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Site Safety Requirements to New NPP Unit(s)

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1.General provisions

The objective of this document is to establish the requirements to NPP Unit(s) site to characterize fully the site specific conditions pertinent to the safety of the installation.
The purpose is to establish requirements and criteria, to be applied as appropriate to site and site–nuclear power plant interaction in operational and accident conditions, including those that could lead to emergency measures, for:
(a) Evaluating a proposed site to ensure that the site related phenomena and characteristics are adequately taken into account;
(b) Analyzing the characteristics of the population of the region and the capability of implementing emergency plans over the projected lifetime of the plant;
(c) Defining site related hazards;
(d) Defining the extent of information on a site to be presented by the applicant.

2. Definitions

The following terms with their corresponding definitation are used in this document:

Delayed Actions: Actions involving public temporary relocation, based on projected doses up to 30 days caused by groundshine and aerosol resuspension, which may be implemented after the practical end of the releases phase of an accident.

Design basis: Set of conditions, needs, and requirements taken into account in designing a nuclear power plant.

Design basis external events: are the external event(s) or combination(s) of external events considered in the design basis of all or any part of a nuclear power plant.

Emergency Protection Actions: Actions involving public evacuation, based on projected doses up to 7 days, which may be implemented during the emergency phase of an accident, e.g. during the period in which significant releases may occur.

Exclusion Zone (EZ): means that area surrounding the nuclear power plant, in which the licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area and within which the management of the nuclear power plant may directly initiate emergency actions.

External events*:* are events unconnected with the operation of a facility or activity which could have an effect on the safety of the facility or activity.

Long Term Actions

Actions involving public permanent resettlement, based on projected doses up to 50 years caused by ground shine and aerosol resuspension.

Low population zone (LPZ) means the area of low population immediately surrounding the exclusion zone which contains residents, the total number and density of which are such that in the event of a severe accident appropriate, effective protective measures could be taken in their behalf in a timely manner.

Risk: means the product derived from the multiplication of the probability of a particular event that results in the release of radioactive material by a parameter corresponding to the radiological consequences of this event.

Safe Shutdown Earthquake Ground Motion (SSE)*:* is the vibratory ground motion for which certain structures, systems, and components must be designed pursuant to national or international standards to remain functional.

Siting: The process of selecting a suitable site for a facility, including appropriate assessment and definition of the related design bases.

Site area: A geographical area that contains an authorized facility, and within which the management of the authorized facility may directly initiate emergency actions.

Surface deformation*:* is distortion of geologic strata at or near the ground surface by the processes of folding or faulting as a result of various earth forces. Tectonic surface deformation is associated with earthquake processes.

3. Site Acceptance Criteria

The main objective in site evaluation for nuclear power plants in terms of nuclear safety is to protect the public and the environment from the radiological consequences of radioactive releases due to accidents and normal operation.

The site will be considered acceptable if it is shown by analysis, for the combination of site characteristics and plant design, that radiological impact of postulated fission product release:

1) in case of DBA will NOT lead any action necessary beyond Exclusion area (maximum 800m from the plant). Economic impact out of the plant shall be very limited, i.e. ground and elevated releases for two reference isotopes, I^{131} and Cs^{137}, shall not exceed following values:

Isotope	Ground release, TBq	Elevated release, TBq
I^{131}	10	150
Cs^{137}	1,5	20

2) in case of severe accident will NOT lead:

- Emergency Protection Action beyond Exclusion area (maximum 800 m from the reactor) during releases from the containment;
- Delayed Action at any time beyond Low Population Zone (maximum 3 km from the reactor);
- Long Term Action at any distance beyond Exclusion area (maximum 800 m from the reactor).

