Arranges timely investigation of industrial accidents and occupational diseases according to the law-established procedure. Ensures, within the scope of its responsibility, development and implementation of personnel protection measures in case of an accident at NPP. Ensures increase of production efficiency, salary payment within the established time frames. Represents interests of the employer during the collective bargaining on development, conclusion and amendment of the collective employment agreement, signs the collective employment agreement under the agreed conditions. Arranges measures on assurance of NPP economic safety. Ensures observation of legitimacy in the NPP activity and in implementation of its economic connections; strengthening of contractual and financial discipline, regulation of social and labor relations. Determines NPP development prospects. Supervises the civil defense and bears responsibility for arrangement and implementation of civil defense measures. Manages emergency works and bears responsibility for works on prevention and elimination of emergencies in the NPP sanitary protection area, activation of an action plan on personnel protection in case of an accident at NPP. Provides measures on mobilization training, mobilization, civil defense, localization of emergencies in compliance with the law. Arranges implementation of requirements of the safety regime, preservation of information presenting the state, business and commercial secret. Represents NPP interests in the state authorities, federal authorities of the state supervision in the determined activity field and their regional bodies (inspections), local government bodies and other institutions and public organizations.

Responsibility: Bears personal responsibility for the safety of the NPP. Responsible for the consequences of decisions taken, the safety and efficient use of NPP assets, as well as the production and financial and business results of its activities.

* 1. **Plant Chief Engineer**

Chief Engineer is subordinated to the Plant Director.

During temporary absence of the Plant Chief Engineer (when in business trip, vacation, or disabled) the Plant Chief Engineer’s duties shall be performed by one of the Bushehr-2 NPP managers who has successfully passed knowledge verification in accordance with established procedure to have the right to substitute the Plant Chief Engineer and received the appropriate permit. Temporary performance of the duties of the chief engineer by an official who substitutes him is executed by the order on the Bushehr-2 NPP.

Duties: Determines and implements policy aimed at ensuring safe, reliable and cost-efficient operation of a nuclear plant in compliance with the current regulatory documents, achievement and maintaining of design performance indicators; Organizes and supervises the work to ensure nuclear, radiation, fire, technical and environmental safety of the NPP, environmental protection, improvement of the technical level of operation and efficiency of the NPP, implementation of measures to improve the safety of its operation. Provides uninterrupted supply of electric and thermal energy in accordance with the concluded contracts. Guides generation of measures on the NPP technical development, preparation and performance of works on modernization and reconstruction of systems, equipment, buildings and facilities of NPP. Performs technical control of design, equipment acceptance, progress of installation and commissioning activities of newly commissioned power units, production facilities and objects of NPP. Guides the works on labor protection at NPP. Arranges registration, special assessment of labor conditions. Provides and controls observation by the NPP employees of nuclear power standards and rules, observation of requirements of the safety regulating bodies, environment protection, sanitary and other federal executive authorities supervising the use of atomic energy. Organizes training and maintenance of personnel qualifications of the NPP. Takes measures on improvement of arrangement, labor and management. Arranges research, work on testing of new equipment and technology, expansion of advanced domestic and foreign experience in NPP operation. Provides regular analysis of NPP equipment operation, analysis and the development of the necessary methods to maintain technical and economic indicators at the required level while observing safety requirements. Organizes the scheduled maintenance at the NPP. Provides for safe storage and movement of fresh and spent nuclear fuel within the NPP, nuclear materials control and accounting; Provides safe collection, processing and storage of radioactive waste at the NPP, accounting and control of radioactive substances and radioactive waste. Organizes development and implementation of quality assurance programs for operation and repair of NPP systems and equipment, coordinates the work of subdivisions implementing and controlling implementation of quality assurance programs. Ensures the development and implementation of fire safety requirements, control off observation of the fire-fighting mode and state of fire-fighting equipment, arrangement of fire-fighting drills and practicing fire-fighting plans at NPP. Ensures that the requirements of the terms of licenses are met. Arranges the work on patent and invention, rationalization activities, special assessment of working conditions. Arranges work to investigate the causes of fires, failures in the NPP operation, including the fault of the staff, and analysis of personnel errors. Having plan and forecasts to extend the operating period and, decommissioning plan for BNPP-2/

Equipment and piping systems important for safety should be registered in the NNSD. Preparation of documents for registration can be performed by the Contractor under the control of the Principal -bnunits - owners of this equipment. Plant Chief Engineer is responsible for organization of work on the registration.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Deputy Plant Chief Engineer for operation (Manager Production Division)**

Deputy Plant Chief Engineer for operation(Manager Production Division) is directly subordinate to the Plant Chief Engineer and can perform his functions during his temporary absence (vacation, business trip, etc.) on the basis of an order issued by the director of the Bushehr-2 NPP. The head of the production department must have the qualifications of an equal qualification of the Plant Chief Engineer for the possible performance of his functions.

Deputy Plant Chief Engineer for operationis directly involved in technical issues to ensure reliable, safety operation of the NPP unite while unconditionally observing the safety priority of the NPP operation, in contrast to the duties of the Chief Engineer, who largely performs administrative duties.

Deputy Plant Chief Engineer for operation is a Head of Production Division.

Duties: Provides compliance of technical status and operation level of NPP equipment and systems with operational limits and conditions, including conditions of safe work performance, measures on nuclear, radiation, industrial and fire safety during NPP operation. Supervises the work of NPP operating personnel. Supervises the implementation of load-carrying schedules in order to implement the state plan-order on the electric energy output. Arranges development of schedules of NPP equipment operation and check of safety systems, schedules of shutdown, startup of power units, controls their implementation. Arranges analysis of results of the NPP safety systems check. Considers and approves technical solutions, test programs, check methods, schedules of current repairs and major overhauls of the main equipment. Takes decisions on requests for equipment take-down to repairs, which do not require a permission from the power grid dispatcher, accepts equipment after repair and reconstruction. Arranges measures on improvement of technical and economic indicators of equipment operation. Periodically controls the status of workplaces, equipment, operation documentation. Arranges development of technical documentation on equipment operation, investigation of non-scheduled equipment switch-offs and deviations from normal operation, develops measures aimed at exclusion of similar cases. Approves operation instructions and control timeliness of their revision. Arranges development and approval of provisions on NPP production subdivisions and job descriptions of subordinate personnel. Arranges work on training and qualification sustainment of NPP operating personnel. Arranges emergency and fire drills. Arranges works on labor protection of subordinate personnel. Participates in consideration of innovatory proposals, elaboration and implementation of labor protection measures reducing effect of ionizing radiation on the personnel. Controls observation of labor protection rules, implementation of necessary measures on environment protection. Ensures supervision of study and improvement of working conditions of NPP personnel. Participates in special assessment of labor conditions. Arranges the work with NPP operating personnel on development of safety culture, strengthening labor discipline, compliance with the labor code, internal labor routine regulations; provides safe labor conditions of the subordinate personnel.

* 1. **Head Technical & Engineering Division (Deputy Plant Chief Engineer for Technical & Engineering Support)**

The Head Technical & Engineering Division (Deputy Plant Chief Engineer for Technical & Engineering Support) is directly subordinate to the Plant Chief Engineer.

Main responsibilities:

Manages the work and implementation of measures for engineering support and modernization of systems and equipment of a nuclear power plant (NPP). Elaborates and implements the promising, annual and monthly plans for the modernization of systems and equipment in accordance with the requirements of existing rules and regulations in the field of the use of nuclear energy. Provides engineering support in the management of operational and emergency modes. Manages the scheduling of modernization of the NPP systems and equipment, the preparation of proposals for the reconstruction of NPP systems and equipment, technical improvement, development of measures to improve production efficiency, and monitors their implementation. Performs work on the analysis of implemented modernization of systems and equipment of the NPP in order to verify compliance with the safety requirements of the NPP. Provides interaction with scientific, design and engineering organizations on the improvement of systems and equipment. Coordinates engineering solutions, process instructions, changes to the operational documentation of the NPP, test programs of newly installed equipment, the program of modernization of the NPP systems and equipment. Manages continued surveillance over the implementation of plans and schedules for the improvement of systems and equipment of the NPP. Manages the elaboration of technical documentation related to engineering support and improvement of systems and equipment of the NPP. Provides the introduction of advanced domestic and foreign experience in engineering support and improvement of systems and equipment of the NPP. Takes measures to provide conditions for the re-equipping of working places. Coordinates the work of subordinate subdivisions of the NPP. Manages the work on preparing and maintaining the qualifications of employees of subordinate subdivisions of the NPP. Controls observation of labor protection rules by the subordinate personnel, implementation of necessary measures on environment protection. Periodically controls the state of workplaces, equipment, operation documentation.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head Maintenance & Repairs Division (Deputy Plant Chief Engineer for Maintenance & Repairs)**

The Deputy Plant Chief Engineer for Maintenance & Repairs is directly subordinate to the Plant Chief engineer.

Main responsibilities:

Supervises the preparation and organization of repairs, maintenance, improvement of equipment of the nuclear power plant (NPP). Provides a high technical level of repair work in accordance with the requirements of the norms and rules and in the field of the use of atomic energy, specifications and other regulatory documents. Ensures the creation of safe conditions for repair work. Coordinates the repair work performance by all organizations involved in the repair. Provides a solution to organizational and technical problems related to the repair and improvement of equipment, buildings and structures of the NPP, participates in the resolution of issues related to their reconstruction. Organizes the elaboration of prospective, annual and monthly schedules of planned preventive maintenance, plans for the improvement of equipment, oversees their implementation. Organizes the execution of contracts for the maintenance of equipment, buildings and structures of the NPP, signs contracts and estimates for the performance of maintenance in an economic and contractual manner. Participates in the work of the commission on the delivery of basic equipment to repair and acceptance from repairs. Provides for the manufacture of spare parts, repair equipment and other devices for the repair of equipment by personnel of the NPP, as well as the placement of orders for their manufacture at other factories. Provides a rational expenditure of materials and spare parts during maintenance. Organizes the application writing for materials, spare parts and equipment, oversees their implementation. Manages the elaboration of regulatory documents on the maintenance of equipment, processes for typical and non-standard repairs, consumption rates of spare parts, equipment and materials. Organizes the writing and execution of the reporting documentation on the equipment maintenance. Takes part in the preparation of proposals for the improvement of equipment and reconstruction of buildings and structures of the NPP, the technical improvement, in the elaboration of plans to improve production efficiency. Supervises the development and implementation of measures to increase the inter- maintenance periods, improve the maintenance quality. Provides accommodation for NPP maintenance and repair personnel and employees of contracting organizations in work centers. Performs work to improve the organization of labor, the development and implementation of new progressive methods of repair, the restoration of parts, components and mechanisms, the implementation of mechanical equipment. Participates in the elaboration and implementation of labor protection measures, reducing the effects of ionizing radiation on NPP personnel. Controls observation of labor protection rules, implementation of measures on environment protection. Supervises work on the study and improvement of working conditions of personnel for maintenance and repair of NPP. Participates in the work of the committees for the investigation of accidents and injuries occurring during the repair of equipment. Takes measures to reduce the labor intensity of repair service, increase labor productivity, elaborate and implement progressive standards of equipment repair time. Monitors compliance of the maintenance and repair personnel of the NPP with the requirements of the rules, regulations, instructions and standards for the repair methods. Provides training and sustainment of qualifications of personnel for maintenance and repair of the NPP.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head APCS and Electricity Division (Deputy Plant Chief Engineer for APCS and Electricity)**

The duties of the Deputy Plant Chief Engineer for APCS and Electricity include:

Provides compliance of technical status and operation level of NPP equipment and systems with operational limits and conditions, including conditions of safe work performance, measures on nuclear, radiation, industrial and fire safety during NPP operation. Supervises the work of NPP operating personnel. Considers and approves technical solutions, test programs, check methods, schedules of current repairs and major overhauls of the main equipment. Takes decisions on requests for equipment take-down to repairs, which do not require a permission from the power grid dispatcher, accepts equipment after repair and reconstruction. Periodically controls the status of workplaces, equipment, operation documentation. Arranges development of technical documentation on equipment operation, investigation of non-scheduled equipment switch-offs and deviations from normal operation, develops measures aimed at exclusion of similar cases. Approves operation instructions and control timeliness of their revision. Arranges development and approval of provisions on I&C and Electric equipmnet subdivisions and job descriptions of subordinate personnel. Arranges work on training and qualification sustainment of NPP operating personnel. Arranges emergency and fire drills. Arranges works on labor protection of subordinate personnel. Controls observation of labor protection rules, implementation of necessary measures on environment protection.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head Common Facilities Division (Deputy Plant Chief Engineer for Common Facilities)**

The Deputy Plant Chief Engineer for Common Facilities for common facilities is directly subordinate to the Plant Chief Engineer.

Provides compliance of technical status and operation level of common NPP equipment and systems with operational limits and conditions, including safe work, measures on nuclear, radiation, industrial and fire safety during NPP operation. Supervises the work of NPP operating personnel. Considers and approves technical solutions, test programs, check methods, schedules of current repairs and major overhauls of the main equipment. Takes decisions on requests for equipment take-down to repairs, which do not require a permission from the power grid dispatcher, accepts equipment after repair and reconstruction. Periodically controls the status of workplaces, equipment, operation documentation. Arranges development of technical documentation on equipment operation, investigation of non-scheduled equipment switch-offs and deviations from normal operation, develops measures aimed at exclusion of similar cases. Approves operation instructions and control timeliness of their revision. Arranges development and approval of provisions on General Plant Objects subdivisions and job descriptions of subordinate personnel. Arranges work on training and qualification sustainment of NPP operating personnel. Arranges emergency and fire drills. Arranges works on labor protection of subordinate personnel. Controls observation of labor protection rules, implementation of necessary measures on environment protection.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head of Safety Division (Deputy Plant Director for Safety)**

The Deputy Plant Director for Safety is directly subordinate to the Plant Director.

Ensures the safety of nuclear and radiation hazardous work at the NPP. Organizes the development of plans and measures to improve nuclear and radiation safety, protect the environment from radioactive contamination, and monitors their implementation. Takes measures to eliminate violations of the rules and regulations in terms of nuclear and radiation safety and reliability. Organizes recording and analysis of violations in the operation of safety equipment and the development of engineering solutions aimed at improving its reliability. Provides the analysis of loading and the implementation of modes of refueling of fuel assemblies and absorbers in reactors, continuous monitoring of the state of fuel elements, the reactor vessel and the internals. Provides optimal use of nuclear fuel, monitoring compliance with the requirements of safety rules for operations with fresh and spent nuclear fuel. Organizes timely ordering of fuel for operating NPP units, nuclear materials control and accounting and preparation of documentation for fuel shipped out of the NPP. Organizes the development and adjustment of the component parts of the process regulations for the operation of NPP units. In the event of a radiation accident, manages the work of the personnel in assessing the emergency. Arranges works on labor protection of subordinate personnel. Arranges development and approval of provisions on Safety subdivisions and job descriptions of subordinate personnel. Arranges work on training and personnel qualification sustainment of subordinate NPP subdivisions. Arranges work on accounting and control of radioactive substances and radioactive waste. Arranges work with subordinate personnel on development of a safety culture, strengthening labor discipline, compliance with the labor code, and internal work regulations.

Ensure adequate protection of the health and safety of workers, members of public and the environment from harmful effects of ionizing radiation.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head Support and Development Division**

Ensures efficient work of subordinate subdivisions. Ensures implementation of the functions and tasks assigned to the subdivision, safe conditions of the subordinate personnel’s work.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head Human Resources and Training Center**

Organizes work with personnel in accordance with the personnel policy of the enterprise. Provides staffing of the enterprise. Selects personnel, holds interviews with persons applying for a job. Organizes staff training, coordinates work on staff development and development of their business career. Organizes the assessment of the results of labor activity of employees, certification, competitions for filling vacant positions. Together with heads of structural divisions, he/she participates in decision-making on hiring, transfer, promotion, demotion, imposing administrative penalties, and dismissal of employees. Consults managers at various levels on the organization of personnel management. Takes part in planning the social development of the collective, resolving labor disputes and conflicts. Draws up and issues employment contracts, keeps personal files of employees and other personnel documentation.

Organizes work on the training, maintenance and advanced training of nuclear power plant (NPP) personnel. Ensures development of training programs for a position, qualification sustainment programs for NPP personnel and training materials. Performs analysis of the effectiveness and quality of training of personnel of the NPP and the improvement of its training system. Ensures implementation of a systematic approach to training of NPP personnel, arranges on-the-job-training and practical training at NPP for students of educational institutions. Ensures obtaining of licenses (permits) of the state safety regulatory authorities and specialized organizations for NPP personnel training in the NPP training center, observation of license validity conditions. Ensures the operation of technical training aids and the timely implementation of their modernization. Organizes and controls the educational process in the NPP training unit, the development of emergency training programs for NPP personnel using technical training tools and their implementation. Ensures training for a position for the NPP personnel in compliance with the annual plan schedule for work with the personnel. Provides NPP personnel being sent to study in special educational institutions. Participates in arrangement of professional competitions among the NPP employees, performs the work on the training improvement of the NPP personnel, occupational orientation of the young population and implementation of safety culture. Provides interaction with educational institutions on the issues of training, supporting and qualification upgrade of NPP personnel. Arranges the work on study, summarizing and distribution of modern domestic experience on professional training and qualification improvement of NPP personnel. Participates in arrangement and conduct of seminars, conferences and meetings on the training and qualification sustainment of NPP personnel, work of qualification commissions, commissions on investigation of violations in the NPP equipment operation. Ensures correct expenditure of material and financial resources in compliance with the cost estimates approved. Controls observation of labor protection rules by the subordinate personnel, implementation of necessary measures on environment protection. Periodically holds inspection of workplaces of employees of the NPP training unit. Participates in special assessment of labor conditions. Supervises the subordinate personnel.

