NUCLEAR POWER CORPORATION OF INDIA LIMITED

Regulatory Controls of Nuclear Power Projects

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The proposals for administrative approval and financial sanction for Nuclear Power Projects, in India, are finalized only after two regulatory authorities; namely Ministry of Environment & Forests (MoE&F) and Atomic Energy Regulatory Board (AERB), have accorded prior clearances for environmental considerations and safely angle.

Prior Environmental Clearance from MoE&F

The nuclear power projects, like all other projects in the country, require prior environmental clearance from Ministry of Environment & Forests in accordance with the Environment Protection Act 1986 and the rules made under the Act. The activities for this clearance are;

Approval of the terms of reference (TORs) for Environment Impact Assessment (EIA) by the Expert Appraisal Committee specifically constituted by MoE&F for making recommendations to the Government regarding prior Environment Clearance in respect of nuclear projects. Draft EIA report is prepared, by the national institutions, in accordance with approved TORs along with Environment Management Plan. The draft EIA report is circulated to the public and a pubic hearing is conducted by the State Government authorities. The EIA report and the Environment Management Plan (EMP) are finalized addressing the concerns expressed in public hearing. Views of all stake holders received through letters, submissions and memorandum are also considered.

EIA report with EMP, the report on the proceedings of the public hearing and views of the state pollution control board are comprehensively discussed by the EAC who makes recommendation to MoE&F for accord of prior environmental clearance of the project, at times, with certain stipulated conditions for compliance. Conformity to conditions of prior environmental

clearance and compliance to the Environment Protection Act during life time of the project is responsibility of NPCIL.

The entire process of prior Environmental Clearance is in Public domain. This process conducted in a transparent manner based on well written guidelines and requirements and utilizing national expertise in different fields ensures that there are no adverse environmental impacts on account of setting up the nuclear projects.

AERB is the Nuclear Regulatory Authority in India

Nuclear safety, in India, is regulated in terms of the Atomic Energy Act 1962, as amended from time to time.

The Atomic Energy Regulatory Board (AERB) has been constituted by exercising the powers conferred by the Atomic Energy Act to carry out certain regulatory and safety functions under the Act. The regulatory authority of AERB is derived from the rules and notifications promulgated under the Atomic Energy Act and the Environment (Protection) Act, 1986.

Regulations on protection of population and environment against Ionizing radiations are in AERB domain

Prior Clearance of AERB

In addition to impact assessment of nuclear projects on environment which are common for all large projects, nuclear projects handle nuclear materials and protection of public and environment from harmful effects of radiation is of paramount importance. Thus, a prior clearance from Atomic Energy Regulatory Board (AERB) from nuclear safety angle is an additional pre requisite.

Considering the global importance of nuclear safety, international codes and guides have been evolved by the International Atomic Energy Agency for ensuring safety in all aspects of nuclear power for the benefit of member states and with a view to ensure high level of safety in nuclear installations world over. Based on these documents and national expertise acquired over last five decades, AERB in India has also prepared set of codes and guides for use in India. AERB have established a safety guide on requirements for according a siting consent from AERB. The prior clearance by AERB is in terms of "consent for siting' and it involves;

Siting evaluation to comply requirements of Regulatory Guide

- Preparation of Site Evaluation Report and its submission to AERB
- Evaluation of the SER through multi ties review at AERB.

AERB safety guide details the information to be included in SER, with particular emphasis on factors important to radiation safety, emphasizing those site characteristics which may influence the engineering and operation of the plant. Information regarding the interaction of the facility with the environment needs to be included in a Site Evaluation Report. The suitability of the site for the project is to be justified in the SER. The SER also includes site characteristics and only some details of the project having bearing on environment, its management plans from nuclear safety considerations.

Detailed guidelines on the contents of SER are also given in AERB Guide. Preparation of SER thus requires, fairly detailed project description with particular emphasis on safety, geo technical investigation of the site, demographic details around the project, power availability and power evacuation, impact of floods, cyclone and such other natural phenomenon, security consideration, absence of hazardous industries, military installations &

Siting consent by AERB is technology neutral

airports in the vicinity and emergency preparedness plans. Thus in some respects, AERB siting consent is technology neutral.

Multi Tier Review Process at AERB

The SER is assessed by the site evaluation committee (SEC) of AERB. SEC consists of experts in respective fields. In the process of review, SEC is also authorized to get any special investigations and verifications conducted by other specialist agencies/ consultants. The findings and recommendations of the SEC are reviewed by Advisory Committee for Project Safety Review (ACPSR) who makes recommendation to AERB. Finally the recommendations of ACPSR are considered by AERB for grant of consent for locating the project at the site. Thus the Site Evaluation Report is subjected to a comprehensive multi tier review by national experts before siting consent by AERB is accorded.