Economic impact out of the plant shall be limited, i.e. for each reference isotope, the sum of ground and elevated releases during the entire release time shall not exceed following values:

Isotope	Ground release, TBq
I^{131}	4 000
Cs^{137}	30
Sr^{90}	400

The fission product release assumed for this evaluation should be based upon a major accident, hypothesized for purposes of site analysis only. Such accidents have been assumed to result in substantial meltdown of the core with subsequent release into the containment of appreciable quantities of fission products. In performing this assessment, it shall be assumed a fission product release from the core into the containment assuming that the facility is operated at the ultimate power level contemplated. It shall be performed an evaluation and analysis of the postulated fission product release, using the expected demonstrable containment leak rate, together with applicable site characteristics, including site meteorology, to evaluate the offsite radiological consequences. If a specific reactor design has not been selected for the site, the evaluation may be performed using parameters typical for plants of the type and size contemplated.

The evaluation of the site for a nuclear installation must include the following activities:

(a) Site characteristics that may affect the safety of the nuclear installation shall be investigated and assessed.
(b) Proposed sites shall be adequately investigated with regard to all the site characteristics that could be significant to safety in external natural and human induced events. Possible natural phenomena and human induced situations and activities in the region of a proposed site should be identified and evaluated according to their significance for the safe operation of the nuclear installation. This evaluation should be used to identify the important natural phenomena or human induced situations and activities in association with which potential hazards are to be investigated.
(c) The following physical characteristics of the site - including seismology, meteorology, geology, and hydrology – should be considered: (1) Investigation of the geologic and seismic data necessary to determine the suitability of the proposed site and the plant design bases must be conducted; (2) Meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design must be identified and characterized; (3) Factors important to hydrological radionuclide transport must be obtained from on-site measurements; (4) The maximum probable flood should be estimated using historical data.
(d) In the determination of hazards, site specific data should be used, unless such data are unobtainable. In this case, data from other regions that are sufficiently relevant to the region of interest may be used in the determination of hazards. Appropriate and acceptable simulation techniques may also be used.
(e) Historical and instrumentally recorded information and records, as applicable, of the occurrences and severity of important natural phenomena or human induced situations and activities should be collected for the region and carefully analyzed for reliability, accuracy and completeness.
(f) Foreseeable significant changes in land use shall be considered, such as the expansion of existing installations and human activities or the construction of high risk installations.
(g) Measures shall be taken, as necessary, to ensure that the overall risk remains acceptably low and that physical characteristics unique to the proposed site that could pose a significant impediment to the development of emergency plans are identified.
(h) The population density, population distribution and other characteristics of the external zone in so far as they may affect the possibility of implementing emergency measures and the need to evaluate the risks to individuals and the population shall be evaluated.
(i) The characteristics of the site and its environment that could influence the transfer to persons and the environment of radioactive material that has been released should be evaluated.

(j) Methods shall be adopted for establishing the hazards that are associated with major external phenomena. The methods should be justified in terms of being up to date and compatible with the characteristics of the region. Special consideration should be given to applicable probabilistic methodologies. The probabilistic hazard curves are needed to conduct probabilistic safety assessments for external events.

(k) If it is proposed that the installed nuclear capacity be significantly increased to a level greater than that previously determined to be acceptable, the suitability of the site shall be re-evaluated.

(l) Any site hazard, external to the nuclear power plant that can be shown to occur with a frequency less than about 1E-7 per year may be excluded from consideration in the design of the plant structures, systems and components. Hazards occurring with a frequency greater than about 1E-7 per year may be excluded from consideration in the design of the plant if it is justified by applicant that their consequences do not affect the safety of the plant.

For hazards which must be considered in the design of the plant, the design-basis event will be that which occurs with a return frequency of about 1E-7 per year or greater. Site evaluation will be of sufficient quality to identify with reasonable confidence the severity level with a return frequency of about 1E-7 for each hazard considered. Because of the difficulty of assigning precise numerical values to the probability of occurrence of the types of potential hazards generally considered in determining the acceptability of a site for nuclear power plant, judgment must be used as to the acceptability of the overall risk presented by an event.