Obtain a license (qualification certificate) from authorized legal authorities for training of the nuclear power plant personnel as an authorized training center.

Updating the training materials based on the latest operational experiences and accidents/ incidents feedback in nuclear power plants.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head Information and Communication Technology Management**

Manages the development and implementation of projects to improve the management of the production of a nuclear power plant (NPP) based on the use of economic and mathematical methods, modern computer equipment, communications, and new information technologies. Supervises the development of instructions, methodological and regulatory documents related to the information support of the CAM system (coding products, materials, finished products, parts, preparing the necessary reference books, decoders, etc.), organizing the subsystem reference information, ensuring the correctness of the transfer of source data to machine carriers. Ensures the smooth operation of the CAM system and taking of operational measures to eliminate the violations arising in the course of operation. Organizes the control of the timeliness of receipt of primary documents provided for by the document management system, the correctness of their execution, transfer to the appropriate NPP subdivisions, ensures their processing. Analyzes cases of malfunctions in the operation of the CAM system and its subsystems, ensures the development of measures to improve the quality and reliability of the CAM system. Organizes the work on training and sustainment of employees of the information and communication technology department. Supervises the staff of the information and communication technology department.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Head Management of Management System and Inspection**

Duties: Organizes work to control the provision of nuclear, radiation, industrial, environmental, energy and fire safety of a nuclear power plant (NPP), sanitary and epidemiological well-being of the population, safety when handling nuclear materials and radioactive substances. Supervises the implementation of duties by the NPP personnel to ensure safety and labor protection at all stages of the plant life cycle. Runs employees of subordinate units of the NPP. Provides functioning and improvement of the NPP quality management system. Guides the work on determination of quality assurance policy, its main directions in compliance with the NPP development strategy and its realization. Arranges and coordinates development of the quality management documents necessary for its functioning and maintenance. Coordinates quality plans development, ensures systematicity of the works conducted. Organizes internal audits of the quality management system and external audits at the suppliers’ quality systems. Participates in preparation and conduct of external and certification audits. Analyzes efficiency of the NPP quality management system. Supervises the work on prevention of the product issue and execution of the works not complying with requirements of standards, specifications and technical conditions, design and technical and process documentation, approved samples (references), conditions of supply and contracts. Organizes the work of the production and technical department, licensing department, quality assurance department, information and communication technology department. Ensures development and improvement of a technical inspection system in compliance with requirements of the NPP quality management system. Arranges works on strengthening of industrial and process discipline aimed at assurance of necessary quality of works. Supervises control of tests, measurements, parameters of NPP systems and equipment, processes, indicators of environment state and standardization and certification works. Coordinates the work of NPP subdivisions on quality management. Arranges the NPP personnel training in the fundamentals of quality management. Issues reports on the quality management system work and measures on its improvement.

Responsibility:

Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

1. **Operational personnel main functions:**
   1. **Plant Shift Supervisor (PSS)**

Duties. Ensures the execution of the dispatching schedule for the generation and supply to consumers of heat and electricity of the established quality. Organizes safe and economical operation of the NPP equipment. Distributes the load over the installations. Supervises the operation of the main electrical circuit, switching operations in the main electrical and plant circuits. Operationally controls the state and modes of operation of the plant equipment, equipment of the main electrical circuit, equipment of the power units, plant communications and alerts. Regulates distribution of common plant resources, auxiliary resources, use of the standby motor and railway vehicles. Controls compliance with requirements of nuclear, radiation, industrial and fire safety by operating personnel during maintenance and operation of the common plant equipment switchovers of the switching boards, preparation of working places. Organizes the repair work, commissioning, testing and acceptance of equipment in operational management. Supervises the testing of plant electrical equipment, switching, checking of protections and interlocks. Takes measures to ensure energy supply of the NPP auxiliaries in case of an accident in the power system and switchgear. Communicates with the duty dispatcher of the power system, the duty dispatcher of higher-level authorities on the issues within his/her scope of work. Evaluates the nature and extent of NPP unanticipated operational occurrences. Takes measures to minimize the consequences of emergency situations and ensure the safety of NPP personnel. Ensures the implementation of emergency plan and fire extinguishing plan at the NPP. Participates in the work of the commission to investigate the causes of emergency situations. Arranges works on labor protection of subordinate personnel. Ensures observation of instructions, rules on regime issues and takes measures on prevention of their violation. Supervises the operational staff of the plant shift, participates in the assessment of knowledge of the operating personnel of the plant shift, conducts briefings to the operational personnel of the shift. Ensures participation of the shift operating personnel in emergency response and fire drills, civil defense activities. Supervises activities of the operational personnel on fire extinguishing prior to arrival of fire brigades to NPP. Organizes the maintenance of operational documentation in accordance with the established procedure. Training and sustainment in accordance with the set requirements. Arranges work with subordinate personnel on development of a safety culture, strengthening labor discipline, compliance with the labor code, and internal work regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Unit Shift Supervisor (SSU)**

Duties. Ensures execution of the dispatching schedule of generation and consumption of heat and electricity of the established quality at NPP. Fulfills the work on observation of conditions for safe and efficient operation of the power unit equipment in compliance with schedules, operation instructions, orders, regulations. Arranges operations on startup, shutdown, changes of operating modes, switchovers of equipment and process systems of the power unit. Controls refueling works. Controls observation by the operating personnel of the rules of radiation, nuclear, general and fire safety during the NPP unit operation. Controls the technical state of the power unit equipment and process systems. Arranges the work on implementation of schedules of trials of control and protection systems of reactors and turbine generators, process, emergency and fire alarms and interlocks. Performs walk downs and inspections of equipment, rooms of the power unit, working places of the unit operating personnel, trials of alarm systems and interlocks of the common unit equipment of NPP. Analyzes the reasons of revealed malfunctions, takes measures for their elimination and informs the operating managers thereon. Ensures preparation of equipment, structures, devices, rooms and sites for repair activities. Controls the progress of repair activities. Performs access of repair personnel to the works on equipment and process systems of the unit according to the work permits and orders. Participates in acceptance of equipment, structures, facilities, rooms and sites after repair. Arranges implementation of actions from the emergency plan and fire extinguishing plan at NPP. Performs initial assessment of nature and scope of emergency. Takes measures on minimization of consequences and safety provision for shift personnel in case of failure in unit operation. Organizes keeping of shift operational documentation in accordance with the established procedure. Supervises the shift personnel of the NPP unit. Arranges works on labor protection of subordinate personnel. Participates in the work of a commission to assess the knowledge of the operating personnel. Ensures participation of the shift operating personnel in emergency response and fire drills, civil defense activities. Training and sustainment in accordance with the set requirements. Participates in special assessment of labor conditions. Arranges work with subordinate personnel on development of a safety culture, strengthening labor discipline, compliance with the labor code, and internal work regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Reactor shift supervisor (RSS)**

Duties. Controls the shift personnel involved in the operation of process equipment and systems of the NPP workshop. Ensures the operation and systems of NPP workshop, compliance with the requirements of codes and standards in the field of use of nuclear energy and operational documentation. Supervises the operation of equipment and systems, ensures the performance of dispatcher’s schedule in accordance with which working places and checked, supervises the compliance with the established modes, the condition of equipment and systems, buildings and facilities, order at working places, maintenance of technical documentation. Reveals defects in the operation of equipment and systems of NPP workshop, takes measures for their elimination by the efforts of the shift personnel or repair divisions of the NPP. In accordance with the established order, performs trial of serviced equipment, regulation, control, alarm and protection systems. Ensures compliance with the rules of transfer to operation of standby equipment. Provides access for the maintenance personnel to works on equipment of the NPP workshop, with the shift personnel involvement makes necessary process operations for maintenance works, arranges equipment preparation for bringing into operation or putting standby. Controls cleaning and decontamination of waste waters, takes measures to prevent the environment contamination. Organizes briefings of the NPP shift personnel concerning safety and correct use of protective means. Keeps operating technical documentation. Organizes the work on training and qualification sustainment of subordinate personnel, controls if they fulfill rules of labor protection, fire safety, nuclear and radiation safety (depending on operation conditions of serviced NPP equipment and systems) and internal labor routine regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Turbine shift supervisor (TSS)**

Duties. Controls the shift personnel involved in the operation of process equipment and systems of the NPP workshop. Provides the operation and systems of NPP workshop, compliance with the requirements of codes and standards in the field of use of nuclear energy and operational documentation. Supervises the operation of equipment and systems, ensures the performance of dispatcher’s schedule in accordance with which working places and checked, supervises the compliance with the established modes, the condition of equipment and systems, buildings and facilities, order at working places, maintenance of technical documentation. Reveals defects in the operation of equipment and systems of NPP workshop, takes measures for their elimination by the efforts of the shift personnel or repair divisions of the NPP. In accordance with the established order, performs trial of serviced equipment, regulation, control, alarm and protection systems. Ensures compliance with the rules of transfer to operation of standby equipment. Provides access for the maintenance personnel to works on equipment of the NPP workshop, with the shift personnel involvement makes necessary process operations for maintenance works, arranges equipment preparation for bringing into operation or putting standby. Controls cleaning and decontamination of waste waters, takes measures to prevent the environment contamination. Organizes briefings of the NPP shift personnel concerning safety and correct use of protective means. Keeps operating technical documentation. Manages the work on training and qualification sustainment of subordinate personnel, controls if they fulfill rules of labor protection, fire safety, nuclear and radiation safety (depending on operation conditions of serviced NPP equipment and systems) and internal labor routine regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Reactor control engineer (RCE)**

Duties. Provides operational control of reactor and its process systems. Ensures safe and economically efficient operation of the reactor plant and auxiliary equipment in accordance with the regulations, operating instructions, orders, schedules.. Controls the progress of the in-core processes, the parameters of the coolant, fuel elements, the position of the absorber rods, the level and rate of change in reactor power, the temperature in the fuel channels, the state of the reactor plant. Performs operations of reactor start-up and shutdown, power ascension and cutback. Performs operational switching on equipment, devices and process systems of the reactor. Performs inspections and testing of reactor control and protection systems, process signaling and interlocks. Analyzes the data of parameter measurements and the results of inspections, trials, tests of the reactor plant and auxiliary equipment. Informs operational management of the NPP about accidents, failures, fires, other violations in the operation mode of the reactor, auxiliary equipment, process systems, and the occurrence of nuclear and radiation hazards. in the event of an emergency, he/she takes measures to ensure the safety of operating personnel, the safety and emergency shutdown of equipment, the localization of the consequences of violations and the restoration of normal operation. Participates in the investigation of the causes of accidents, failures and malfunctions in the equipment operation of the reactor compartment. Training and sustainment in accordance with the set requirements. Takes part in emergency response and fire training, civil defense activities. Keeps operational documentation in accordance with the established procedure. Meets labor protection requirements established by laws and other regulations, as well as rules and regulations on labor protection.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties.

* 1. **Turbine Control Engineer (TCE)**

Duties. Operates turbine and process systems. Ensures safe and economically efficient operation of the turbines and auxiliary equipment in accordance with schedules, manuals, mode maps. Monitors the parameters of steam, water, the process condition and operation of turbines, auxiliary equipment and process systems. Operates start-up, shut-down of equipment and turbine process systems. Performs switching in thermal circuits of turbine units. Participates in operational tests and commissioning work performed at the NPP. Monitors the operation of turbine generators and regulates the load and voltage. Performs inspections and testing of process, emergency and fire alarms, process protections and interlocks. Analyzes the parameters measurement data in the control points, the results of inspections, trials, testing of turbine generators and process systems. Informs operational management of the NPP about accidents, failures, fires and other violations in the mode of operation of turbine units, about the occurrence of nuclear and radiation hazards. in the event of an emergency, he/she takes measures to ensure the safety of operating personnel, the safety and emergency shutdown of equipment, the localization of the consequences of violations and the restoration of normal operation. Participates in the investigation of the causes of accidents, failures and malfunctions in the equipment operation of the turbine units. Training and sustainment in accordance with the set requirements. Takes part in emergency response, fire training and civil defense activities. Keeps operational documentation in accordance with the established procedure. Meets labor protection requirements established by laws and other regulations, as well as rules and regulations on labor protection.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties.

* 1. **Joint Systems Shift Supervisor**

Supervises the shift personnel involved in operation of common plant equipment and systems. Ensures operation of equipment and systems, compliance with requirements of codes and standards in the field of use of nuclear power and operational documentation. Supervises the operation of equipment and systems, ensures the performance of dispatcher’s schedule in accordance with which working places and checked, supervises the compliance with the established modes, the condition of equipment and systems, buildings and facilities, order at working places, maintenance of technical documentation. Reveals defects in the operation of equipment and systems of NPP workshop, takes measures for their elimination by the efforts of the shift personnel or repair divisions of the NPP. In accordance with the established order, performs trial of serviced equipment, regulation, control, alarm and protection systems. Ensures compliance with the rules of transfer to operation of standby equipment. Provides access for the maintenance personnel to works on equipment of the NPP workshop, with the shift personnel involvement makes necessary process operations for maintenance works, arranges equipment preparation for bringing into operation or putting standby. Controls cleaning and decontamination of waste waters, takes measures to prevent the environment contamination. Organizes briefings of the NPP shift personnel concerning safety and correct use of protective means. Keeps operating technical documentation. Organizes the work on training and qualification sustainment of subordinate personnel, controls if they fulfill rules of labor protection, fire safety, nuclear and radiation safety (depending on operation conditions of serviced NPP equipment and systems) and internal labor routine regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Electricity Shift Supervisor**

Duties: Supervises the shift personnel involved in operation of electrical equipment and systems of the NPP workshop. Ensures the operation and systems of NPP workshop, compliance with the requirements of codes and standards in the field of use of nuclear energy and operational documentation. Supervises the operation of equipment and systems, ensures the performance of dispatcher’s schedule in accordance with which working places and checked, supervises the compliance with the established modes, the condition of equipment and systems, buildings and facilities, order at working places, maintenance of technical documentation. Reveals defects in the operation of equipment and systems of NPP workshop, takes measures for their elimination by the efforts of the shift personnel or repair divisions of the NPP. In accordance with the established order, performs trial of serviced equipment, regulation, control, alarm and protection systems. Ensures compliance with the rules of transfer to operation of standby equipment. Provides access for the maintenance personnel to works on equipment of the NPP workshop, with the shift personnel involvement makes necessary process operations for maintenance works, arranges equipment preparation for bringing into operation or putting standby. Takes measures to prevent environmental pollution. Organizes briefings for NPP workshop shift personnel to ensure safety and proper use of protective equipment. Keeps operating technical documentation. Organizes the work on training and qualification sustainment of subordinate personnel, controls if they fulfill rules of labor protection, fire safety, nuclear and radiation safety (depending on operation conditions of serviced NPP equipment and systems) and internal labor routine regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Chiller, Ventilation and Automated Fire Fighting Control Systems Shift Supervisor**

Duties: Supervises the shift personnel involved in operation of equipment and systems of the vent and air conditioning shop , including chemistry of the HVAC component cooling water system. Monitors the state of automatic fire extinguishing systems. Ensures operation of equipment and systems, compliance with requirements of codes and standards in the field of use of nuclear power and operational documentation. Supervises the operation of equipment and systems, ensures the performance of dispatcher’s schedule in accordance with which working places and checked, supervises the compliance with the established modes, the condition of equipment and systems, buildings and facilities, order at working places, maintenance of technical documentation. Reveals defects in the operation of equipment and systems of NPP workshop, takes measures for their elimination by the efforts of the shift personnel or repair divisions of the NPP. In accordance with the established order, performs trial of serviced equipment, regulation, control, alarm and protection systems. Ensures compliance with the rules of transfer to operation of standby equipment. Provides access for the maintenance personnel to works on equipment of the NPP workshop, with the shift personnel involvement makes necessary process operations for maintenance works, arranges equipment preparation for bringing into operation or putting standby. Controls cleaning and decontamination of waste waters, takes measures to prevent the environment contamination. Organizes briefings of the NPP shift personnel concerning safety and correct use of protective means. Keeps operating technical documentation. Organizes the work on training and qualification sustainment of subordinate personnel, controls if they fulfill rules of labor protection, fire safety, nuclear and radiation safety (depending on operation conditions of serviced NPP equipment and systems) and internal labor routine regulations.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Chemistry Shift Supervisor**

Duties: Provides maintenance of safe, reliable and economical modes of operation of the assigned equipment in accordance with the instructions, guidelines. Provides control over the most important parameters of the equipment and systems of the chemical workshop. Provides timely detection of defects, their recording, notification to higher officials; outage, acceptance for repairs with testing of equipment; control over the repairs and post-repair testing of equipment important to safety. Performs the initial admission to a workplace by the permit to the main equipment. Provides continuous availability of a standard reserve of equipment, reagents and demineralized water; in the case of a decrease in the regulatory reserve, takes urgent measures to restore it. Provides timely and high-quality implementation of all preventive measures for maintenance of equipment (checking of interlocks, protections, alarms; changeover). Organizes and manages the elimination of emergency situations, extinguishing fires with the involvement of the necessary forces and means. Controls the condition of the premises, equipment and ensures the safety and cleanliness of the external parts of equipment, instrumentation and I&C, electrical equipment, front panels of control boards and consoles, cleanliness of the premises; safety and updating of warning posters, tables, marking of equipment and valves; availability and serviceability of fire extinguishing and lighting means; compliance with radiation safety regulations for visits to premises in the controlled access area. Organizes and controls the maintenance of water chemistry of the NPP systems in the amount provided for by the schedule of chemical monitoring. Analyzes indicators of water chemistry and makes conclusions about the compliance of water chemistry of the individual systems and NPP in the whole. Ensures that subordinate shift personnel fulfill the requirements of special norms, rules and instructions on nuclear safety, programs and schedules of nuclear hazardous work, organizational and technical measures, orders and instructions of the NPP management related to ensuring nuclear safety in the operation of NPP power units. Ensures the accuracy of monitoring of boric acid concentration and the specific activity of the reactor coolant and other NPP process fluids. Supervises and ensures compliance with safety regulations by the shift personnel, as well as other personnel located in the attended premises. Performs, according to the approved schedule, walkovers and inspections of operating personnel workplaces and controls the provision of reagents, laboratory glassware, tools, instruments, documentation, clothing, personal protective equipment, first-aid, fire fighting, warning and communication equipment in accordance with the standards.

