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सत्यमेव जयते

भारत सरकार
GOVERNMENT OF INDIA
परमाणु ऊर्जा नियामक परिषद
ATOMIC ENERGY REGULATORY BOARD

ISO 9001: 2008

डॉ. ए. यू. सोनवणे
प्रमुख, विकिरण संरक्षा प्रभाग
एवं
बाह्य संबंध अधिकारी (ईआरओ)

Dr. A. U. Sonawane
Head, Radiological Safety Division
&
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No. AERB/ERO/10.7/2017/18

June 23, 2017

PRESS RELEASE

AERB grants clearance for First Pour of Concrete of Kudankulam NPP Unit 3&4

The Atomic Energy Regulatory Board (AERB) in its 121st Meeting held on June 19, 2017 has granted clearance to the Nuclear Power Corporation of India Limited (NPCIL) for the First Pour of Concrete (FPC) of Kudankulam Nuclear Power Projects 3&4 (KKNPP-3&4). In general terms, the clearance for FPC implies commencement of first pour of structural concrete and continuation of construction works of the safety related structures.

KKNPP-3&4 are two units of VVER (Russian) pressurised water reactors to be constructed at Kudankulam, Tamil Nadu. These reactors will be repeat design of KKNPP-1&2 with design improvements based on commissioning and operational experience feedback from KKNPP-1&2.

The FPC clearance for KKNPP-3&4 is granted based on detailed safety review and satisfactory compliance to regulatory requirements.

At present, excavation of main plant area of KKNPP-3&4 is completed and is ready for construction activities.

23/6/17

(A.U. Sonawane)

30 Years of Safety Regulation 1983 - 2013

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Atomic Energy Regulatory Board

भारत सरकार

GOVERNMENT OF INDIA

शिव अभिलाष भारद्वाज, एफएनएई
S. A. BHARDWAJ FNAE
अध्यक्ष
CHAIRMAN

No. CH/AERB/KKNPP-3&4/2017/37 **June 23, 2017**

Clearance for First Pour of Concrete for KKNPP-3&4

References

1. No. NPCIL/DIR(T)/2016/M/83, dtd. 27.04.2016
2. No. NPCIL/ED(Engg-LWR)/KK34/2017/M/108, dtd. 08.06.2017
3. No. AERB/SEC/1B/121/1485, dtd 23.06.2017

Consent Number	KKNPP-3&4/22000
Stage of Consent	First Pour of Concrete (FPC)
Consent issued by	Chairman, AERB Competent Authority as per Atomic Energy Act, 1962.
Applicant	Nuclear Power Corporation of India Ltd (NPCIL) (Application for FPC of KKNPP-3&4 was submitted by NPCIL [1]. NPCIL progressively made various submissions required for FPC. Subsequently NPCIL submitted revised application with updated status on submissions, compliance to recommendations and project schedule [2]).
Brief Description of Nuclear Power Project	Kudankulam Nuclear Power Project, KKNPP-3&4 Type: 1000 MWe VVER, PWR type reactor (Repeat Design of KKNPP-1&2). Located at: Kudankulam Nuclear Power Project (Existing Site), Kudankulam P.O., Radhapuram Taluk, Tirunelveli Dist, Tamil Nadu - 627 106. Present status: Excavation of main plant area is completed.
Basis for issuing the Consent	AERB regulatory requirements as per AERB Safety Code on Design of Light water reactor based NPPs (AERB/LWR-SC/D), AERB Safety Guide on Consenting process for Nuclear Power Plants & Research Reactors (AERB/NPP&RR/SG/G-1).

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Safety Review	After satisfactory two-tier safety review, final review is done by Board of AERB (third tier) for FPC of KKNPP-3&4 [3]. Detailed review carried out prior to grant of FPC consent including verification of compliance to regulatory submissions is briefly given in Annexure-1. The proposed activities of FPC can be carried out without undue risk to workers, the public or the environment.
Responsibility of Safety	It is the responsibility of Applicant to comply with safety requirements as specified in Regulations.
Other statutory requirements	The status of compliance to MoEF & CC stipulations by Applicant as relevant to AERB are brought in Annexure-1. Applicant shall ensure that all necessary statutory clearances are obtained and are valid for present stage of consent i.e. First Pour of Concrete.
AERB Stipulations and Conditions	AERB Stipulations and conditions for FPC of KKNPP-3&4 to enable effective regulatory control is brought out in Annexure-2.

Based on satisfactory review as brought out above, clearance is hereby granted for First Pour of Concrete (FPC) of KKNPP-3&4, subject to satisfactory compliance to the stipulations and conditions as brought out in Annxure-2. The clearance will be subjected to re-review for any non-compliance to the stipulations and conditions.

This clearance is valid till June 30, 2024. The construction activity of safety and safety related structures as per AERB/NPP&RR/SG/G-1 shall be completed within the validity period, else extension shall be sought with justification.

Encl.Annexure-1&2

23.6.17
(S.A. Bhardwaj)

Chairman and Managing Director
Nuclear Power Corporation of India Ltd.
Nabhikiya Urja Bhavan (NUB)
Anushaktinagar
Mumbai - 400 094.