4. Site Characteristics

4.1 Cooling water supply

Assurance of adequate cooling water supply for emergency and long-term shutdown decay heat removal shall be considered in site evaluation for nuclear power plant, taking into account information concerning the physical properties of the materials underlying the site, the effects of the Safe Shutdown Earthquake and the design basis for surface faulting. Consideration of river blockage or diversion or other failures which may block the flow of cooling water and failure of dams and intake structures should be included in the evaluation, where appropriate.

Characteristics of the site containing cooling water systems shall permit periodic inspection of important components. Potential natural and human induced events that could cause a loss of function of systems required for the long term removal of heat from the core shall be identified, such as the blockage or diversion of a river, the depletion of a reservoir, an excessive amount of organic organisms, the blockage of a reservoir or cooling tower by freezing or the formation of ice, oil spills and fires. If the risk of such events cannot be reduced to acceptable levels by design measures, then the hazards for the nuclear power plant associated with such events shall be established.

4.2 Interaction between the electrical power grid and the plant

In evaluating a nuclear power plant site, account shall be taken of the availability, capacity, reliability, stability, durability, and vulnerability of the offsite transmission network (electrical power grid). Natural and human-induced hazards to the grid should be evaluated and practical solutions to mitigate these hazards should be considered. If the assessment indicates that the hazards are unacceptable and if no practical solutions are available, then the site shall be deemed unsuitable.

In evaluating of a site, account shall be taken of power grid – plant interactions, including the independence of and number of power supply lines to the plant, in relation to the necessary reliability of the power supply to plant systems important to safety.
To mitigate the loss of offsite power due to the trip of a nuclear power plant provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power plant, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies. The offsite power circuits must be available following a trip of the nuclear power unit, to permit the functioning of system structures and components necessary to respond to the event.

4.3 Atmospheric dispersion of radioactive material

Site atmospheric dispersion characteristics must be evaluated and dispersion parameters established.
A program for meteorological measurements, at appropriate elevations and locations, of basic parameters such as wind speed and direction, air temperature, precipitation, humidity, atmospheric stability parameters, and prolonged inversions at or near the site, shall be implemented. Data should be collected for at least a full year.
On the basis of the data obtained from the investigation of the site and the region and any other relevant data, the atmospheric dispersion of radioactive material released shall be assessed with the use of appropriate models. These models should include all significant site specific and regional topographic features and characteristics of the nuclear installation that may affect atmospheric dispersion.

4.4 Dispersion of radioactive material through surface water

Surface hydrological characteristics of the region shall be determined, including descriptions of natural and artificial water bodies, major structures for water control, locations of water intake structures and information on water use in the region. A program to characterize the surface hydrology, by measurements and analysis, should be implemented to determine the dilution and dispersion characteristics of the water bodies, the re-concentration ability of sediments and biota, and the transport mechanisms of radionuclides in the hydrosphere and of exposure pathways.
An assessment of the potential impact of the contamination of surface water on the population shall be performed by using the collected data and information in a suitable model.

4.5 Dispersion of radioactive material through groundwater

Groundwater hydrology characteristics of the region shall be determined, including water bearing formations, their interaction with surface water and groundwater uses. A program to characterize the groundwater hydrology, by measurements and analysis, should be implemented to determine radionuclide transport mechanisms. This program should include evaluation of migration and retention characteristics of the soils, the dilution and dispersion characteristics of the aquifers, and the physical and physicochemical properties of underground materials that could affect radionuclide transport in groundwater and their exposure pathways.
An assessment of the potential impact of the contamination of groundwater on the population shall be performed by using the collected data and information in a suitable model.

5. Radiological effects on the environment

Characteristics of the natural environment in the region that may be affected by potential radiological impacts in operational states and accident conditions should be investigated.