Provides all types of training and instruction to subordinate personnel, participates in the testing of their knowledge; timely organizes the study by employees of new and revised instructions, rules and other documentation, monitors their execution. Keeps logs in the Chemical Shop Shift Supervisor workplace.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification. Responsible for the safe, reliable and economical operation of systems and equipment assigned to the chemical workshop, for the organization of water chemistry monitoring of the NPP systems and for the actions of the operating personnel of the chemical workshop. Is the person assuring the nuclear safety.

* 1. **Radioactive Waste Treatment Shift Supervisor**

Duties: Organization of activity of the shift personnel. Walkover, control and supervision of waste management systems. Organization of reliable and safe operation of systems and equipment for LRW and SRW management. Organizing the collection, sorting, minimization, processing and transportation and temporary storage of solid radioactive waste. Monitoring the reception, processing and solidification of LRW and temporary storage. Interaction with the chemical / spectrometry laboratory for analyzing LRW samples and obtaining results. Organization of repair and control after repairing the equipment of the area. Organization and preparation of scheduled and unscheduled repairs. Monitoring of equipment performance after repair. Monitoring the process of minimizing the formation of radioactive waste. Coordination to perform work activities requiring a dosimetry permit. Keeping of operating and other documentation. Ensures training and qualification sustainment of subordinate personnel. Controls implementation by the subordinate personnel of rules for labor protection, nuclear, radiation and fire safety, internal labor routine regulations. Supervises the subordinate personnel. Organizes work with subordinate personnel on the formation of a safety culture.

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties and for subordinate personnel qualification.

* 1. **Radiation Safety Shift Supervisor**

Duties: Provides operational management of the organization of work to ensure radiation safety, protect the environment against radioactive contamination, and create safe working conditions. Monitors the radiation situation at the nuclear power plant (NPP), compliance with the requirements of the rules and standards of radiation safety during the work. Provides inspections of dosimetric and radiometric equipment and instruments of the NPP, their operational state. Takes measures to improve the radiation situation, perform an analysis of the state of radiation safety, reduce the radiation exposure of NPP workers and study the causes of occupational diseases. Continuously monitors the radiation situation in the controlled access area of the NPP, the state and magnitude of gas-aerosol emissions, removal of solid and liquid radioactive waste, contamination of equipment and premises surfaces, providing the NPP personnel with personal protective equipment, disposal of radioactive waste, maintaining prescribed documentation, recording doses received employees of the NPP. Controls the radiological work permit work, the correct admission to work with ionizing radiation sources and radioactive substances, performs targeted briefings on radiation safety, admit personnel to the controlled access area and removes personnel from the dangerous area in the event of an emergency, ensures the adoption of measures that contribute to normalization of the radiation environment. Takes part in the training of non-military units for work with radiation reconnaissance and dosimetric monitoring devices. Ensures the accuracy check of the information presented on the state of nuclear safety in the NPP subdivisions. Arranges work on training and qualification sustainment of NPP subordinate personnel. Keeps operating documentation. Supervises the subordinate personnel.

provides radiation monitoring in case a radiation accident

Responsibility: Bears personal responsibility for non-fulfillment or poor fulfillment of his/her duties.

1. **Shifts**

Shifts are the part of process management department. Shift structure, quantity of operating personnel of the shift and certification requirements are specified in Table 13.1.2.5.1.

Table 13.1.2.5.1

| Job Title | Headcount | Requirements for qualification |
| --- | --- | --- |
| Plant Shift Supervisor | 8 | Category 1. Permit to unsupervised work only if INRA/NNSD license is available |
| Unit Shift Supervisor | 8 | Category 1. Permit to unsupervised work only if INRA/NNSD license is available |
| Reactor Shift Supervisor | 8 | Category 1. Permit to unsupervised work only if INRA/NNSD license is available |
| Turbine Shift Supervisor | 8 | Category 1. Permit to unsupervised work only if INRA/NNSD license is available |
| Reactor Control Engineer | 8 | Category 1. Permit to unsupervised work only if INRA/NNSD license is available |
| Turbine Control Engineer | 8 | Category 1. Permit to unsupervised work only if INRA/NNSD license is available |
| Reacor Senior Field Operator | 7 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Reacor Field Operator | 18 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Reacor Field Operator - Clean Zone | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Emergency Diesel Generators Operator | 12 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Turbine Senior Field Operator | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Turbine Field Operator | 12 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Pumphouse Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Joint Systems Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Joint Systems Senior Field Operator | 18 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Treatment Unit Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Boiler Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Radioactive Waters Treatment Laboratory Technician | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Electricity Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Electrical Equipment Senior Field Operator | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Substation Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Electrical Equipment Field Operator | 18 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Chiller, Ventilation and Automated Fire Fighting Control Systems Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Cooling Facilities, Ventilation and Fire Fighting Control Senior Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Cooling Facilities Operator | 24 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Ventilation Systems Operator | 18 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| I&C Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| I&C Shift Engineer | 12 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| I&C Shift Technician | 24 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Chemistry Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Chlorinate and Water Treatment Senior Field Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Water Treatment Systems Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Secondary Circuit Water Treatment Field Operator | 12 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Chlorinate Unit Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Radioactive Waters Treatment and Reactor Auxiliary Systems Engineer | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Radioactive Waters Treatment Field Operator | 18 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Primary Circuit Water Laboratory Technician | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Secondary Circuit Water Laboratory Technician | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Radioactive Waste Treatment Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Cementing Line Field Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Hoisting Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Waste Treatment Field Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Radioactive Waste Treatment Shift Supervisor | 6 | Category 2. Permit to unsupervised work according to the results and successful examination on NPP |
| Dosimetry Senior Operator | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Dosimetry Field Operator | 16 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Radiation Control Laboratory Shift Technician | 6 | Category 3. Permit to unsupervised work according to the results and successful examination on NPP |
| Total: | 419 |  |

Minimum required personnel quantity per shift under the normal operation modes is 68 persons. The organizational structure of operating personnel shift is given in Figure 13.1.2.5.2.

Main task of shift operating personnel is to provide Bushehr-2 NPP reliable and safe operation by means of safe fulfillment of operation processes, equipment operational management, control of equipment condition and its maintaining in serviceable condition, safe execution of operations related to tests and maintenance, as well as equipment and systems' repair.

Shift operating personnel shall have the following main objectives:

1. providing safe performance of electric and thermal energy production technological processes, equipment operational control under normal operating conditions (start-up, operating modes, shutdown) in accordance with the "Power unit safe operation process regulations" and operation instructions;
2. providing equipment operational control, as well as its status control during accident management, carried out for the purpose of consequences mitigation, in accordance with emergency operating procedures requirements and beyond design basis accidents management guideline;
3. providing main equipment operational control according to the requirements of regulations, rules, project and operating instructions
4. providing compliance with established rules for handling nuclear fuel, radioactive waste;
5. providing nuclear, radiation, environmental, fire, technical and general safety measures during the performance of process operations and all types of equipment works;
6. providing compliance with planned tasks on operating capacity, electricity generation and supply, approved by the Energy Commission.



Figure 13.1.2.5.2 Organizational structure of operating personnel shift

In order to complete this tasks, the shift operating personnel shall fulfill the following functions:

1. in terms of ensuring compliance with nuclear energy rules and safety standards requirements, technological regulations and operating instructions for safe performance of electric energy production technological processes, equipment operational control under normal operating conditions (start-up, operating modes, shutdown):

* to monitor defense in depth physical barriers state;
* to monitor the limits and conditions of reactor, equipment and safety-critical systems safe operation;
* to monitor and maintain first and second circuits water-chemistry conditions;
* to monitor gaseous radioactive waste emission;

1. in terms of ensuring the safe performance of technological processes during operation of Bushehr-2 NPP power unit No.2:

* to provide control of process parameters with the use of APCS, monitoring instrumentation, etc.;
* to eliminate the revealed deviations from the normal operation of Bushehr-2 NPP equipment and systems of Unit No.2;
* to monitor the limits and conditions of equipment and safety-critical systems safe operation;
* to provide control of and, if necessary, adjustment to second circuit water-chemistry condition;
* to maintain the necessary operational documentation;

1. in terms of ensuring the equipment operational control, as well as its status control during accident management, carried out for the purpose of consequences mitigation, in accordance with emergency operating procedures requirements and beyond design basis accidents management guideline;

* supervise the provision of personnel protective equipment at personnel workplaces in accordance with established norms and their application in case "Local emergency" or "General emergency" is declared at Bushehr-2 NPP;
* to provide Bushehr-2 NPP shutdown alongside with reactor shift to a subcritical state in accordance with instructions for emergency response, to monitor and control equipment in service;
* to take part in accident confinement, as well as in its consequences liquidation in accordance with the management of beyond design basis accidents regulations and the "Action plan for personnel protection in case of an accident at Bushehr-2 NPP";

1. in terms of ensuring equipment and systems operation in accordance with the rules, regulations, project, "safe operation process procedure" and the operating instructions:

* control and maintenance of systems and equipment under normal operating conditions;
* carrying out of routine tests, inspections and testing of systems and equipment;
* organization of works on elimination of revealed defects of equipment, maintenance, repair, modernization and rehabilitation, replacement of equipment with worked out service life;
* to provide control over all kinds of equipment and systems works and to accept equipment after the implementation of such works;
* analyze of revealed equipment defects impact on the safety and reliability of operation, to organize timely defects elimination, to perform, if necessary, decommissioning works, to prepare workplaces and to grant access to maintenance personnel, to put equipment into operation after repair (elimination of a defect);
* taking part in investigation of violations at Bushehr-2 NPP, to implement the developed compensatory measures;

1. in terms of ensuring compliance with established rules for handling nuclear fuel, radioactive waste;

* taking part in refueling, spent fuel assemblies storage in spent fuel pool, shipping spent fuel from Bushehr-2 NPP in strict accordance with the charts, programs, instructions, regulations and rules requirements;
* to organize collection, processing and transporting of radioactive waste in accordance with the operating instructions, rules and regulations requirements;
* in terms of ensuring nuclear, radiation, environmental, fire, technical and general safety during the performance of process operations and all types of equipment works; to provide their performance in strict accordance with regulations and safety standards requirements, "Safe operation process procedure", the instructions for equipment operations and work programs.

Control of radiation and dosimetric situation under normal operation modes is provided by radiation control systems' shift personnel with use of inbuilt tools.

At carrying out of works for reactor rise to the minimum controlled power level, carrying out of physical experiments, acceptance, handling and sending of nuclear fuel, group of supervising physicists (that work by shift system) is formed from the personnel of all groups of nuclear and fuel safety devision (safety department). Responsibilities of supervising physicists are specified by "Statement about group of supervising physicists'.

1. Certification of personnel working at nuclear power plants
   1. **Qualification requirements for the Principal personnel**

The main requirements for qualification of Principal personnel are regulated by the IAEA Safety Guides:

* №NS-G-2.8 "Recruitment, Qualification and Training of Personnel for Nuclear Power Plants ".

*Category 1 personnel*

Persons in this category shall have graduated in engineering or science or have another appropriate educational background. They may also have attained the required equivalent knowledge through appropriate experience and training.

The Plant Director shall have experience in a number of key NPP-related fields, such as operation, maintenance and technical support. Such experience can be gained for 8-10 years of work. They shall have appropriate management experience.

The Heads of services and departments shall have adequate experience in their respective fields of activities, sufficient for the acquisition of professional competence and the ability to carry out leadership. Such experience can be gained for 5-8 years of work, where at least 2-3 years were at nuclear power plants and 6 months at this particular (or similar) site.

Shift Supervisors shall have experience as Shift Operators at conventional or nuclear power plants, as well as experience in leadership and teamwork. Such experience can be gained for 4-6 years of work, where at least 2-3 years were at nuclear power plants and 6 months at this particular (or similar) site.

Head of Radiation Protection Service and the official responsible for any problems of reactor physics shall have experience in this specialty at similar facilities. Sufficient experience can be acquired during 4-6 years of work at nuclear power plants, where at least 6 months were at this particular (or similar) site.

*Category 2 personnel*

Persons who will operate the reactor shall have the required competence and experience, gained in responsible operational positions at nuclear or at least conventional power   
plants.

All other operators shall have experience appropriate to their duties and responsibilities.

Senior personnel in this category shall have experience as Shift Operators at the plants running on fossil fuel or at nuclear power plants. Such experience can be gained for 3-4 years of work, where at least 2 years were at nuclear power plants and 3 months at this particular (or similar) site.

The other operators shall have experience appropriate to their duties and responsibilities.

*Category 3 personnel*

Persons in this category shall have education appropriate to the performance of their duties at a power plant or have the equivalent knowledge gained   
through experience and training.

The leading staff in this category shall have 2-3 years of practical experience. Other technicians shall have experience appropriate to their duties and responsibilities.

Some experience may be acquired during plant construction and commissioning.

* 1. **Qualification of the NPP personnel**

The employees having the qualification which meets the qualification requirements established in the IRI regulatory documents and no medical and psychophysiological contra-indication for the respective position are allowed to hold such position.

The proposed requirements for education and experience of Bushehr-2 NPP industrial personnel are shown in Tables 13.1.3.2-1. The final qualifications will be defined after approval of the basic design of Bushehr-2 NPP.

Table 13.1.3.2-1 - Requirements for qualification of industrial personnel

| Job Title | Qualification Requirements (Education)  (a priority) | Work experience |
| --- | --- | --- |
| Plant Director | Master/Bachelor, any technical education, Master/Bachelor, specialties Mechanical Technology, Electrical Technology, Electronic Technology, Chemical Technology, Physics, Chemistry, Nuclear Development, Mechanical Engineering. | Plant managers should have experience in several key areas of plant activity such as operation, maintenance or technical support. This experience may be usually be gained over a period of between 10 and 15 years, but not less then 5 years. |
| Plant Chief Engineer | Master/ Bachelor, any technical education, Master/ Bachelor, specialties Mechanical Technology, Electrical Technology, Electronic Technology, Chemical Technology, Physics, Chemistry, Nuclear Development, Mechanical Engineering. | Plant managers should have experience in several key areas of plant activity such as operation, maintenance or technical support. This experience may be usually be gained over a period of between 10 and 15 years, but not less then 5 years. |
| Deputy Plant Chief Engineer (Manager Production Division) | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties Mechanical Technology, Electrical Technology, Electronic Technology, Chemical Technology, Physics, Chemistry, Nuclear Development, Mechanical Engineering | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Deputy Plant Director for Safety (Head of Safety Division) | Master/ Bachelor, discipline Physics, Master/ Bachelor, specialties Physics, Nuclear Development. | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Technical & Engineering Division (Deputy Plant Chief Engineer for Technical & Engineering Support) | Master/ Bachelor, discipline Physics, Master/ Bachelor, specialties Physics, Nuclear Development. | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Maintenance & Repairs Division ( Deputy Plant Chief Engineer for Maintenance & Repairs) | Master/ Bachelor, discipline Mechanical Technology | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head APCS and Electricity Division (Deputy Plant Chief Engineer for APCS and Electricity) | Master/ Bachelor, discipline Electronical Technology, Electrical Technology, | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Common Facilities Division (Deputy Plant Chief Engineer for Common Facilitirs) | Master/ Bachelor, any technical education.  Master/ Bachelor, specialties Mechanical Technology, Electrical Technology, Electronic Technology, Chemical Technology, Physics, Chemistry, Nuclear Development, Mechanical Engineering. | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Support and Development Division | Master/ Bachelor, any technical education.  Master/ Bachelor, specialties Mechanical Technology, Electrical Technology, Electronic Technology, Chemical Technology, Physics, Chemistry, Nuclear Development, Mechanical Engineering. | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Human Resources and Training Center | Master/ Bachelor, any technical education  Master/ Bachelor, specialties Mechanical Engineering, Technology, Electrical **E**ngineering Technology, Electronic Engineering Technology, Chemical Engineering Technology, Physics, Chemistry, Nuclear Physics Engineering, Development, Mechanical Engineering. | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Information and Communication Technology Management | Master/ Bachelor, any technical education | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Head Management of Management System and Inspection | Master/ Bachelor, any technical education.  Master/ Bachelor, specialties Mechanical Technology, Electrical Technology, Electronic Technology, Chemical Technology, Physics, Chemistry, Nuclear Development, Mechanical Engineering. | Experience in key activities for 5-8 years in a position according to professional occupation, but 2-3 years as an executive manager position |
| Plant Shift Supervisor | Master/ Bachelor, discipline Mechanical Technology  Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties "Mechanical Technology", "Electrical Technology", "Electronic Technology", "Chemical Technology", Physics, Chemistry, Nuclear Development. | Experience may usually be gained over period of between 4-6 years, with a minimum 2-3 years at NPP, of which 6 month at the site concerned (or a similar site) |
| Shift Supervisor Unit\* | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties "Mechanical Technology", "Electrical Technology", "Electronic Technology", "Chemical Technology", Physics, Chemistry, Nuclear Development. | Experience may usually be gained over period of between 4-6 years, with a minimum 2-3 years at NPP, of which 6 month at the site concerning (or a similar site) |
| Shift Supervisor of Reactor Compartment\* | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties "Mechanical Technology", "Physics", "Nuclear Development". | Experience may usually be gained over period of between 3-4 years, with a minimum 2 years at NPP, of which 6 month at the site concerning (or a similar site) |
| Shift Supervisor of Turbine Hall\* | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties Mechanical Technology, Mechanical Engineering. | Experience may usually be gained over period of between 3-4 years, with a minimum 2 years at NPP, of which 6 month at the site concerning (or a similar site) |
| Reactor Control Operator\* | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties "Mechanical Technology", "Physics", "Nuclear Development". | Experience may usually be gained over period of between 3-4 years, with a minimum 2 years at NPP, of which 6 month at the site concerning (or a similar site) |
| Turbine Control Operator\* | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties Mechanical Technology, Mechanical Engineering. | Experience may usually be gained over period of between 3-4 years, with a minimum 2 years at NPP, of which 6 month at the site concerning (or a similar site) |
| Joint Systems Shift Supervisor | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialties "Mechanical Technology" | Some experience may be gained in design, construction and commissioning activities |
| Electricity Shift Supervisor | Master/ Bachelor, discipline "Electrical Technology", Master/ Bachelor, specialty Electrical Technology. | Senior technicians and craftsperson should have between 2-3 years of practical experience |
| Chiller, Ventilation and Automated Fire Fighting Control Systems Shift Supervisor | Master/ Bachelor, discipline "Mechanical Technology", Master/Bachelor, specialty Cooling and Air conditioning Technology. | Some experience may be gained in design, construction and commissioning activities |
| Chemistry Shift Supervisor | Master/ Bachelor, discipline "Chemistry", Master/ Bachelor, specialties "Chemical Technology", "Chemistry". | Senior technicians and craftsperson should have between 2-3 years of practical experience |
| Radioactive Waste Treatment Shift Supervisor | Master/ Bachelor, discipline "Mechanical Technology", Master/ Bachelor, specialty Mechanical Technology. | Senior technicians and craftsperson should have between 2-3 years of practical experience |
| Radiation Safety Shift Supervisor | Master/ Bachelor, discipline Physics, Master/ Bachelor, specialties Physics, Nuclear Development. | Some experience may be gained in design, construction and commissioning activities |
| I&C Shift Supervisor | Master/ Bachelor, discipline "Electronic Technology", Master/ Bachelor, specialty Electronic Technology. | Experience may usually be gained over period of between 3-4 years, with a minimum 2 years at NPP, of which 6 months at the site concerning (or a similar site) |