Siting Consent by AERB is the second stage process of site selection

The siting consent by AERB is actually the second stage of site selection process completed by a detailed technical study conducted for establishing a nuclear installation; the first being site selection by a site selection committee having experts from AERB, MoE&F amongst others and based on a first order assessment of the site screening criteria specified by AERB in terms of AERB guide.

While the codes and guides for assessment of the site are in public domain, the assessment has been, so far, an internal process of AERB. Historically this has been on account of limited technical expertise in this field outside DAE. However, a committee appointed by the Government is currently considering the option of brining in greater transparency in this process.

The simultaneous application of Atomic Energy Act by the Department of Atomic Energy and Environment Protection Act by Ministry of Environment & Forests in prior clearance of nuclear projects creates an overlapping requirement. In fact the Environment Protection Act itself empowers AERB to carry out some functions of the EP Act relating to the radioactive substances.

COMPLETE NUCLEAR SAFETY IMPACT IS INCLUDED IN SERs & NOT EIA REPORTs

While some details on nuclear safety are included in the EIA reports, these are to be considered as "for the sake on completeness" of EIA only. Both documents together complete the assessment of the impact on environment. Criticism on absence of full details of the impact due to radioactive discharges to the environment in the EIA report is to be viewed in context of availability of such detailed information only in the SERs.

The clearances by MoE&F and AERB are mandatory for project formulation and its approval by the Government. The conditions specified in both clearances are complied with for execution and subsequent operation of the facility.

In India, Atomic Energy Regulatory Board (AERB) exercises the regulatory controls on the establishment and operation of nuclear projects through the stage wise consenting process. This system provides for issue of a licence/ consent/ clearance for a specified activity on satisfying itself that compliance with the regulatory requirements is ensured. This is through detailed reviews of the applications, regulatory inspections and other available means. A stage-wise consenting process from 'siting' to the 'licence for operation' is followed. The plants, during operational phase, are subjected to a regular programme of safety surveillance and monitoring for continuing appraisal of safety. Safety is assessed based on operating experience feedback and against the current safety standards & practices for periodic renewal of the operating licence.

Stage Wise Consent of AERB

The consent at the second major stage, namely construction, involves the review of the design & safety aspects. This requires assessment and review of safety analysis report (SAR), construction site quality assurance manual, construction schedule (major milestones including regulatory clearances) and construction methodology document. As a supplement to SAR, separate design basis reports & design reports of items important to safety, are to be progressively made available for review before consent for construction is issued. AERB may also issue the consent for construction as "one time consent" for total construction activities or in three stages, viz. clearance for excavation, clearance for first pour of concrete and clearance for erection of major equipment.

The safety analysis report (SAR) demonstrates, evaluates and demonstrates that the project can be built and operated at the proposed site, safely, without undue risk to the health of the general public and environment. SAR provides information on design basis, site and plant characteristics, safety analyses and conduct of operations, in such a way that a technical evaluation on the safety of the plant can be evaluated. The details of different submissions, their contents and schedule of submissions for getting construction consent are given in AERB Safety Guide.

In India, we have a life long (Siting, construction, operation & decommissioning) stage wise consenting regulatory process

Similarly consent for commissioning is also granted in different stages of commissioning like hot conditioning, first criticality, and physics experiments during commissioning and commercial operation.

This process of stage wise clearance/ consent has been used for all our nuclear plants.

Considering the stage wise and progressive nature of the documents to be submitted to the regulatory clearances, the technical details of the projects are accordingly finalized in a progressive manner. This is some what different process compared to what is followed in some other countries where a combined construction & operation license is accorded or a design is pre certified for construction. The Indian system has advantage where we have a single agency for design, development, architect engineers, reactor vendor, project developer and eventually operator of the installation considering our modest nuclear power programme. The Indian regulatory system has been peer reviewed by international experts and regulatory agencies, including 5th Review Meeting of the Convention on Nuclear Safety held in Vienna, Austria in April 2011 and found to be robust.

Consistent with the prevailing regulatory system in India, while the commercial negotiations with foreign vendors for setting up light water reactors are on going, the specifications of the reactors in terms of technical assignment, and other details to be submitted for regulatory clearances are being finalized in parallel and progressively.

The limited participation of AERB, so far, in discussion for setting up LWRs with foreign vendors is to be viewed in the context of time needed for finalization of submissions to the regulatory body.

Stage Wise Consenting means AERB involvement is progressive consistent with project progress

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