The potential radiological impacts in operational states and in accident conditions on people in the region, including impacts that could lead to emergency measures, shall be evaluated with due consideration of the relevant factors, including population distribution, dietary habits, use of land and water, and the radiological impacts of any other releases of radioactive material in the region.

In the evaluation of a potential site, appropriate estimates should be made of expected or potential releases of radioactive material, while taking into account the specific design of the nuclear installation and its safety features. If a reactor design has not been selected, generic estimates may be used. The evaluation shall ensure that the radiological risk to the public and the environment associated with radioactive releases is acceptably low. These estimates shall be verified when the final design has been confirmed.

Potential pathways for radioactive material release from the nuclear installation, and the manner in which it could reach and affect people and the environment shall be identified and evaluated. Specific regional and site characteristics should be taken into account, with special attention paid to the function of the biosphere in the accumulation and transport of radionuclides.

The design of the nuclear installation should compensate for any unacceptable potential effects of the installation on the region, or otherwise the site shall be deemed unsuitable.

Before commissioning of the nuclear installation the ambient radioactivity of the atmosphere, hydrosphere, lithosphere and biota in the region shall be assessed in order to determine the effects of the installation. The data obtained should be used as a baseline for future investigations.

6. Non-seismic site hazards to plant safety

The hazards associated with external events that are to be considered in the design of the nuclear installation shall be determined. Consideration should be given to the effects of the combination of these hazards with the ambient conditions.

6.1 Meteorological events

The extreme values of meteorological variables and rare meteorological phenomena – such as wind, precipitation, snow, temperature and storm surges - should be investigated for the site, and the results be presented in a form suitable for design purpose of the nuclear installation, such as severity vs. frequency curves and including uncertainty analysis.

The meteorological and climatologic characteristics for the region around the site shall be investigated.

The potential for the occurrence, and the frequency and severity of rare meteorological events for the site should be evaluated. The evaluation should be based on detailed historical and instrumentally recorded data for the region, and the hazard assessment of the nuclear installation shall consider potential missiles that could result from meteorological events.

6.2 Flooding

The region shall be assessed to determine the potential for flooding due to one or more natural causes such as runoff resulting from precipitation or snow melt, that may affect the safety of the nuclear installation. If there is a potential for flooding, then all pertinent data, including historical

data, shall be collected and critically examined and suitable models should be developed and verified with region-specific data. The model should include uncertainty analysis and be applied to assess the hazards to the site due to flooding.

6.2.1 Floods and waves caused by failure of water control structures

Site evaluation should include analyses of upstream water control structures (e.g. dams) to determine whether the nuclear installation would be able to withstand the effects resulting from the failure of one or more of the upstream structures. The impact of such potential failure on the nuclear installation shall be determined.

6.3 Geotechnical hazards

Siting factors for other design conditions that must be evaluated include soil and rock stability, soil liquefaction potential, natural and artificial slope stability, cooling water supply, and remote safety-related structure siting. All siting factors and potential causes of failure shall be evaluated, such as, the physical properties of the materials underlying the site, ground disruption, and the effects of vibratory ground motion that may affect the design and operation of the proposed nuclear installation.

6.3.1 Slope instability

The site and its vicinity should be evaluated to determine the potential for slope instability (such as land and rock slides and snow avalanches) that could affect the safety of the nuclear installation.
The hazards to the nuclear installation posed by potentially vulnerable sites should be evaluated by using site specific ground motion parameters.

6.3.2 Collapse, subsidence or uplift of the site surface

Geological maps and other appropriate information for the region shall be examined for the existence of natural features such as caverns, karstic formations and human made features such as mines, water wells and oil wells. The potential for collapse, subsidence or uplift of the site surface should be evaluated.
If the evaluation shows that there is a potential for collapse, subsidence or uplift of the surface that could affect the safety of the nuclear installation, practicable engineering solutions shall be provided or otherwise the site shall be deemed unsuitable. The engineering solutions should include a detailed description of subsurface conditions obtained by reliable methods of investigation, in order to define the hazards to the nuclear installation.