\* Requires to be lisenced by INRA

NPP personnel which is not required certain length of service in the previous positions according to qualification characteristics shall be allowed to work independently after undergoing necessary instructions on occupational safety, pre-training for the assignment, probation, primary knowledge verification and reverification (if necessary).

1. Training
2. NPP Plant Staff Training Program

General employee training programs shall give new employees a basic understanding of their responsibilities and of safe work practices.

Graded approach shall be applied to personnel training and retraining depending on the extent to which some or other employees influence on NPP safety.

The managers directly responsible for reliable and safe operation of nuclear plant shall be trained in training units.

Training of the operating personnel providing technical and nuclear safety shall include several mandatory stages:

* general training to obtain higher or secondary technical education, that gives a general but fairly detailed understanding of the technological processes and control system of NPP unit (the knowledge acquired at this stage are the basis for further development of skills and capabilities);
* initial training in special training centers (TC), where a future operator studies specifically that power unit, which he will work at, as well as process instructions for managing the power unit and acquires the skills necessary for routine work;
* training and further training of personnel in training centers (TC) in order to maintain a sufficiently high level of proficiency and continuous readiness for instant response and responsible decision-making in emergency situations.

New craftsmen and employees shall be trained in vocational-technical schools, training centers. Training can also be conducted directly at the plant in the form of training courses agreed with regulatory authorities.

The personnel temporarily involved in work at NPP shall compete the accelerated training courses when the necessary information is given during few days or hours. Training should be conducted in form of interviews with in-house personnel training experts.

The operating personnel who are responsible for NPP safe operation shall be selected based on professional psychological and psycho-physiological criteria when recruited, and shall pass psychological examination when appointed to another position. The list of such persons shall be approved by the operating organization and health protection organization.

NPP operating personnel training shall emphasize the concept of safety culture - qualification and psychological fitness for assuring NPP safety that becomes a first-priority objective and internal need resulting in self-awareness of responsibility and self-control when carrying out safety-related jobs.

The following professional training methods shall be widely used in training:

* qualifying selection and psychophysiological examination of trained personnel;
* teaching the Russian language to the level corresponding free conversational language, as well as sufficient to read all the necessary educational and technical documentation and written answers when testing knowledge. The need to study Russian will be determined in the Generalized Training Schedule;
* knowledge entrance control of the Principal's trained personnel;
* theoretical training, including, training using SOCV (CE) and evaluation of training;
* practical training in classrooms, laboratories and workshops using TSE for the established list of positions;
* special training in specialized organizations of the IRI and the Russian Federation for the list of positions set forth in Annex I.A;
* On-the-job training at the Bushehr-1 NPP and the Bushehr-2 NPP according to the Generalized Training Schedule;
* practical training on a full-scale simulator for an established list of positions (at PMT-1 and PMT-2 in accordance with the Generalized Training Schedule);
* an intermediate test of knowledge and skills at the end of each course of study and a final exam to test knowledge and skills at the completion of training for the post-graduate programs;
* initial examination of students' knowledge of the position in the commissions of the Bushehr-2 NPP to obtain permits to independent work;
* pre-licensing training for positions requiring licenses;
* duplication at workplace for operating personnel of the 2-nd Unit;
* permission for unrestricted work;
* training for the position of the Bushehr-2 NPP staff, as well as maintaining the qualifications of licensed personnel, controlling physician and inspectors of the RC and TC until the final acceptance into operation of each unit of the Bushehr-2 NPP.

The selection, recruitment and technological training schemes for the instructors of the training center of the Bushehr-2 NPP should be similar to the selection, recruitment and technological training schemes for the highest position to be trained. Additionally, the training of the instructor personnel of the training center of the Bushehr-2 NPP should include psychological and pedagogical training.

Training of the Personnel of the Bushehr-2 NPP should be conducted under the Training Programs for the staff of the Training Groups agreed by the Parties. The number of study groups:

* when conducting Theoretical training no more than 15 people;
* when conducting Practical training at FSS - no more than two people at one workplace of operational personnel of the control room during training courses for the formation of "individual skills" and no more than one person at one workplace - when working out the actions in the shift and during the exam;
* with an internship of no more than 2 people in one workplace.

.

Testing the knowledge and skills of staff during the Intermediate Testing of knowledge and skills at the end of each training course and final exam at the completion of training programs for the position should be carried out in the form of:

* interviews, control tasks;
* written and oral checks;
* control training at the FSS;
* practical assignment in workshops and laboratories.

Changes in the scope of training programs should be agreed upon and approved by the Parties.

Training of key personnel of the Bushehr-2 NPP is carried out in two stages:

* Stage 1. Training at the Bushehr-1 NPP;
* Stage 2. Training on differences between Bushehr-1 NPP and Bushehr-2 NPP.

Key personnel of the Bushehr-2 NPP, as set out in Appendix I.A. to this Annex I, is being trained for the position in the amount specified in Appendix I.F. to this Annex I, according to the following two-step scheme:

**Stage 1.** Training at the Bushehr-1 NPP - Training for the position of the staffing of the Bushehr-1 nuclear power plant, corresponding to the functional responsibilities of the staff of the Bushehr-2 nuclear power plant using the UMM of the Bushehr-1 nuclear power plant, including:

* Classroom training;
* Practical training at the Training Center of Bushehr-1 NPP;
* Internship at the Bushehr-1 workplace;
* Practical training on a full-scale simulator (FSS of the Bushehr-1 NPP) for an established list of personnel;
* Intermediate testing of knowledge and skills at the end of each training course and the final exam on knowledge and skills at the completion of training programs for the position of Bushehr-1 NPP;
* initial examination of students' knowledge of the position in the commissions of the Bushehr-1 NPP to obtain permits to independent work (if required);
* Admission to independent work and work at the Bushehr-1 NPP (if required).

**Stage 2.** Training for the position at the Bushehr-2 NPP (personnel is allowed who completed the training and successfully passed the knowledge test of the Bushehr-1 NPP programs), including:

* theoretical training in the course of differences between the Bushehr-1 nuclear power plant and the Bushehr-2 nuclear power plant;
* an internship at the Bushehr-2 NPP under the programs of the Bushehr-2 NPP;
* an intermediate test of knowledge and skills at the end of each course of study and a final exam to test knowledge and skills at the completion of training programs for the position;
* initial examination of students' knowledge of the position in the commissions of the Bushehr-2 NPP to obtain permits to independent work;
* permission for unrestricted work.
* in addition, for operating personnel licensed:
* theoretical training on the operating modes of the Bushehr-2 NPP;
* training on the full-scale simulator of the Bushehr-2 NPP;
* pre-licensed training;
* training at the FSS in order to prepare for participation in the conduct of physical experiments at the stage of the physical start-up of the Units (before the start of the physical start-up of the Units);
* training at the FSS in order to prepare for participation in the conduct of physical experiments and dynamic tests at the stage of physical and energy start-up of the Units and pilot production;
* a final exam in theoretical knowledge and practical skills at the supervisory laboratories of the Bushehr-2 NPP upon completion of training in the Post Training Programs;
* duplication and licensing.

Training on the Bushehr-1 NPP, (according to Stage 1, p. 1.2.4.1) should be carried out in Russian as part of the agreed Training Groups and using the Russian version of the Training and Methodological Documentation of the Bushehr-1 NPP.

Training at the Bushehr-2 NPP, (according to Stage 2, p. 1.2.4.1) should be carried out in Russian based on the Russian version of the LTD and SOCV, which should be developed for the Bushehr-2 NPP. UMM at the Bushehr-2 NPP includes:

* A course of study on differences between the Bushehr-1 NPP and the Bushehr-2 NPP;
* A course of study at the FSS in order to prepare for participation in the conduct of physical experiments at the stage of the physical start-up of the Units (before the start of the physical start-up of the Units);
* A course of study at the FSS in order to prepare for participation in the conduct of physical experiments and dynamic tests at the stage of physical and energy start-up of the Units and pilot production;
* UMM for Training on the Bushehr-2 NPP in accordance with the list set out in Appendix I.H .;
* Scenarios of control exercises at the FSS to test the practical skills of the technological process with operating personnel, when obtaining a license, in accordance with the subject of testing the practical skills of licensed candidates, taking into account the requirements of the IRI regulator.

A course of study on differences between the Bushehr-1 NPP and the Bushehr-2 NPP should be developed on the basis of an agreed procedure for analyzing the main differences between the Bushehr-1 NPP and the Bushehr-2 NPP.

* 1. **Description of training programs**

The Bushehr-2 NPP personnel training programs shall comply with requirements of IRI safety rules and norms.

Training programs shall be developed according to the requirements of qualification profiles and provide acquisition of deep knowledge in the equipment operation theoretical background field along with required practical training.

Personnel training shall correspond to the required level of knowledge according to qualification requirements and future functional duties of every trained person. These objectives are achieved by using the concept of personnel training system applied by the Contractor for personnel training at similar NPP of Russia.

Qualification requirements for every duty position are defined as a scope of knowledge for specific specialty and required relevant experience.

Applied personnel training system depends on analysis of organizational structure and NPP personnel official duties and foresees qualification-based personnel selection, training in theoretical knowledge acquisition and practical field experience with use of technical training aids, if necessary, on-the-job training on appropriate working places of NPP power units under operation and the Principal NPP. Training process shall be followed by step-by-step control of received knowledge.

The Contractor shall train the Principal personnel according to standards applied for training of NPP maintenance personnel in Russia in such a way that trained personnel could be certified and get licenses as per the Russian certification sequence.

The Contractor shall accomplish the Principal personnel training program in such a manner as to provide the Principal personnel possibility of in-time and effective participation in NPP start-and-adjustment works. The training shall provide the personnel with all required knowledge for safety, effective and reliable operation of Bushehr-2 NPP.

Training program for specialists, MCR operators and senior technicians provides for development of deep understanding of basic principales of nuclear engineering, nuclear safety and radiation protection, the project ideas and admissions, as well as theoretical backgrounds of the plant operation, and should be followed by the required training at working place. For other operators, technicians and skilled workers, it is essential, that the program has more practical orientation, with no explanations of theoretical or safety-related problems.

All employees occupationally exposed to ionizing radiation, as well as the personnel involved in radiation protection, shall have appropriate training in radiation risk and technical and administrative means required to prevent any excessive exposure.

The program provides for training of the Principal personnel having different specialties, as well as higher or special technical education to ensure that NPP maintenance personnel can perform their job duties and fulfill NPP control and maintenance of MCR, electrical, electronic, process equipment, maintenance and repair work at plant. The program is intended for training of NPP key personnel whose actions effect safety and reliability of NPP.

The training program is the organizational document that determines:

* minimum base skill level;
* scope of theoretical knowledge and list of examined subjects;
* scope of practical knowledge including knowing of nuclear power generation industry safety norms and regulations, industrial and duty regulations, as well as safety requirements being stipulated in standards;
* kinds of learning;
* composition of applied technical features;
* scope of on-the-job training if required for this job position or professional occupation;
* procedure and terms of knowledge testing.
* duplication, if required.
* personnel training program shall provide the following stages:
* qualification-based selection;
* psychophysiological testing (PPT);
* classroom training,
* firefighting training;
* on-the-job training at operating Unit;
* training on equipment mock-ups and/or simulators;
* knowledge test;
* duplication at workplace (for operating personnel);
* emergency and firefighting training;
* unsupervised work at lower duties prior to assignment to a higher position;
* instructing before CW stages and complex process operations;
* step-by-step preparation in the scope of CW stages;
* briefing upon the results of CW stages;
* The contractor is responsible for:
* consultation in the process of selection of potential trainees together with the Principal, if required;
* development of general annual training plans;
* development of training programs for every group of students;
* training of the Principal personnel in Russia and Iran according to the Russian requirements and standards;
* organization and decision of all issues related to the Principal personnel training in Russia;
* certification of trained personnel;
* providing of all necessary services to the Principal personnel while its staying in Russia;

The Principal is responsible for:

* in-time personnel recruitment after its qualification-based selection, as well as medical supervision;
* organization of in-time sending of personnel for training;
* control of fulfillment of educational programs and training quality;
* providing of proper level of knowledge of Russian language by the personnel;
* participation in training process coordination;
* all required technical features for personnel selection, theoretical and other preparation in Iran, as for example: office facilities, computers, psychophysiological laboratory, instruments, instruments, expendables, dummies, laboratories and workshops equipped with appropriate equipment and instruments.

Training of the Principal operating personnel is divided into three phases:

Phase I - preliminary course that includes qualification-based selection, learning of Russian language and basic course of preparation at the Principal site and in Russia;

Phase II - basic course that includes theoretical preparation, practical training, simulator training, on-the-job training at working place as per the position;

Phase III - special course that includes studying the specifics of a certain workplace , on-the-job training at the Principal site being directly involved in equipment erection and commissioning.

In the process of training and after termination of every training course the Principal personnel passes knowledge assessment. According to the training program requirements the knowledge assessment can be carried out as:

* course project;
* briefing;
* testing;
* control simulator trainings;
* written and oral exams.

When forming the groups the Principal should take account   
of the possibility that some of trainees will prove to be unsuitable at various stages of   
the training process.

The Contractor estimates knowledge level of students and submits the results to the Principal.

After successful completion of the training program course in Russia and/or Iran, the Principal personnel receives licenses of training center or other educational organization that confirm the personnel readiness for execution of obligations under the appropriate position. The above mentioned certificates should be notarized by the Contractor. The form of acknowledgment will be coordinated in the process of training.

In case of failure of inter-mediate or final exam for specific position by any of the students, the Contractor can recommend to the Principal to employ the student to another positions.

The training is carried out according to the same norms and regulations that applied in Russia, approved by general and annual schedules agreed by the parties and general documents that define start-up and duration of each group training . Training plans can be changed only by mutual agreement of both parties.

The training programs are developed in accordance with the requirements of qualification characteristics; such programs provide the theoretical knowledge of operation and necessary practical training. These objectives are achieved by using the concept of personnel training system applied by the Contractor for personnel training at similar NPP of Russia.

Qualification requirements for every duty position are defined as a scope of knowledge for specific specialty and required relevant experience.

Personnel training is carried out according to standards applied for training of NPP maintenance personnel in Russia and Iran in such a way that trained personnel could be certified and get licenses as per the Iran certification sequence.

The training program is developed with account of its accomplish in such a manner as to provide the Principal personnel possibility of in-time and effective participation in Bushehr-2 NPP commissioning. The training shall provide the personnel with all required knowledge for safety, effective and reliable operation of Bushehr-2 NPP.

* 1. **Training arrangement**

1. **General requirements**

**Annually**, no less than 10 months before the beginning of the next academic year, based on the Generalized Training Schedule for the personnel of the Bushehr-2 NPP, taking into account the updated schedule for the construction of the Bushehr-2 NPP and the results of the annual assessment of the training results of the certain categories of personnel to the various stages of the construction and commissioning of the Bushehr-2 NPP (the dates of the stages are taken from the construction schedule of the Bushehr-2 NPP), the Annual Training Schedule of the Bushehr-2 NPP is being developed.

Annually, no less than 9 months before the beginning of the next academic year, the Annual Recruitment Scheme of the Bushehr-2 NPP is developed based on the Generalized Training Schedule of the Bushehr-2 NPP and the Annual Training Schedule of the Bushehr-2 NPP. Acquisition should be performed on the basis of qualification requirements for the staff of the Bushehr-2 NPP (Appendix I.V. to this Annex I).

Every year, at least 2 months before the groups start training, a list of students is formed to form the respective training groups.

Knowledge entrance control for candidates for positions is carried out at least 1.5 months before the start of training in the relevant Training Group set out in the Annual Training Schedule.

The final composition of the Training Groups is formed according to the knowledge entrance control results.

The training program for groups is developed at least one month prior to the start of Training of the relevant Training Group, in accordance with the Annual Training Schedule and the entrance control results.

Approval of training programs should be carried out no later than two weeks before the start of training of the relevant Training Group.

Special training in the Specialized Organization of Russia must be organized at least 3 months before the start of training. Not less than six weeks before the students arrive in Russia, a list of the Bushehr-2 NPP personnel should be determined, indicating the positions, and scanned copies of the students' passports should be sent. Required information should be sent by fax or email to the Contractor. Appropriate invitations for students should be sent to the Principal. The Contractor must confirm the date of arrival of the trainees and the flight number at least one week before the students leave.

Training and monitoring of the implementation of training programs, training effectiveness and quality analysis should be carried out in accordance with the QAP training quality assurance procedures.

An intermediate test of knowledge and skills should be carried out at the end of each course.

Upon completion by the trainees of the Training Program as a whole, final exams should be organized and conducted and certificates should be issued to the Principal based on their results. In the event that the results of this verification are unsatisfactory and / or if the trainees have completed incomplete training of the program, certificates are issued to the trainees and the Parties must follow the procedures of the Quality Assurance Program. The form of the Certificate will be agreed by the Parties during the training.

Certificates / references on the results of Special training / certification in the Specialized organizations of Russia and Iran are issued in the form of relevant training organizations (in the language of the Training Provider with a certified translation into English).

Upon completion of the Training Program, the Principal is provided with a Personal Dossier for each student in Russian and English (one electronic copy and one paper copy in each language).

The format of the Trainee's Personal Dossier, the content and timing of the submission will be determined in accordance with the QAP procedure.

1. **Training in Russia and Iran**
2. Training in Russia

Special Training of the Bushehr-2 NPP personnel in Russia should be conducted in accordance with the training programs approved by the parties for the established membership of Training Groups in Specialized Organizations.

When finding the Bushehr-2 NPP Personnel in Specialized Organizations in the Russian Federation, if necessary, students should be provided with overalls and personal protective equipment in accordance with the applicable standards, as well as the documents used in training.

1. Training in Iran

Training in Iran is carried out at the Bushehr-1 NPP Training Center and the Bushehr-1 NPP departments, at the specialized organizations of Iran agreed by the Parties in accordance with the training programs, and at Bushehr-2 NPP Training Center and the Bushehr-2 NPP departments, in Russian.

Training in Stage 1 at the Bushehr-1 NPP will be provided by the LTD of the Bushehr-1 NPP. The multiplication and transfer of the LTD to the trained Personnel of the Bushehr-2 NPP (paper copies in the required quantity for each student) should be ensured.

In the course of training at the Bushehr-1 NPP and the Bushehr-2 NPP, the Bushehr-2 NPP personnel should be provided with UMM, as well as with working clothes and personal protective equipment in accordance with the rules applicable to NPP operational personnel.

In order to obtain the necessary practical experience, the trained personnel of the Principal may be involved in practical work at the Bushehr-2 NPP (to work on the acceptance of design and operational documentation, installation and commissioning work, and work on commissioning the Bushehr-2 NPP unit) in accordance with official duties, after completion of the Training or its separate stages and admission to independent work on the position or for certain types of work.

1. **Qualification-based selection**

The aim of qualification-based selection is to determine adequacy of basic knowledge of the student for digestion of studied material. Qualification-based selection is performed by means of interview (briefing) with specialists or special tasks solution. Personnel separation by groups is performed by available operational experience:

* persons with no trial operational experience;
* persons with operational experience at plants not relating to the equipment within the jurisdiction of supervision bodies.
* persons who had or have access to operation on the power units similar (analogous) to the present one.

According to the results of qualification-based selection individual training program can be corrected.

Detailed qualification requirements for the staff of the Bushehr-2 NPP for each position in the staffing schedule are contained in Appendix I.B of Annex I to the Contract.

1. **Professional psychological and psychophysiological testing**

The tasks of professional psychological and psychophysiological testing of operating personnel are to:

* determine the compliance of personnel psychophysiological capabilities with the nature of their production activity;
* increase the operating safety and reliability by selection of individuals who, by their psychological and psychophysiological professional qualities, meet the requirements of specific positions and professions to the most extent, as well as to identify the individuals whose functional state proves their reduced working efficiency and high likelihood of professional failures;
* assess the current psychophysiological state of personnel and their professionally significant qualities from the psychophysiological point of view;
* develop and take the corrective measures for rehabilitating the personnel psychophysiology;
* develop and take the measures to eliminate irregularities in NPP operation occurred due to human errors.

Psychological and psychophysiological selection of personnel shall be carried out by specially trained personnel using up-to-date means and techniques.

While selecting the candidates according to their qualification, the Principal together with the Contractor shall prepare and carry out psychophysiological selection, and to do this the required equipment and techniques of the Principal shall be used.

The Contractor shall take part in the final selection of candidates for training and shall have the right to give advice on the suitability or unsuitability of the candidates.

The selection, recruitment and technological training schemes for the instructors of the training center of the Bushehr-2 NPP should be similar to the selection, recruitment and technological training schemes for the highest position to be trained. Additionally, the training of the instructor personnel of the training center of the Bushehr-2 NPP should include psychological and pedagogical training.

1. **Classroom training**

Training of the Personnel of the Bushehr-2 NPP should be conducted under the Training Programs for the staff of the Training Groups agreed by the Parties. The number of study groups:

1. when conducting Theoretical training no more than 15 people;
2. when conducting Practical training at FSS - no more than two people at one workplace of operational personnel of the control room during training courses for the formation of "individual skills" and no more than one person at one workplace - when working out the actions in the shift and during the exam;
3. with an internship of no more than 2 people in one workplace.

Testing the knowledge and skills of staff during the Intermediate Testing of knowledge and skills at the end of each training course and final exam at the completion of training programs for the position should be carried out in the form of:

1. interviews, control tasks;
2. written and oral checks;
3. control training at the FSS;
4. practical assignment in workshops and laboratories.

Changes in the scope of training programs should be agreed upon and approved by the Parties.

Classroom training is conducted in the form of lectures that give the trainee the fundamentals of Bushehr-2 NPP operation:

* scientific foundations;
* safety systems;
* normal operation systems;
* industrial safety;
* nuclear safety;
* radiation protection;
* professional basis;
* organizational framework and regulatory requirements.

Classroom training provides for learning of safety and technical operation rules. Each lesson shall be provided with a classroom lesson plan containing the following information;

* course;
* topic in the course;
* lesson name;
* approximate duration;
* materials used by the instructor;
* trainee’s materials;
* list of references;
* terminal learning objectives;
* intermediate (supporting) objectives;
* lesson summary with training documentation used to give explanations;
* specific questions to be answered by a trainee after lecture.

To solidify the knowledge acquired during lectures, specially programmed sessions are used such as "Dialogue", "Man-Machine" which should reinforce the skills in understanding the information model, data analysis and decision making. For the self-study the specially designed materials are provided to the trainees.

1. **Firefighting training**

The main purpose of the firefighting training is to prevent fire, train the personnel to response properly in case of fire and to be able to use primary fire extinguishing equipment.

Initial firefighting training shall be obligatory conducted to the gas-electric welders and other personnel involved in hot work, electricians maintaining the automatic fire-extinguishing systems, as well as to the individuals whose activities directly affect the fire safety of nuclear plant.

Initial firefighting training of the personnel at the NPP site shall be completed before fuel is delivered to the site.

Firefighting training program is aimed to make the personnel be aware of the certain issues of NPP fire safety according to the profession and qualifications. The program shall include the following topics:

* physicochemical properties of substances and materials used in nuclear power plants;
* assessment of NPP fire hazard and development of fire prevention measures;
* fire hazard of cable structures and firefighting requirements for them;
* fire hazard of NPP turbine hall, fire prevention measures;
* fire hazard of premises with computing machine, personal computers, control panels;
* firefighting requirements to be met during design and construction of NPP industrial buildings and structures;
* fire hazard of switchgear, transformers, oil-filled equipment and firefighting requirements for them;
* methods of respiratory protection in case of fire.

1. **On-the-job training**

On-the-job training provides the opportunity for the trainees to study the unit to be controlled, location of equipment, routine duties in the workplace and interaction of shift personnel. After the lecture, the trainees have the opportunity to solidify and test their knowledge in the operating unit. The on-the-job training programs shall be used to develop on-the-job training manuals which then shall be broken down to lessons. The lesson plans for on-the-job training shall include the following information:

* topic, purpose and place of on-the-job training;
* terminal objective (supporting objectives);
* location of equipment, controls and instruments in the area assigned to a particular specialist;
* regulations on operational, preventive and repair activities;
* methods used to carry out routine maintenance.

The lesson plans shall also include training and control tasks.

The calendar dates for on-the-job training are assigned individually, taking into account the actual level of professional knowledge, skills, practical and professional experience.

1. **Knowledge test**

Exams are intended to determine whether the professional qualifications of trainees comply with the qualification requirements. Exams are held in accordance with the developed procedure as follows:

* theoretical knowledge test in writing;
* test of the knowledge of equipment and its location in-situ;
* demonstration of practical experience on simulator to evaluate the skills of maintaining normal and emergency modes;
* oral interview, etc.

A combination of written and oral techniques has been found to be the most   
appropriate for demonstrating knowledge and performance. Assessment of simulator training should utilize previously prepared checklists to improve objectivity.

Knowledge test shall be carried out by the examination committee in order to identify whether an employee is ready to fulfill his job duties according to the job description. The number of committees at the plant and the list of persons whose knowledge is to be tested by these committees are determined taking into account the need to ensure proper knowledge test in a timely manner. If the exam result is positive, a training completion certificate is issued that gives the right to further participate in the procedures for admission to independent work.

1. **Continuous training**

Continuing training is that training necessary to maintain and enhance the competence of nuclear plant staff in terms of their knowledge, skills and attitudes. It can also include training to improve the career development potential of   
selected individuals. Continuing training programs must therefore be regarded as an integral part of the operations of a nuclear plant .

Continuing training program shall be carried out on a annual basis. Included in the program should be all groups of personnel whose functions are important to the safe operation of the nuclear plant .

All site personnel shall have continuing training in the performance of their duties in an emergency.

Persons occupationally exposed to ionizing radiations shall receive periodic training in radiation protection.

Operators should undergo formal continuing training on a regular basis and the time needed for this should be taken into account when work schedules are established. Continuing training at a simulator facility is of primary concern. Simulator training   
exercises should be planned annually and at least twice a year. Such exercises should   
reflect operating experience with emphasis on those situations which do not occur   
frequently:

* start-up;
* shutdown;
* transient modes;
* accident conditions.

In the case of the maintenance group, refresher training should be given on   
infrequently performed maintenance activities.

The continuing training should include updates on the plant and procedural changes or modifications, operating experience gained in-house and elsewhere in the industry as well as trends in job performance.

1. **Emergency training**

A schedule of emergency response training shall be made annually. The objectives of the training are as follows:

* systematic testing of the personnel's ability to perform fast and correct accident management on their own;
* training the personnel in the ways to prevent and remedy the adverse effects of accidents;
* developing skills in functioning as a shift in case of an accident, and interaction with fire-fighting personnel, medical personnel and the personnel of other engaged divisions;
* testing the skills in administering first aid, use individual protection devices, fire extinguishing agents, etc.;
* drills in arranging for the evacuation of people.

Emergency response training usually is conducted at workplaces or simulators. The following topics shall be studied within the scope of the emergency response training:

* drills for the personnel's actions in case of abnormal operation of the NPP and design basis accidents;
* drills for the personnel's actions in case of radiological accidents;
* drills for the personnel's actions aimed at suppression of various fires;
* nuclear safety analysis;
* applicable codes, rules and regulations;
* information concerning the NPP's reliability margin;
* symptom-based procedures;
* accident management measures.

Fire-fighting drills are conducted at workplaces, training ranges, simulators and teaching models (drills in smoke simulation training facilities, psychological training at the fire band, fire extinguishing at energized units). The results of the emergency response and fire-fighting drills shall be entered into a special training log. The results of the crisis management drills shall be considered at a meeting of the NPP Emergency Situation Commission and appropriately documented.

The objectives of the fire-fighting training are as follows:

* the skills to get one's bearings fast and correctly and correct decisions under fire conditions;
* training in the skills to prevent potential damage to the equipment and the personnel's injuries during a fire;
* drills in organizing immediate call-out for the fire protection service when automatic fire protection devices are tripped, smoke generation or fire is identified;
* drills in taking necessary actions to suppress fire, including at electric plants;
* drills in the interaction between the NPP personnel and fire brigades;
* training in correct use of fire extinguishing equipment;
* drills in organizing rescue and evacuation of people and material valuables;
* checking the correctness of the actions taken by the fire ground commanders.

The following shall be conducted prior to the first power unit commissioning:

* each shift personnel shall be trained using the whole NPP, including one drill involving fire departments and medical personnel;
* two drills of the operating personnel for the most distinctive disturbances in the NPP power unit operation, with one of them involving fire-fighting elements.

1. **Training for Senior Management (Category I)**

Senior managers shall be experts in the respective technical fields who have taken basic training courses and have vast experience in the nuclear field. They shall have deep knowledge of the relevant standards, rules and instructions, and good knowledge of the NPP and its systems. Persons holding positions of responsibility in the system of emergency preparedness organization shall be specially trained in their duties in emergency conditions.

Since managers hold senior positions in the NPP organizational structure, it is necessary that they develop special skills in educating their subordinate personnel, primarily by personal example, committed approach to the need to consider safety as one of the objectives of day-to-day operation.

There shall be a program to train managers so that there be the sufficient number of qualified employees to replace any senior management positions when in immediate need of this. The training of managers and their prospective successor shall conducted as courses and seminar for developing skills in management and control.

Training plan of the main courses for category I personnel training by topics:

1. Entry level tests

2. Management Fundamentals

3. NPP operation organization

4. Quality assurance

5. Repair organization and planning

6. NPP equipment:

* *components;*
* *systems.*

7. Safety Culture

8. "Human factor"

9. Interview for the knowledge of the learned material.

1. **Special Training for Operating Personnel (Category II)**

Operators shall take the basic training provided for the personnel and basic training in operation intended for Category II personnel.

The systematic training shall cover those technical fields that are needed to perform the established functions. Such training shall facilitate the formation of deep theoretical and practical knowledge of NPP systems, their functions, location and operation. It is useful to work at the NPP during the pre-operational period and its startup. Emphasis shall be placed on systems having safety significance. The training shall emphasize the importance of maintaining the plant within the operating   
limits and conditions and the consequences of the violation of these limits.

Operators should also get extensive experience in plant diagnostics,   
control manipulations, team work and administrative tasks. Shift Supervisors should additionally be trained in supervisory techniques and communication skills. Their training should in general be more broadly based than that of other operators.

The training of control room operators should consist of:

* classroom lectures and seminars;
* on-the-job training;
* simulator training.

On-the-job training should be planned and controlled to ensure that all necessary topics are completed during the training period. Simulator exercises should be structured and planned in detail   
to ensure adequate coverage of relevant topics: normal and abnormal operation modes, emergencies. The exercises should include preliminary briefings and follow-up critiques.

Training at a representative full scope simulator facility is of paramount importance for operators who work in real time with immediate consequences on the plant behaviour and who may be confronted with abnormal situations which have low probability of occurrence and which cannot therefore be enacted in real plant practice. Consideration shall be given to training MCR staff as a unit to develop strength in interaction as members of a team.

Trainees shall learn routines for normal operation of the plant and the response of the equipment to changes that could cause damaging accidents if not counteracted. The program shall improve the diagnostic skills of the trainees. Operating procedures for normal operation and anticipated operational occurrences as well as appropriate actions for design basis accidents and, as far as practicable, for severe accidents shall be included in the program and shall be practiced at the simulator, so that the trainees may recognize the negative consequences of errors or violations of the procedures.

All operating personnel shall have detailed knowledge of the operational features of the plant and hands-on experience. This knowledge shall cover both the MCR and the plant as a whole.

Training plan of the main courses for category 2 personnel training by topics:

1. Entry level tests

2. Management Fundamentals

3. NPP operation organization

4. Quality assurance

5. Repair organization and planning

6. NPP equipment:

* *components;*
* *systems.*

7. Safety culture.

8. "Human factor".

9. Interview for the knowledge of the learned material.

1. **Training for maintenance personnel (Category III)**

Initial training of maintenance staff shall develop knowledge about plant layout and the general features and purposes of plant systems, quality assurance and quality control, maintenance procedures and practices, including surveillance and inspections, and special maintenance skills.

Training of maintenance staff shall emphasize the potential safety consequences of technical or procedural errors. Past experience of faults and hazards caused by such errors shall be reviewed.

* Controls should be established to ensure that maintenance personnel are qualified   
  on equipment to which they are assigned to work. This qualification could be   
  based on:
* training given by the component manufacturer;
* training on equipment   
  mock-ups;
* on-the-job training under supervision by experienced staff.