6.3.3 Soil liquefaction

The potential for liquefaction of the subsurface materials of the proposed site should be evaluated by accepted methods of soil investigation and using parameters and values for the site specific ground motion.
If the potential for soil liquefaction is found to be unacceptable, the site shall be deemed unsuitable unless practical engineering solutions can be demonstrated to be available.

6.3.4 Behavior of foundation materials

The geotechnical characteristics of the subsurface materials, including uncertainties, shall be investigated and a soil profile for the site in a form suitable for design of the nuclear installation should be determined. The stability of the foundation material under static and seismic loading conditions shall be assessed.
The groundwater regime and the chemical properties of the groundwater shall be studied. Factors important to hydrological radionuclide transport (such as soil, sediment, and rock characteristics, adsorption and retention coefficients, ground water velocity, and distances to the nearest surface body of water) must be obtained from on-site measurements.

6.4 External human induced events

The external human induced events considered in this document are all of accidental origin. Considerations relating to the physical protection of the nuclear installation against willful actions by third parties are outside of the scope of this document.
Potential hazards associated with nearby transportation routes and industrial and military facilities must be evaluated and site parameters established, such that potential hazards from such routes and facilities will pose no undue risk to the proposed nuclear power plant.
The nature and proximity of human-related hazards (e.g., airports, dams, transportation routes, military and chemical facilities) shall be evaluated to establish site parameters for use in determining whether a plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is acceptably low.
The size of the region to which a method for establishing the hazards associated with major external phenomena is to be applied should be large enough to include all the features and areas that could be of significance in the determination of the natural and human induced phenomena under consideration and for the characteristics of the event.

6.4.1 Aircraft crashes

The potential for aircraft crashes on the site shall be assessed with account taken, to the extent practicable, of characteristics of future air traffic and aircraft. An assessment of the hazards, including impact, fire and explosions, should be made.
If the assessment indicates that the hazards are unacceptable and if no practical solutions are available, then the site shall be deemed unsuitable.

6.4.2 Chemical explosions

Activities in the region involving the handling, processing, transport and storage of chemicals having a potential for explosions or for the production of gas clouds capable of deflagration or detonation should be identified, and the associated potential hazards shall be evaluated. A site shall be considered unsuitable if such activities take place in its vicinity and there are no practical mitigating solutions available.

6.4.3 Other important human induced events

The region and the site shall be investigated for installations in which flammable, explosive, asphyxiant, toxic, corrosive or radioactive materials are stored, processed, transported and otherwise dealt with that, if released under normal or accident conditions, could jeopardize the safety of the nuclear installation. This investigation should also include installations that may give rise to missiles of any type that could affect the safety of the nuclear installation. The potential effects of

electromagnetic interference, eddy currents in the ground and the clogging of air or water inlets by debris should also be evaluated. If the effects of such phenomena and occurrences would produce an unacceptable hazard and if no practical solution to mitigate the hazard is available, the site shall be deemed unsuitable.

6.5 Other hazards

In the analysis to determine the suitability of the site to host nuclear installations, consideration should be given to additional matters relating to safety such as the storage and transport of input and output materials, fresh and spent fuel and radioactive wastes. The potential for interactions between nuclear and non-nuclear effluents, such as the combination of heat or chemicals with radioactive material in liquid effluents, should be considered.
Historical data concerning phenomena that have the potential to give rise to adverse effects on the safety of the nuclear installation, such as volcanism, sand storms, severe precipitation, snow, ice, hail, and subsurface freezing of subcooled water, should be collected and assessed. If the potential is confirmed, the hazard should be assessed and design bases for these events should be derived.
If the hazards for the nuclear installation are unacceptable and no practical solution to mitigate the hazards is available, the site shall be deemed unsuitable.