Maintenance personnel should have access to training mock-ups and models for training in maintenance activities that have to be carried out quickly and cannot be practiced with actual equipment. Evaluation of each individual’s skills and knowledge in performing a given maintenance activity should normally precede qualification.

Training plan of the main courses for category 3 personnel training by topics:

1. Entry level tests

2. NPP operation organization

3. NPP equipment:

*- components;*

*- systems.*

4. Safety culture.

5. "Human factor".

6. Interview for the knowledge of the learned material.

1. **Training of other technical personnel**

Personnel involved in chemistry, health physics, nuclear engineering or other   
functions should have qualifications and receive training appropriate to their jobs and responsibilities. Such training should be determined by a systematic approach as described above for operators and maintenance personnel.

Technicians may be assigned to carry out work similar to their own at other plants or with equipment suppliers. Emphasis shall be placed on the development of specific skills, with classroom training limited to essentials. In some cases, laboratories and part-scope simulators may have to be established to impart basic and specific skills.

Craftsmen shall receive general employee training and some overall plant training. The main objective shall be to impart and develop the basic and specialized skills required for work on the installed equipment. Methods to achieve this objective could include:

* attaching persons to suppliers of equipment and components;
* and assignment to construction groups.

The basic skills could also be developed with the help of part scope simulators, as appropriate.

1. **Training time and schedules**

The time and schedules of training for the Bushehr-2 NPP personnel will be provided in FSAR.

1. **Training curricula**

The training curricula for the main operating personnel are given in Annex A.

* 1. **Coordination with pre-operational tests and fuel loading**

A few senior professionals, including in particular the Plant Director and his   
deputies, shall be recruited at the beginning of the recruitment period, since one of   
their first duties is to plan and carry out further recruitment and training. This group should increase in number with the ongoing training and other pre-operational activities. Particular attention shall be given to an early recruitment of Shift Supervisors and senior operators.

Relatively early recruitment of operators and technicians is advisable as time will also be needed for training and some of their duties start before the commencement of commissioning. The initial recruitment of these personnel may start about   
a year later than the recruitment of persons in the professional category, especially   
if operators and technicians with substantial previous experience are recruited. As junior staff are appointed, they shall be placed in training groups and be given pre-operational duties. The increase in personnel shall be brought about in steps so as   
to facilitate organized training.

An important aspect of training for some operators and technicians could be working with the construction organization in the checking and initial calibration of instruments and controls and in initial operation of equipment prior to fuel loading. Some individuals may thus be located at the site well before the commencement of operation, and others may be sent to suppliers’ plants to acquire experience with new and complex equipment.

The initial recruitment of the most experienced craftsmen should start about one year after recruitment of those in the operators and technicians category. They may receive specialized training at suppliers’ plants during the assembly and preshipment testing of special equipment. Personnel should continue to be recruited at a rate commensurate with the length of training they will require and also with the opportunities available to place them into the construction and commissioning work to provide experience with the installed equipment and systems.

The Contractor's operating personnel shall undergo the following prior to the commissioning works for Bushehr-2 NPP:

* medical examination and psychophysiological testing;
* required theoretical training;
* assessment of the knowledge of nuclear power rules and norms, operational procedure and instructions for Bushehr-2 NPP.

The training of the Contractor operating personnel shall be completed at least one month before the Bushehr-2 NPP pre-start adjustment work.

The following shall be conducted regularly for the Contractor operating personnel during their work at Bushehr-2 NPP:

* technical training and briefing on the changes introduced to the systems and equipment of the power unit during the pre-commissioning activities;
* emergency training;
* medical examination.

The Principal's personnel shall be selected with consideration for the requirements for education, qualification, work experience and health status established by the Principal and approved by the Contractor.

During the commissioning works and trials of Bushehr-2 NPP, the Principal's operating personnel shall take the training and shadowing at workplaces under guidance of the Contractor's operating personnel. Each shift of the Principal's operating personnel shall whenever possible be there in accordance with the power unit normal operation conditions, perform the power unit startup in full under the Contractor's control from the hot shutdown state to the level of the Permissible power, and power unit shutdown from the Permissible power level to the hot shutdown state. The Principal's operating personnel shall have the skills to start up the NPP from the cooled state, and be able to shut down the NPP to the cooled state.

1. Replacement and re-training
   1. **Further training of personnel without certificates**

Professional further training shall include:

1. training in institutions of additional education;
2. training in the personnel training system of the operating organization.

Professional further training shall be performed:

For specialists:

1. with a view to their obtaining additional knowledge, skills and abilities in educational programs that foresee study of certain disciplines necessary to perform a new type of professional duties;
2. to expand the qualification of specialists in order to adapt them to new economic and social conditions, conduct new professional duties, including taking into account international requirements and standards.

For workers with the purpose of obtaining a new qualification (profession) or specialty.

Professional further training of specialists is carried out as off-the-job, on-the-job training, partial-the-job training.

Professional further training of workers is organized with the purpose of mastering new professions by the freed-up workers who cannot be used according to their available professions, as well as by persons who have expressed a desire to change their profession in accordance with the manufacturing requirements. When developing training plans for further training of workers, it is possible to reduce programs by eliminating previously studied material, taking into account the actual level of professional and economic knowledge, skills and abilities of trainees. Further training of workers is terminated by passing the qualification examinations.

Professional further training of workers can be realized in the educational departments of the Bushehr-2 NPP, in vocational training institutions, training centers.

* 1. **Training of personnel filling the office**

Personnel, whose duties include filling the office of other employees during their absence, is required to undergo training and testing of knowledge in a scope of filling the office positions.

The list of specialists having the right to fill the office is determined by the management of Bushehr-2 NPP. The right of a specialist to fill the office must be recorded in the job description.

1. Documents used when preparing Section 13.2

The following documents have been used to develop the Section:

1. Act on Safe and Peaceful Use of Nuclear Power in the Republic of Iran;
2. Bushehr-2 NPP Construction Contract;
3. Appendix I to the Bushehr-2 NPP Construction Contract;
4. Quality Assurance Program Guidance, AEOI/NPPD;
5. IAEA Safety Guide 50-SG-01 Staffing of Nuclear Power Plants and the Recruitment,. Training and Authorization of Operating Personnel;
6. Russian Federal Law “On Atomic Energy Use” No. 170-FZ;
7. PORP-2015. Regulation for Management of Personnel at Nuclear Power Plants;
8. Bushehr-2 NPP Preliminary Safety Analysis Report.

1. Emergency planning
2. Preliminary planning (PSR)

Emergency planning at the Bushehr-2 NPP, unit 2, will be developed taking into account 52.BU.1 0.00.AB.WI.ATEX.015, revision 2, 2015.

"The activity plan for the protection of personnel in the event of an emergency at the Bushehr-2 NPP, power units 2,3" (hereinafter referred to as the "Plan for the protection of personnel" will be developed in accordance with the requirements of the "Order on the safety and use of nuclear energy in peaceful purposes in the Republic of Iran".

A “personnel protection plan” will be developed based on a study of reference beyond design basis accidents with the worst consequences for personnel and the public. According to chapter 15 of the PSAR, a large coolant leakage due to rupture in the absence of core cooling is taken as a similar beyond design basis accident for the Bushehr-2 NPP.

* 1. Emergency targets

1. Activities performed in the mode of disruption of normal operation at nuclear power plants and in the event of an emergency, pursue the following objectives:
2. taking control of the situation;
3. prevention or minimization of consequences at the scene.

The objectives of actions in emergency situations are achieved due to the presence of the necessary structures, operational and technical documents, qualified and trained personnel with the required personal protective equipment and equipment, as well as due to the clear definition and delimitation of the spheres of responsibility of persons and their actions.

To achieve the practical goals of emergency response at NPP, an emergency management service was created, which ensures maximum efficiency of emergency control, mitigation of the consequences of accidents, protection of personnel, the public and the environment.

1. This "Personnel Protection Plan" is the basic document for the establishment of the above-mentioned service at NPP. It defines the structure of the emergency management service, the procedure for taking actions, the list of participants and the extent of their responsibility in the event of an emergency, and also provides:

* maintaining the personnel and facilities of emergency management at the Bushehr-2 NPP in a state of constant readiness;
* implementation of emergency protective actions in the event of an accident at a nuclear power plant.

1. The ultimate goal of the "Personnel Protection Plan":
2. Preventing the deterministic effects of radiation exposure (death or injury) by:

* taking protective measures before or immediately after the emission or exposure to radiation due to destruction caused by the accident in the core;
* prevention of radiation exposure on the population and people working to eliminate the accident, in doses exceeding the threshold values ​​for the development of deterministic effects.

1. Reducing the risk of stochastic effects of radiation exposure (mainly cancer and severe genetic effects of radiation) by:

* taking protective measures in accordance with the requirements of regulatory documents;
* prevention of exposure of emergency workers to doses exceeding the recommended limits.
  1. Planning of zones
  2. Actions in emergency situations at nuclear power plants should be carried out in a timely manner and be organized without prejudice to the safety functions constantly performed by personnel.

Actions in emergency situations outside the industrial site should be effectively managed and coordinated with the actions to eliminate the accident carried out at the industrial site.

* 1. In most emergency situations, emergency response actions should be carried out in two main areas:
  2. Industrial site area

The NPP zone located inside the perimeter of the fence is under the direct control of the management of the Bushehr-2 NPP.

* 1. Area outside the site

The zone outside the perimeter of the NPP fence is the responsibility of the Bushehr provincial administration, as specified in the RG-BL-01-01 “Population Protection Plan”

* 1. The planning level for different zones differs depending on their distance from the NPP. For the Bushehr-2 NPP, the following emergency planning zones have been established:
  2. Preventive action area:

The designated zone of the nuclear power plant, for which emergency protective actions are planned, and in which emergency protective measures should be applied immediately after the announcement of the "Emergency" at the nuclear power plant. The boundaries of the precautionary action zone coincide with the boundaries of the protected area around the NPP and pass around the perimeter of the station (PSAR, Chapter 15).

* 1. Emergency Protective Zone:

The specified area around the station, in which the planning of actions in case of an accident has been carried out in advance, and there is a willingness to promptly perform protective actions on a signal from the NPP announcing the "Emergency".

The boundaries of the zone of emergency protective actions are outlined by the station perimeter (inner boundary) and circles with a radius of 5 km (outer boundary). The NPP is responsible for timely notification of emergency and issuing recommendations to the population living in the area: Bandarga, Morvarid, Saddaf, Hele-Heyle, as well as the administration of the city Bushehr.

* 1. Zone of long-term protective actions:

Specified area around the station, in which preparation was carried out in advance for the effective implementation of protective actions to limit the long-term effects of radiation, precipitation and consumption of contaminated food. The zone of long-term protective actions is limited from the inside by the boundary of the zone of emergency protective actions, and a circle with a radius of 30 km from the outside.

* 1. These zones have an approximately annular shape with a center corresponding to the location of the ventilation pipe of the nuclear power plant. The sizes of these zones are established according to the results of studies of the potential effects of radiation exposure and nuclear accidents of all types. The boundaries of the zones should be clarified on the basis of local landmarks (roads, rivers) so that they can be easily distinguished from each other when the accident is eliminated. It must be borne in mind that state borders do not interrupt the boundaries of planning zones.
  2. Scope

1. The requirements of the Plan of personnel protection apply to the personnel of the Bushehr-2 NPP, personnel of the special safety and fire service, as well as personnel temporarily assigned to work at the Bushehr-2 NPP. These requirements must be met at the Bushehr-2 NPP industrial site, within the boundaries of the sanitary protection zone and in the area of the town of Morvarid in terms of protecting the personnel of the Bushehr-2 NPP and their family members.
2. Plans for actions in emergency situations of organizations (companies) conducting production and economic activities at the Bushehr-2 NPP and within the sanitary protection zone should be developed by the administrations of the respective organizations, taking into account the provisions of the Plan of personnel protection and the requirements of the current regulatory radiation safety documentation.
3. Development of activities plans for the protection of the population in the city and other areas within the zone of observation of radioactive contamination around the Bushehr-2 NPP should be carried out by the administration of these territories in accordance with the regulatory legal acts of the Republic of Iran and current regulatory documents on emergency response planning.
4. Emergency planning should be carried out at two main levels.
   1. The first level is a nuclear power plant, on which there must be readiness to implement measures to localize the accident, mitigate potential consequences at the nuclear power plant and notify officials outside the plant about the occurrence of a hazard.
   2. The second level is the management outside the NPP, which should be ready to take actions to reduce the impact of the accident on the population. This Plan Personnel Protection regulates the actions of organizations, fully covering potential accidents, from major reactor accidents to accidents with a small amount of radioactive materials and natural disasters.
5. Information about the measures for the population protection (SAR) .

This section will be presented in the PSAR of the Bushehr-2 NPP.

.

1. Analysis and Revisions
2. Site analysis
3. Independent analysis
4. Audit program

The initial data from the Principal as per IRI normative and regulatory documentation are required for this subsection elaboration in terms of inspections and checkouts, as specified in Para 3 of draw up minutes of the meeting on initial data for Chapter 13 elaboration of the Bushehr-2 NPP PSAR dated 24-25.10.2017.

1. Events at the NPP
2. Administrative activities
3. Commissioning and maintenance

The initial data from the Principal are required for this subsection elaboration in terms of the Bushehr-2 NPP project management structure, as specified in Para 1 of draw up minutes of the meeting on initial data for Chapter 13 elaboration of the Bushehr-2 NPP PSAR dated 24-25.10.2017.

1. Physical Protection
2. General Provisions

Physical protection for the Bushehr-2 NPP is fully described in a separate confidential document, which is not to be disclosed. This document is being developed taking into account the recommendations of the IAEA “nuclear safety recommendations on physical protection of nuclear materials and nuclear facilities” (INFCIRC/225/Revision 5).

This section presents only general provisions for ensuring the physical protection of the Bushehr-2 NPP (without providing detailed information on locations and technical characteristics of engineering and technical means of the physical protection system, etc.), which is strictly confidential.

The physical protection is a state of protection of the vital assets of person, property, society, and the environment from physical actions and events that could cause serious loss damage.

The system of physical protection an integrated set of physical protection measures intended to prevent the completion of a malicious act.

The physical protection of the Bushehr-2 NPP is ensured by creating a physical protection system for the Bushehr-2 NPP and selecting a protection plan, as well as the necessary personnel for protection.

Responsibility for the effective operation of the physical protection system of the Bushehr-2 NPP and ensuring the protection of the facility rests with the Atomic Energy Organization of Iran.

The physical protection system of the Bushehr-2 NPP is a complex of organizational and technical measures aimed at preventing and eliminating the hazards associated with inadequate actions of personnel and other persons in relation to nuclear materials or systems, equipment and devices of the Bushehr-2 NPP, which may lead to emergencies and threats to the health and safety of the personnel of the Bushehr-2 NPP and the public, associated with the risk of exposure. The physical protection system of the Bushehr-2 NPP during operation performs the following tasks:

* protection against theft or other unlawful taking of nuclear material;
* ensuring the implementation of rapid and comprehensive measures to locate and, where appropriate, recover of missing or stolen nuclear materials;
* protection of nuclear materials and nuclear facilities against sabotage;
* Mitigation or minimization the radiological consequences of sabotage.

1. Physical protection areas

The system of physical protection, in accordance with the recommendations of the IAEA on the physical protection of nuclear material and nuclear facilities, is made in-line and includes the following types of areas:

1. **Limited access area.** Designated area containing a nuclear facility and nuclear material to which access in limited and controlled for physical protection purposes;
2. **Protected area.** Area inside a limited access area containing Category I or II nuclear material and/or sabotage targets surrounded by a physical barrier with additional physical protection measures.
3. **Vital area**. Area inside a protected area containing equipment, systems or devices or nuclear material the sabotage of which could directly or indirectly lead to high radiological consequences.

The physical protection system includes three functionally interconnected subsystems:

1. perimeter physical barriers (passive means) (building structures, barriers, gates, walls, etc.);
2. a set of technical equipment and equipment for a physical protection system (engineering and technical equipment, an alarm system, automated tools, etc.);
3. a subsystem of organizational measures for the prevention and suppression of malicious actions and the execution of response (NPP safety service, personnel, access control, etc.).

Main functions of automated physical protection system at BNPPр‑2 are as follows:

1. Automatic detection of authorized access to the territory of BNPP‑2 to the protected zones, premises and buildings;
2. Intrusion prevention by engineered means
3. Urgently calling the response forces and for informing about the commitment of illegal actions
4. Automatic control of access to the territory of BNPP‑2 to the protected zones, premises, rooms and buildings;
5. A 24-hour video surveillance of the situation on periphery and at the territory of BNPP‑2, in the protected zones, premises, rooms and buildings
6. Safety Control Implementation
7. Automatic accounting for ~~the~~ presence of the personnel on site and for protected zones state;
8. Providing continuous communication between all departments and agencies that are responsible for physical protection BNPP‑2;
9. Detection and prevention of the unauthorized delivery of prohibited objects to the site: Weapons, explosive agents as well as export of nuclear materials from the site;
10. Protection of data, related to physical protection of BNPP‑2 from an unauthorized access;
11. Long-term archiving, copying, and data recording of all physical protection systems
12. System survivability and fault-safe properties providing;
13. Continuous power supply for system equipment;
14. Integration of individual functional technical systems and means of the NPP physical protection system into a joint system and to organize automated fulfillment of guard-related tasks
15. Remotely observing the approaches to protected areas, parts of perimeters, and other areas of the space in order to assess the current situation, to monitor the behavior and advancement of intruders, coordination of PPS personnel activities, and archiving of visual information

NOTE: detailed information will be provided in the PSAR of the Bushehr-2 NPP.

Appendix A  
   
 Thematic plans for training of personnel of the Bushehr-2 NPP

**Curriculum of training for the 1st category personnel under Shift Supervisor Program**

**I** Basic course

**II** Course on turbine compartment

*Classroom training*

1. Composition, purpose, design and technical parameters of turbine compartment process systems and equipment, operation requirements.

2. Turbine - main components, design, purpose, principle of operation, operation requirements.

3. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

4. Electric equipment of turbine compartment.

5. Operation of the Unit, including the turbine plant (TP) in normal operation, failure, abnormal operation and emergency modes,

6. Secondary circuit water chemistry.

7. Changeover to standby equipment.

8. Tests of safety systems.

9. Knowledge testing.

*Simulator training*

1. Preparation of equipment and process systems for operation.

2. Start-up of turbine plant and unit.

3. Unit operation at permissible power level.

4. Start-up of turbine plant and unit.

5. Operation of turbine plant and unit in failure, abnormal operation and emergency modes.

6. Changeover to standby equipment.

7. Training tests.

**III** Course on reactor compartment

*Classroom training*

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of reactor plant process systems and equipment, operation requirements.

3. Equipment maintenance.

4. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

5. Primary circuit water chemistry.

6. Reactor Shop electric equipment.

7. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

8. Basic information on secondary circuit equipment - turbine compartment.

9. Operation of reactor plant and unit in normal operation modes, failure, abnormal operation and emergency modes.

10. Tests of safety systems.

11. Knowledge testing.

*On-the-job training at operating Unit*

*Simulator training*

1. Preparation of equipment and process systems for operation.

2. Start-up of reactor plant and unit.

3. Unit operation at permissible power level.

4. Shutdown of reactor plant and unit.

5. Operation of reactor plant and unit in failure, abnormal operation and emergency modes.

6. Changeover to standby equipment.

7. Training tests.

**III** Course on Chemistry and Dosimetry Department

*Classroom training*

1. Water treatment and water chemistry at NPPs with VVER-1000.

2. Facilities for adjusting the primary and secondary circuits water chemistry.

3. Facilities for adjusting the water chemistry of the circulation systems at NPPs with VVER-1000.

4. Chemical monitoring at NPPs with VVER-1000.

5. Radiation and in-process monitoring.

6. Knowledge testing.

**III** Course on Electrical Department

*Classroom training*

1. Purpose, operating principle and design of generator.

2 Synchronization with the power system

3. Purpose and operating principle of excitation system.

4. Purpose and operating principle of generator.

5 generator protection activation.

6. Purpose, operating principle and design of transformers (autotransformers).

7. Protections and operation modes of transformers (autotransformers).

8. Switchgears.

9. Schematic control diagrams of consumers.

10. Reliable power supply system of group 2 consumers.

11. Standby power supply system of group 1 consumers.

12. Main electric circuits of outdoor switchgear.

13. diesel generators and batteries

14. Knowledge testing

**VI** Course on instrumentation and control systems

*Classroom training*

1. Design and functional structure of APCS hardware at NPP.

2. Nuclear physical control by in-core instrumentation system (ICIS).

3. Thermal monitoring, instrumentation.

4. Unified Set of Hardware (USHW). USHW components.

5. Process protections and interlocks.

6. Automatic controllers.

7. Process alarm.

8. Neutron flux monitoring equipment.

9. Reactor control and protection system.

10. Information computation systems.

11. Automated turbine control system.

12. Centralized control over the process parameters of generator.

13. Electric power supply of TAM equipment.

14. Knowledge testing.

**VII** Special course on workplace

*Classroom training*

1. Interaction of NPP SS with the dispatching service of power grid.

2. NPP SS - emergency localization and elimination manager.

3. NPP SS response to fire at Bushehr-2 NPP.

4. NPP SS response to initiation of personnel and population radiological emergency plan.

5. Knowledge testing.

**VIII** On-the-job training at operating power unit

**IX** Practical guide for simulator training for shift personnel

1. MCR personnel interaction training.

2. Unit normal operation training.

3. Equipment failure training.

4. Equipment abnormal operation training.

5. Emergency training.

6. Training tests.

**X** Bushehr-2 NPP on-site on-the-job training

**VIII** On-the-job training at operating power unit

**XII** Simulator training

**XIII** Certification

**Curriculum of training for the 1st category personnel under Instructor Program**

Nuclear sub-divisions

Production department

**I** Basic course

**II** Course on reactor compartment

*Classroom training*

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of reactor plant process systems and equipment, operation requirements.

3. Equipment maintenance.

4. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

5. Primary circuit water chemistry.

6. Reactor Shop electric equipment.

7. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

8. Basic information on secondary circuit equipment - turbine compartment.

9. Operation of reactor plant and unit in normal operation modes, failure, abnormal operation and emergency modes.

10. Tests of safety systems.

11. Knowledge testing.

**III** Course on turbine compartment

*Classroom training*

1. Composition, purpose, design and technical parameters of turbine compartment process systems and equipment, operation requirements.

2. Turbine - main components, design, purpose, principle of operation, operation requirements.

3. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

4. Electric equipment of turbine compartment.

5. Operation of the Unit, including the turbine plant (TP) in normal operation, failure, abnormal operation and emergency modes,

6. Secondary circuit water chemistry.

7. Changeover to standby equipment.

8. Tests of safety systems.

9. Knowledge testing.

**IV** On-the-job training at operating power unit

**V** Special course

**VI** Bushehr-2 NPP on-site on-the-job training

**VII** Certification

**Curriculum of training for Production and Technical Department personnel**

Training of category 2 personnel under the program of fire-fighting system operation engineer

Production department

**I** Basic course

**II** Special course

1. Synchronous generator.

1.1. Purpose, operating principle, design.

1.2. Operation specifics of generator gas cooling system.

1.3. Operating principles of main generator protections that may cause fire.

2. Transformers (autotransformers).

2.1. Purpose, design and operating principle.

2.2. Operating principle of protections enabling fire-fighting systems.

3. Auxiliary switchgear.

3.1. Purpose and location of switchgears.

3.2. Switchgear fire extinguishing equipment.

4. Reliable power supply system of the loads.

4.1. Diesel-generator, purpose, equipment, process systems.

4.2. Fire-fighting system of diesel-generator station.

4.3. General requirements for accumulator battery rooms

5. Cable facilities.

5.1. Types of cables used at NPP.

5.2. Fire hazard of cables and fire-fighting protection of cable rooms.

5.3. Fire extinguishing in cable rooms.

6. NPP fire-fighting system.

6.1. Fire-fighting system equipment and its operating principle.

6.2. Fire-fighting equipment.

6.3. Operating principle of automatic fire fighting system.

6.4. Main principles of NPP fire protection.

6.5. Means and methods used to prevent and extinguish fire at NPP.

6.6. Arrangement of firefighting at NPP.

7. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Bushehr-2 NPP on-site on-the-job training

**V** Certification

**Training of category 3 personnel under the program of Reactor Plant Equipment Operator**

**I** Basic course

**II** Classroom training

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of the process systems and equipment to be maintained by the operator, operation requirements.

3. Operation of reactor plant systems and equipment in normal operation modes, failure, abnormal operation and emergency modes.

4. Primary circuit water chemistry.

5. Automatic control of RP thermal processes, protections and interlocks of the primary circuit equipment.

6. Electric equipment of reactor compartment.

7. Equipment maintenance.

8. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

9. Arrangement of workplace and maintenance of operational documentation.

10. Administrative, technical and operational subordination.

11. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 3 personnel under the program of Reactor Compartment Mechanical Technician**

**I** Basic course

**II** Classroom training

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of the reactor plant process systems and equipment to be maintained by the inspector, operation requirements.

3. Operation of reactor plant systems and equipment in normal operation modes, failure, abnormal operation and emergency modes.

4. Equipment maintenance.

5. Taking the equipment out for repair, putting the equipment into operation after repair

6. Arrangement of workplace and maintenance of operational documentation.

7. Administrative, technical and operational subordination.

8. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 3 personnel under the program of Turbine Compartment Auxiliary System Operator**

**I** Basic course

**II** Classroom training

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of the process systems and equipment to be maintained by the operator, TP operation requirements.

3. Operation mode of equipment and systems to be maintained by the turbine compartment operator.

4. Secondary circuit water chemistry.

5. Automatic control of turbine and thermal processes, protections and interlocks of turbine plant equipment.

6. Electric equipment of turbine compartment.

7. Equipment maintenance.

8. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

9. Arrangement of workplace and maintenance of operational documentation.

10. Administrative, technical and operational subordination.

11. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 3 personnel under the program of Turbine Compartment Technician**

**I** Basic course

**II** Classroom training

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of the process systems and equipment to be maintained by the turbine equipment inspector, operation requirements.

3. Operation modes of equipment and systems to be maintained by the turbine compartment inspector.

4. Equipment maintenance.

5. Taking the equipment out for repair, putting the equipment into operation.

6. Changeover to standby equipment.

7. Arrangement of workplace and maintenance of operational documentation.

8. Administrative, technical and operational subordination.

9. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 3 personnel under the program of All-Plant Systems Technician**

**I** Basic course

**II** Special course

1. Diesel generator station.

1.1. Purpose, structure of equipment and its operating principle.

1.2. Operating principle of DG process systems.

1.3. Procedure of DG test run.

1.4. Operation modes.

2. Nitrogen-oxygen plant.

2.1 Purpose, equipment components and operating principles.

2.2. Operating principle of gas separation system.

2.3. Procedure of plant start and shutdown.

2.4. Operation modes of nitrogen-oxygen plant.

3. Electrolysis plant.

3.1 Purpose, equipment components and operating principles.

3.2. Sequence of preparation for Electrolysis plant startup.

3.3. Operation modes of Electrolysis plant.

4. Compressor units.

4.1 Purpose, equipment components and operating principles.

4.2. Operation modes.

5. NPP On-shore pump station.

5.1. Purpose and components of pump station equipment.

5.2. Operation modes of pumping equipment/

6. Knowledge testing.

**III** On-the-job training at operating power unit

1. Workplace study.

2. In-situ study of equipment and its operation modes.

3. Monitoring of process evolution.

4. Knowledge testing.

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 3 personnel under the program of All-Plant Systems Electrical Technician**

**I** Basic course

**II** Special course

1. Diesel-generator stations (DGS).

1.1. Purpose, structure of DGS equipment and its operating principle.

1.2. Purpose, composition and operation principle of DG process system.

1.3. Operating principle of synchronous generator, protections, interlocks.

1.4. DGS operation modes.

2. Nitrogen-oxygen plant.

2.1. Purpose, components of equipment and operating principle.

2.2. Operating principle of the main equipment and its operation modes.

3. Electrolysis plant.

3.1. Purpose, components of equipment and operating principle.

3.2. Operating principle of rectifier unit.

3.3. Operation modes of Electrolysis plant.

4. Compressor units.

4.1. Purpose, components of equipment and operating principle.

4.2. Electric control and interlock circuits of compressor unit drives.

4.3. Operation modes.

5. NPP On-shore pump station.

5.1. Purpose and components of pump station equipment.

5.2. Electric control and interlock circuits of pump drives.

5.3. Operation modes of pumping station equipment.

6. Knowledge testing.

**III** On-the-job training at operating power unit

1. Workplace study.

2. In-situ study of equipment and its operation modes.

3. Monitoring of process evolution.

4. Knowledge testing.

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 3 personnel under the program of Electrical Technician**

**I** Basic course

**II** Special course

1. Reactor plant (RP).

1.1. Components, purpose, design and technical characteristics of RP systems and equipment.

1.2. Operation of RP systems and equipment.

1.3. RP equipment maintenance.

1.4. Taking the equipment out for repair and putting it into operation.

2. Synchronous generator.

2.1. Purpose, operating principle, design.

2.2. Operation specifics of generator gas cooling system.

2.3. Probable reasons for fire in generator.

2.4. Personnel response to fire in generator.

3. Transformers (autotransformers).

3.1. Purpose, design and operating principle.

3.2. Operating principle of the main protections of transformers (autotransformers) enabling automatic fire-fighting system.

3.3. Personnel response to fire in transformers.

4. Switchgears

4.1. Purpose and design of switchgears.

4.2. Purpose of switchgear electric protections and personnel response to their actuation.

4.3. Main fire extinguishing equipment of switchgear.

5. Storage batteries.

5.1. Purpose and operating principle of accumulator batteries.

5.2. Requirements for accumulator battery rooms.

6. Diesel generator station.

6.1. Purpose of the process systems of diesel generator stations.

6.2. Fire-fighting system of diesel-generator station.

7. Cable facilities.

7.1. Types of cables used at NPP.

7.2. Fire-fighting system in cable rooms.

7.3. Types and operating principles of fire detectors (sensors) used in cable rooms.

8. Firefighting system at NPP.

8.1. Firefighting water system.

8.2. Fire-fighting system equipment and its operating principle.

8.3. Power supply circuits of fire-fighting system alarm circuits.

9. Knowledge testing.

**III** On-the-job training at operating power unit

1. Study of workplace and technical and operational documentation.

2. In-situ study of fire-fighting system.

3. In-situ study of control of pumps and fire-fighting system, shut-off valves and fire extinguishing equipment.

4. Knowledge testing.

**IV** Practical training on equipment (in Iran)

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 2 personnel under the program of System Test Engineer.**

Production department

Technical Department

Quality assurance service

**I** Basic course

**II** Course on turbine compartment

Classroom training

1. Composition, purpose, design and technical parameters of turbine compartment process systems and equipment, operation requirements.

2. Turbine - main components, design, purpose, principle of operation, operation requirements.

3. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

4. Electric equipment of turbine compartment.

5. Operation of the Unit, including the turbine plant (TP) in normal operation, failure, abnormal operation and emergency modes,

6. Secondary circuit water chemistry.

7. Changeover to standby equipment.

8. Tests of safety systems.

9. Knowledge testing.

**III** Course on reactor compartment

Classroom training

1. Study of regulatory and technical documents according to the work position.

2. Composition, purpose, design and technical parameters of reactor plant process systems and equipment, operation requirements.

3. Equipment maintenance.

4. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

5. Primary circuit water chemistry.

6. Reactor Shop electric equipment.

7. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

8. Basic information on secondary circuit equipment - turbine compartment.

9. Operation of reactor plant and unit in normal operation modes, failure, abnormal operation and emergency modes.

10. Tests of safety systems.

11. Knowledge testing.

**IV** On-the-job training at operating power unit

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

**Training of category 2 personnel under the program of Nuclear Safety Engineer**

**I** Basic course

**II** Classroom training

1. Study of regulatory and technical documents according to the work position of MCR Operator.

2. Composition, purpose, design and technical parameters of reactor plant process systems and equipment, operation requirements.

3. Equipment maintenance.

4. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

5. Primary circuit water chemistry.

6. Reactor Shop electric equipment.

7. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

8. Basic information on secondary circuit equipment - turbine shop.

9. Operation of reactor plant and unit in normal operation modes, failure, abnormal operation and emergency modes.

10. Tests of safety systems.

11. Knowledge testing.

**III** On-the-job training at operating power unit

1. Study of the workplace of Reactor Compartment Senior Operator and MCR Operator for RP control.

2. In-situ study of main equipment and process systems location and requirements for their operation.

3. Arrangement of workplace and maintenance of operational documentation of MCR Operator.

4. Observation over MCR Operator actions in operation modes of Unit and reactor plant.

5. Study of interaction between MCR Operators during Unit operation.

6. Administrative, technical and operational subordination.

7. Knowledge testing.

**IV** Simulator training

1. Preparation of equipment and process systems for operation.

2. Start-up of reactor plant and unit.

3. Unit operation at permissible power level.

4. Shutdown of reactor plant and unit.

5. Operation of reactor plant and unit in failure, abnormal operation and emergency modes.

6. Changeover to standby equipment.

7. Training tests.

**V** Special course

1. Fundamentals of nuclear reactor theory.

2. Non-stationary processes in reactor.

3. Means used to change reactivity and their effectiveness.

4. Thermal and hydrodynamic processes in reactor.

5. Structure and main neutron and physical parameters of VVER-1000 reactor.

6. Power, energy output, campaign and energy resource.

7. Reactivity effects and coefficient.

8. Physical parameters of control components and protection.

9. Physical start-up and physical changes during start-up.

10. Power start-up, physical and dynamic tests.

11. Shutdown, cooldown, residual heat release.

12. Refueling.

13. Knowledge testing.

**VI** Bushehr-2 NPP on-site on-the-job training

**VII** Certification

**Curricula of training for repair service personnel**

*Training of category 2 personnel under the program of course "Electricity"*

Repair service

Nuclear sub-divisions

**I** Basic course

**II** Special course

1. General information.

2. Generator.

3. Transformers and autotransformers.

4. NPP diesel-generators.

5. Switching devices.

6. NPP auxiliary electric circuit diagrams.

7. Principal circuit of NPP electric connections.

8. Switchgears.

9. Control, protection, monitoring and alarm circuits.

10. Sources and power supply circuits of control, protection, monitoring and alarm circuits.

11. Relay protection.

12. Cable facilities.

13. Firefighting and fire alarm system.

14. Electrolysis and compressor units.

15. On-line Supervisory Control.

16. Operation and repair instructions.

17. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

1. Workplace study.

2. Study of equipment location.

3. Study of functional duties.

4. Instructions on inspection and test of serviced equipment.

5. Study of working documentation.

6. Knowledge testing.

**V** Bushehr-2 NPP on-site on-the-job training

1. Study of administrative and technical organizational structure.

2. Performance of functional duties at the stage of CW.

3. Knowledge testing.

**VI** Certification

***Training of category 2 personnel under the program of course "Mechanics"***

Repair service

Nuclear sub-divisions

**I** Basic course

**II** Special course

1. General information.

2. Main circulation circuit equipment.

3. Secondary circuit equipment.

4. Fuel handling equipment.

5. Process equipment of the primary and secondary circuits.

6. Common plant equipment.

7. NPP equipment operation and repair instructions.

8. Repair documentation.

9. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

1. Workplace study.

2. Study of equipment location.

3. Study of functional duties.

4. Instructions on inspection and test of serviced equipment.

5. Study of working documentation.

6. Knowledge testing.

**V** Bushehr-2 NPP on-site on-the-job training

1 Study of administrative and technical organizational structure.

2. Performance of functional duties at the stage of CW.

3. Knowledge testing.

**VI** Certification

***Training of category 2 personnel under the program of course "I&C"***

Repair service

**I** Basic course

**II** Special course

1. General information.

2. Design and functional structure of NPP APCS hardware.

3. Nuclear physical control.

4. Automatic control of technological processes.

5. Control of electric drives of shut-off valves and motors of auxiliary mechanisms.

6. Process protections and interlocks of thermal mechanical equipment.

7. Process alarm.

8. Reactor plant control and protection system.

9. Reactor neutron flux monitoring.

10. Controlling computer system.

11. Automated turbine control system.

12. Electric power supply of NPP I&C systems.

13. NPP equipment operation and repair instructions.

14. Repair documentation.

15. Knowledge testing.

**III** On-the-job training at operating power unit

**IV** Practical training on equipment (in Iran)

1. Workplace study.

2. Study of equipment location.

3. Study of functional duties.

4. Instructions on inspection and test of serviced equipment.

5. Study of working documentation.

6. Knowledge testing.

**V** Bushehr-2 NPP on-site on-the-job training

1. Study of administrative and technical organizational structure.

2. Performance of functional duties at the stage of CW.

3. Knowledge testing.

**VI** Certification

***Training of category 3 personnel under the program of Maintenance and Repair Department Mechanical Technician***

Repair service;

Nuclear sub-divisions;

Process Management Service.