7. Seismic hazards

The site evaluation shall be performed to identify, with the reasonable confidence, the level of earthquake ground motion and its associated frequency spectrum in accordance with the return frequencies specified in p. 6. of the RA Government Decree N 1546-N as of 15 December 2012."

7.1 Earthquakes

The seismological and geological conditions in the region and the engineering geological aspects and geotechnical aspects of the proposed site area shall be evaluated.
Information on prehistoric, historical and instrumentally recorded earthquakes in the region should be collected and documented. The hazards associated with earthquakes shall be determined by means of seismotectonic evaluation of the region using as much as possible the collected information.
Hazards due to earthquake induced ground motion shall be assessed for the site with account taken of the seismotectonic characteristics of the region and the specific site conditions. A thorough uncertainty analysis should be performed as part of the evaluation of seismic hazards.
The geologic and seismic siting factors considered for design shall include a determination of the Safe Shutdown Earthquake Ground Motion for the site, the design bases for seismic related design conditions such as soil, rock and slope stability, soil liquefaction potential, physical properties of the materials underlying the site and ground disruption.

7.2 Surface faulting

The potential for surface faulting (i.e. the fault capability) shall be assessed for the site. The methods to be used and the investigations should be sufficiently detailed that a reasonable decision can be reached using the following definition of fault capability:

A fault is considered capable if, on the basis of geological, geophysical, geodetic or seismological data, one or more of the following three conditions applies:
(a) It shows evidence of past movements (significant deformations and/or dislocations) of a recurring nature within such a period that it is reasonable to infer that further movements at or near the surface could occur. In highly active areas, where both earthquake data and geological data consistently reveal short earthquake recurrence intervals, periods of the order of tens of thousands of years may be appropriate for the assessment of capable faults. In less active areas, it is likely that much longer periods may be required; (b) A structural relationship with a known capable fault has been demonstrated such that movement of the one may cause movement of the other at or near the surface; (c) The maximum potential earthquake associated with a seismogenic structure is sufficiently large and at such a depth that it is reasonable to infer that, in the geodynamic setting of the site, movement at or near the surface could occur.
Where reliable evidence shows the existence of a capable fault that has the potential to affect the safety of the nuclear installation, an alternative site shall be considered.

8. Emergency preparedness

The distribution and characteristics of the population within the region shall be determined. In particular, information on existing and projected population distributions in the region, including resident and transient populations, should be collected and maintained over the lifetime of the installation. The radius within which data are to be collected should be chosen on the basis of emergency planning requirements. Special attention should be paid to the population living in the immediate vicinity of the installation, to densely populated areas and population centers in the region, and to institutions such as schools, hospitals and prisons. The data should be analyzed to give the population distribution in terms of the direction and distance from the plant.
An evaluation, with the use of site- specific parameters as appropriate, should be performed of the potential radiological impacts of normal and accidental releases of radioactive material, including reasonable consideration of releases due to severe accidents.
The site must have an exclusion zone and a low population zone.
Population centers containing more than about 25,000 residents, should be at least one and one third times the distance from the reactor to the outer boundary of the low population zone (LPZ).
The required distance to exclusion zone boundary and outer boundary of LPZ depends upon plant design aspects such as reactor power level, allowable containment leak rate, and those engineered safety features incorporated into the design, as well as the atmospheric dispersion characteristics of the site.

8.1 Population density

Residence within the exclusion zone shall be prohibited. Activities unrelated to operation of the reactor may be permitted in an exclusion zone under limitations, provided that no significant hazards to the public health and safety will result.
The specified low population zone is acceptable if it is shown by analysis that total number and density of LPZ are such that in the event of beyond design and severe accidents appropriate, effective protective measures could be taken on behalf of the enclosed populace in timely manner.
The cumulative resident population projected for the year of initial plant operation should be analyzed to a distance of at least 30 km. The data shall be analyzed to give the population distribution in terms of the direction and distance from the plant.

Similar information should be provided for the end of plant life, taking in to account the future development of site infrastructure.
The transient population should be included for those sites where a significant number of people (other than those just passing through the area) work, reside part-time, or engage in recreational activities and are not permanent residents of the area. The transient population should be taken into account for site evaluation purposes by weighting the transient population according to the fraction of time the transients are in the area.
Projected changes in population within about 5 years after initial site approval should be evaluated.

8.2 Emergency planning zone

The exact size and configuration of the emergency planning zone (EPZ) surrounding a particular nuclear power reactor shall be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries as well as the estimated radius of plume exposure pathway and the ingestion pathway radius.
The EPZ must be established with consideration that as a minimum, in the event of a General Emergency, EZ around the plant is evacuated, limited protective measures implemented for people living in the LPZ directly downwind of the projected path of the release. Evacuation beyond LPZ is assessed in case of hypothetical sever accident with violation of containment integrity.

8.3 Other emergency preparedness considerations

The uses of land and water shall be characterized in order to assess the potential effects of the nuclear installation in the region and in particular for the purposes of preparing emergency plans. The investigation should cover land and water bodies that may be used by the population or may serve as a habitat for organisms in the food chain. Such a study should include the evaluation of present and future uses of land and water in the region and account for any special characteristics that may affect the potential consequences of radioactive releases for individuals and the population as a whole.
In relation to the characteristics and distribution of the population, the combined effects of the site and the installation should be such that: (a) For operational states of the installation the radiological exposure of the population remains as low as reasonably achievable and is in compliance with national requirements, with account taken of international recommendations; (b) The radiological risk to the population associated with accident conditions, including those that could lead to emergency measures being taken, is acceptably low.
The EPZ for a proposed site shall be established with account taken of the potential for radiological consequences for people and the feasibility of implementing emergency plans, and of any external events or phenomena that may hinder their implementation. Physical characteristics unique to the proposed site that could pose a significant impediment to the development of emergency plans should be identified. Before construction of the plant is started, it shall be confirmed that there will be no insurmountable difficulties in establishing an emergency plan for the external zone before the start of operation of the plant.
Evacuation time estimates provide a basis for demonstrating whether significant evacuation impediments may exist, and are part of the planning basis for nuclear power plant siting. As such, evacuation time estimates studies shall be performed to estimate the time needed to evacuate the public in the unlikely event of a serious accident. While lower evacuation time estimates may reflect favorable site characteristics from an emergency planning standpoint, there is no minimum required evacuation time in these requirements that an applicant has to meet.

Reactor sites should be located away from very densely populated centers. Factors such as access to skilled labor, better transportation infrastructure, shorter transmission lines, better seismic characteristics, etc. may favor an area with medium population density.

9. Monitoring

Site characteristics shall be observed and monitored throughout the lifetime of the nuclear installation, including population growth and population distribution, the frequency and severity of external natural and human induced events and phenomena that could affect the safety of the installation.

The characteristics of the natural and human induced hazards as well as the demographic, meteorological and hydrological conditions of relevance to the nuclear installation should be monitored over the lifetime of the nuclear installation. This monitoring should commence no later than the start of construction and continue up until decommissioning. All the hazards and conditions considered in this document and that are pertinent to the licensing and safe operation of the nuclear installation shall be monitored.

10. Quality assurance

An adequate quality assurance program shall be established, at the earliest possible time consistent with application for site approval, to control the effectiveness of the execution of the site investigations and assessments and engineering activities performed during different stages of the site evaluation for the nuclear installation. The quality assurance program should cover the organization, planning, work control, personnel qualification and training, and verification and documentation, to ensure that the required quality of the work is achieved.

The quality assurance program shall be implemented for all activities that may influence safety or the derivation of parameters for the design basis for the site. The quality assurance program may be prioritized according to the importance to safety of individual siting activities.

Records that permit independent review shall be kept of the work of all site evaluation activities of the nuclear installation.

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