**I** Basic course

**II** Special course

1. General information.

2. Main circulation circuit equipment.

3. Secondary circuit equipment.

4. Fuel handling equipment.

5. Process equipment of the primary and secondary circuits.

6. Common plant equipment.

7. NPP equipment operation and repair instructions.

8. Repair documentation.

9. Knowledge testing.

**III** Practical training on equipment (in Iran)

1. Workplace study.

2. Study of equipment location.

3. Study of functional duties.

4. Instructions on inspection and test of serviced equipment.

5. Study of working documentation.

6. Knowledge testing.

**IV** Bushehr-2 NPP on-site on-the-job training

1. Study of administrative and technical organizational structure.

2. Performance of functional duties at the stage of CW.

3. Knowledge testing.

**V** Certification

***Training of category 3 personnel under the program of Repair Service Electrical Technician***

Repair service

Nuclear sub-divisions

**I** Basic course

**II** Special course

1. General information.

2. Generator.

3. Transformers and autotransformers.

4. NPP diesel-generators.

5. Switching devices.

6. NPP auxiliary electric circuit diagrams.

7. Principal circuit of NPP electric connections.

8. Switchgears.

9. Control, protection, monitoring and alarm circuits.

10. Sources and power supply circuits of control, protection, monitoring and alarm circuits.

11. Relay protection.

12. Cable facilities.

13. Firefighting and fire alarm system.

14. Electrolysis and compressor units.

15. On-line Supervisory Control.

16. Operation and repair instructions.

17. Knowledge testing.

**III** Practical training on equipment (in Iran)

1. Workplace study.

2. Study of equipment location.

3. Study of functional duties.

4. Instructions on inspection and test of serviced equipment.

5. Study of working documentation.

6. Knowledge testing.

**IV** Bushehr-2 NPP on-site on-the-job training

1. Study of administrative and technical organizational structure.

2. Performance of functional duties at the stage of CW.

3. Knowledge testing.

**V** Certification

**Curriculum of training for Chemical and Radiation Dose Monitoring Department personnel**

***Training of category 2 personnel under the program of Chemical and Radiation Dose Monitoring Department.***

Chemical and Radiation Dose Monitoring Department

**I** Basic course

**II** Course on Chemical and Radiation Dose Monitoring Department

1. Principal diagram of NPP with VVER and main process equipment of the primary and secondary circuits.

2. Main and auxiliary systems of the primary and secondary circuits of NPPs with VVER.

3. Water treatment and water chemistry at NPPs with VVER.

4. Facilities for adjusting the water chemistry at NPPs with VVER.

5. Chemical monitoring at NPPs with VVER.

6. Personnel health physics. Personnel protection facilities.

7. Radiation protection at NPPs with VVER.

8. Radiation dose and radiometric monitoring at NPPs with VVER.

9. Information and measuring systems of radiation monitoring at NPPs with VVER.

10. Environmental protection. Environmental engineering.

11. Regulatory documents on safe operation of NPP with VVER.

12. Knowledge testing.

**III** Special course

1. Standardization of irradiation levels.

2. Radiation characteristics of radiation sources.

3. Health physics fundamentals.

4. Radiation and in-process monitoring.

5. Knowledge testing.

**IV** On-the-job training at operating power unit

1. NPP tour. Study of geographic position of the operated equipment of chemical shop (ChS) and NPP.

2. Full-scale study of the equipment and systems served by NPP Chemical and Radiation Dose Monitoring Department personnel.

3. Observation over the actions of the Manager, Deputy Manager and personnel of NPP Chemical and Radiation Dose Monitoring Department.

4. Study of operational (working) documentation in ChS at the workplace of the Manager, Deputy Manager and personnel of NPP Chemical and Radiation Dose Monitoring Department.

5. Knowledge testing.

**V** Bushehr-2 NPP on-site on-the-job training

**VI** Certification

***Training of category 2 personnel under the program of Chemical Department Specialist.***

Chemical and Radiation Dose Monitoring Department

**I** Basic course

**II** Special course

1. Principal diagram of NPP with VVER and main process equipment of the primary and secondary circuits.

2. Main and auxiliary systems of the primary and secondary circuits of NPPs with VVER.

3. Water treatment and water chemistry at NPPs with VVER.

4. Facilities for adjusting the primary and secondary circuits water chemistry at NPP with VVER.

5. Chemical monitoring at NPPs with VVER.

6. Regulatory documents on safe operation of NPP with VVER.

7. Knowledge testing.

**III** On-the-job training at operating power unit

1. NPP tour. Study of the geographic position of ChS operated equipment.

2. Full-scale study of ChS water treatment systems and equipment.

3. Observation over the actions of personnel attending ChS main and auxiliary system equipment.

4. Observation over the actions of personnel maintaining the the NPP ChS primary and secondary circuit water chemistry.

5. Study of operational (working) documentation of ChS Engineer.

6. Knowledge testing.

**IV** Bushehr-2 NPP on-site on-the-job training

**V** Certification

***Training of category 2 personnel under the program of Radiation Dose Monitoring Department Engineer.***

Chemical and Radiation Dose Monitoring Department

**I** Basic course

**II** Special course

1. Primary circuit systems and equipment.

2. Neutron and physical characteristics of reactor core.

3. Standardization of irradiation levels.

4. Radiation characteristics of ionizing radiation sources.

5. Theoretical and engineering& physical basis of radiation protection.

6. Organization of work with ionizing radiation sources.

7. Radiation monitoring facilities.

8. Information and measuring systems of radiation monitoring system.

9. Plans of actions for personnel and population protection in case of accident at NPP.

10. Knowledge testing.

**III** On-the-job training at operating power unit

1. Study of workplace and operational documentation.

2. Study of the location of process systems and equipment.

3. Study of monitoring, control and alarm systems.

4. Study of operating instructions and regulations on NPP safe operation.

5. Knowledge testing.

**IV** Bushehr-2 NPP on-site on-the-job training

**V** Certification

***Training of category 3 personnel under the program of Chemical Analysis Laboratory Assistant.***

Chemical and Radiation Dose Monitoring Department

**I** Basic course

**II** Course on Chemical Department

1. Fundamentals of general and analytical chemistry.

2. Principal diagram of NPP with VVER and main process equipment of the primary and secondary circuits.

3. Main and auxiliary systems of the primary and secondary circuits of NPPs with VVER.

4. Water treatment and water chemistry at NPPs with VVER.

5. General information on the facilities for adjusting the primary and secondary circuits water chemistry at NPP with VVER.

6. Chemical monitoring at NPPs with VVER.

7. Regulatory documents on safe operation of NPP with VVER.

8. Knowledge testing.

**III** Practical training on equipment (in Iran)

**IV** Bushehr-2 NPP on-site on-the-job training

**V** Certification

***Training of category 3 personnel under the program of Health Physics Technician***

Chemical and Radiation Dose Monitoring Department

**I** Basic course

**II** Special course

1. Fundamentals of nuclear physics and dosimetry.

2. Interaction of ionizing radiation with a substance.

3. Biological impact of ionizing radiation.

4. Health physics standards and radiation safety rules during NPP operation.

5. Tasks of health physics service.

6. Ionizing irradiation protection

7. Radiation recording methods.

8. Practical methods for dosimeter and radiometric measurements at NPP.

9. Dosimeter and radiation process monitoring equipment at NPP.

10. Calibration of dosimeters and radiometric instruments, measurement results processing.

11. Occupational safety.

12. Knowledge testing.

**III** Practical training on equipment (in Iran)

**IV** Bushehr-2 NPP on-site on-the-job training

**V** Certification

***Curriculum of training for the personnel of Nuclear sub-divisions***

***Training of category 2 personnel under the program of Modernization Engineer***

Nuclear sub-divisions

Process Management Service

**I** Basic course

**II** Classroom training

1. Study of regulatory and technical documents according to the work position of MCR Operator.

2. Composition, purpose, design and technical parameters of reactor plant process systems and equipment, operation requirements.

3. Equipment maintenance.

4. Arrangement and implementation of equipment taking out for repair and putting into operation after repair.

5. Primary circuit water chemistry.

6. Reactor Shop electric equipment.

7. Main equipment of monitoring, protection, interlock, instrumentation and automatic control systems.

8. Basic information on secondary circuit equipment - turbine compartment.

9. Operation of reactor plant and unit in normal operation modes, failure, abnormal operation and emergency modes.

10. Tests of safety systems.

11. Knowledge testing.

**III** On-the-job training at operating power unit

1. Study of the workplace of Reactor Compartment Senior Operator and MCR Operator for RP control.

2. In-situ study of main equipment and process systems location and requirements for their operation.

3. Arrangement of workplace and maintenance of operational documentation of MCR Operator.

4. Observation over MCR Operator actions during Unit reactor plant operation.

5. Study of interaction between MCR Operators during Unit operation.

6. Administrative, technical and operational subordination.

7. Knowledge testing.

**IV** Simulator training

1. Preparation of equipment and process systems for operation.

2. Start-up of reactor plant and unit.

3. Unit operation at permissible power level.

4. Shutdown of reactor plant and unit.

5. Operation of reactor plant and unit in failure, abnormal operation and emergency modes.

6. Changeover to standby equipment.

7. Training tests.

**V** Special course

1. Fuel handling equipment.

2. Common plant equipment.

3. Knowledge testing.

**VI** Bushehr-2 NPP on-site on-the-job training

**VII** Certification

List of adopted abbreviations

|  |  |  |
| --- | --- | --- |
| ABH | - Auxiliary boiler house | |
| ABH&RUCLO | - Auxiliary Boiler House and Refrigerating Unit Cooling Loop Operator |
| AEF FO | - Auxiliary Electrical Facilities Field Operator |
| AEOI | - Atomic Energy Organization of Iran |
| APCS | - Automated process control system |
| APCS SS | - Automatic Process Control System Shift Supervisor |
| ARSMS | - Automated radiation situation monitoring system |
| AS SE | - Auxiliary Systems Shift Electrician | |
| AS SSE | - Auxiliary Systems Senior Shift Electrician | |
| BAR | - Burnable absorber rods | |
| BDAMG | - Beyond Design Basis Accidents Management Guideline | |
| BDBA | - Beyond design-basis accident |
| Bushehr NPP | - Bushehr-2 Nuclear Power Plant |
| CCR | - Central control room | |
| CDSO | - Сondensate Demineralizing System Operator |
| CP | - Check point |
| GPO | -General Plant Object |
| CAW | -Commissioning and Adjustment Works |
| ChS | -Chemical Shop |
| CPO | - Chlorination Plant Operator |
| CPS | - Control and protection system | |
| CPS AR | - Absorbing rods of control and protection system | |
| CS | - Computer system | |
| CSE | - Chief Shift Electrician |
| CT SS | - Chemical Technologies Shift Supervisor |
| CTPSO | - Chemical Treatment Pretreatment System Operator |
| CWT SFO | - Chemical Water Treatment Senior Field Operator | |
| CWT | - Chemical Water Treatment | |
| DBA | - Design-basis accident |
| ECCS | - Emergency core cooling system | |
| ECR | - Emergency control room | |
| ED | -Electrical Department | |
| EE SS | - Electric Equipment Shift Supervisor |
| EMERCOM | -Ministry of the Russian Federation for Civil Defense, Emergency Management and Natural Disasters Response |
| EOP | - Emergency Operating Procedures |
| EPE | - Electrically-powered equipment | |
| FA | - Fuel assembly | |
| FPS&V SS | - Shift Supervisor for Fire Protection Systems and Ventilation |
| FRR | - Federal Rules and Regulations | |
| FSAR | - Final Safety Analysis Report for NPP (Power Unit) |
| FSR | - Fire Safety Rules | |
| HMI | -Human-machine interface | |
| HR | -Human Recourses | |
| IAEA | - International Atomic Energy Agency |
| ICIS | - In-core instrumentation system | |
| INRA | - Iranian Nuclear Regulatory Authority | |
| IRDMS | - Individual radiation doze monitoring system |
| IRI | - The Islamic Republic of Iran |
| ITD | - Information Technologies Department |
| LM | - Lifting mechanisms |
| M&R | - Maintenance and repairs | |
| MCPL | - Minimal Controllable Power Level |
| MCR | - Main control room |
| MEF FO | - Main Electrical Facilities Field Operator |
| NNSD | - INRA National Nuclear Safety Department | |
| NPP | - Nuclear power plant |
| NPP SS | - Shift Supervisor at BNPP‑2 |
| NPPD Co | - Nuclear Power Production And Development Company Of Iran | |
| NSD | - Nuclear Service Department |
| OI | - Operating instruction |
| OR | - Operational Regulations | |
| PCLT | - Primary Circuit Laboratory Technician |
| PP&I | - Process protections and interlocks | |
| PPM | - Planned preventive maintenance | |
| PPT | - Psychophysiological testing | |
| PTC | - Personnel Training Center | |
| PSAR | - Preliminary safety analysis report |
| PSO | - Power system operator |
| PSO | - Pump Station Operator |
| QAD | - Quality Assurance Department |
| QAP (O) | - Quality Assurance Program for NPP Operation |
| RC SO | - Reactor Compartment Senior Operator | |
| RC SS | - Reactor Compartment Shift Supervisor |
| RCE | - Reactor control engineer |
| RCO | - Reactor Compartment Operator |
| RCP | - Reactor coolant pump |
| RF | - Russian Federation | |
| RITAB | - Russian-Iranian Training Advisory Board | |
| RMS SS | - Shift Supervisor for Radiation Monitoring Systems |
| RP | - Reactor plant | |
| RP FO | - Radiation Protection Field Operator |
| RP ICDS | - Reactor plant instrumentation, control and diagnostic system | |
| RSME | - Radiation safety monitoring equipment | |
| RSR | - Radiation Safety Rules | |
| RTD | - Regulatory and technical documents |
| RTD | - Operating and technical documents | |
| RUO | - Refrigerating Unit Operator |
| RW | - Radioactive waste | |
| SAR | - Safety Analysis Report |
| SCLT | - Secondary Circuit Laboratory Technician |
| SCSSE | - Shift Control System Software Engineer |
| SDGO | - Standby Diesel Generator Operator |
| SDPP | - Standby diesel power plant | |
| SE | - Shift Electrician | |
| SIR RPO | - Radiation Protection Operator of the Sanitary Inspection Room |
| SNF | - Spent nuclear fuel |
| SPZ | - Sanitary protection zone | |
| SRS | - Safety-related systems | |
| SSU | - Shift Supervisor of the Unit |
| SSD | -Supporting System Department |
| SSRC | * Shift Supervisor of the Reactor Compartment |
| SWPLT | - Special Water Purification Laboratory Technician |
| SWPS&AE SS | - Shift Supervisor for Special Water Purification Systems and Auxiliary Equipment |
| SWP | - Special water purification | |
| SWPO | - Special Water Purification Operator |
| SSTH | * Shift Supervisor of the Turbine Hall |
| SRO | * Senior Reactor Operator |
| STO | * Senior Turbine Operator |
| TC | - Training Center | |
| ~~TC SO~~ | ~~- Turbine Compartment Senior Operator~~ | |
| ~~TC SS~~ | ~~- Turbine Compartment Shift Supervisor~~ |
| ~~TCE~~ | ~~- Turbine control engineer~~ |
| TCO | - Turbine Compartment Operator | |
| TICS | -Thermal Instrumentation and control shop | |
| TDS | - Technical Diagnostics System | |
| TSR | - Technical Safety Rules | |
| ~~SSU~~ | ~~- Shift Supervisor of the Unit~~ |
| UUO | - Underground Utilities Operator |
| VVER | - Water cooled water moderated power reactor |
| VD | - Ventilation department |
| WANO | - World Association Of Nuclear Operators | |
| WPSO&LT | - Water Purification System Operator and Lab Technician |