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Executive Director
Head, NPSD
Director SSED
Head, IPSD
Head, LWR-PS, NPSD

AERB Committees
Chairman & Member-Secy, ACPSR-LWR#1
Chairman & Member-Secy, ACS
Chairman & Member-Secy, PDSC-KKNPP-3&4
Chairman & Member-Secy, CRSA

NPCIL
Director (T-LWR)
Director (P)
ED (Engg.-LWR)

KKNPP Site
Site Director
PD, KKNPP-3&4
CCE, KKNPP-3&4

Annexure-1

SAFETY REVIEW FOR FPC OF KKNPP-3&4

1.0 Safety Review

Siting Clearance for locating 4 x 1000 MWe VVERs (KKNPP – 3 to 6) was granted by AERB on February 9, 2011. Subsequently, AERB granted clearance for excavation for KKNPP-3&4 on January 21, 2016. NPCIL submitted application seeking AERB Consent for First pour of Concrete (FPC) of KKNPP Unit-3&4 on April 27, 2016 and progressively submitted the Preliminary Safety Analysis Reports (PSAR). NPCIL progressively made various submissions required for FPC. Subsequently NPCIL submitted revised application with updated status on submissions, compliance to recommendations and project schedule.

KKNPP Unit-1&2 Design has already been extensively reviewed in AERB. Since KKNPP Unit-3&4 plant design is a repeat design of KKNPP Unit-1&2, the review process was optimized to detailed review of design differences impacting safety and compliance to AERB safety code on Design of LWRs. The AERB safety code on Design of LWRs and AERB Safety Guide on Consenting Process for NPPs formed the main review basis document for review of Application for Consent of First Pour of Concrete (FPC) of KKNPP Unit-3&4. Review was focused towards the requirements related to FPC and emphasis was given for any layout changes of irreversible nature.

Compliance to relevant Regulatory Codes and Guides were used for checking design changes meets the regulatory requirements vis-à-vis KKNPP-1&2 as already design compliance to requirements specified in these documents have been ensured during the detailed review of KKNPP-1&2. Feedback from commissioning and operational experience of KKNPP-1&2 and associated changes were followed up during the review process. Also aspects of Nuclear Security for KKNPP-3&4 have been reviewed.

The Application and associated documents were reviewed by Project Design Safety Committee (PDSC) and Nuclear Projects Safety Division (NPSD) of AERB. PDSC Constituted several Working Groups (WGs) to Review Preliminary Safety Analysis Reports (PSAR) and associated documents (WG to review Quality Assurance & associated documents, WG to review Site Characteristics; WG to review General Plant Layout and Design of Structures, Components, Equipment & Systems; WG to review Reactor; WG to review Reactor Coolant System & Engineered Safety Features; WG to

review Instrumentation & Control Systems & Electrical Systems; WG to review Auxiliary System; WG to review Radioactive Waste Management & Radiation Protection; and NPSD-I&FS to review Industrial and Fire Safety (I&FS) aspects).

PDSC completed the review and submitted review report to NPSD. Nuclear Security aspects have been reviewed by Committee for Reviewing Security Aspects of Nuclear and Radiation Facilities and Transport of Radioactive Material (CRSA) and its report was also taken into account while verifying requirement related to FPC.

NPSD reviewed the reports of PDSC & CRSA and verified compliance to regulatory requirements related to FPC and also compliance to MoEF & CC recommendations with regard to AERB. Section-2 and 3 below gives the compliance status with respect to regulatory submission requirements for FPC and compliance status to MoEF & CC stipulations which are relevant to AERB respectively. NPSD submitted its report for consideration by Advisory Committee for Project Safety Review (ACPSR). ACPSR reviewed FPC application along with NPSD report and based on ACPSR deliberations, updated status note with respect to NPSD report was submitted for consideration by AERB. Board of AERB in its Meeting#121 approved FPC for KKNPP-3&4.

2.0 Compliance to Regulatory Submissions for FPC

KKNPP-3&4 is a repeat design of KKNPP-1&2 and in general meets the regulatory requirements. Compliance with requirements of AERB/NPP&RR/SG/G-1 in terms of submissions and essential review required for consenting stage of FPC was verified. After submission of FPC application, NPCIL submitted the various documents supporting its application as required by consenting process of AERB for NPPs. Review of all required chapters of PSAR for FPC stage, has been completed with specific attention on design differences, taking into account review experience feedback of KKNPP-1&2 and specifically ensuring there are no irreversible aspects. Compliance with requirements of AERB/NPP&RR/SG/G-1 for FPC stage of KKNPP-3&4 is given below:

2.1 Review of Relevant Safety Analysis Reports (Preliminary): As required by AERB/SG/G-1, PSAR chapters (on Quality Assurance, Site Characteristics; General Plant Layout, Design of Structures, Components, Equipment & Systems; Reactor; Reactor Coolant System, Engineered Safety Features; Instrumentation & Control Systems, Electrical Systems; Auxiliary System; Radioactive Waste Management, Radiation Protection and Industrial and Fire Safety) and associated documents were

progressively submitted for KKNPP-3&4 along with FPC application. Review of these PSAR chapters is completed. Main focus of review was on design differences with respect to KKNPP-1&2 and compliance to recently issued AERB safety code on Design of LWRs (AERB/NPP-LWR/SC/D). All design differences and compliance to AERB/NPP-LWR/SC/D were reviewed including plant layout and irreversible aspects concerning consent for FPC stage. Review also covered the bulk shielding, penetration shielding, layout of rooms containing radioactive sources etc., as part of review of PSAR chapters.

2.2 **Design Basis Ground Motion (DBGM) and Confirmatory Investigations:** Report on DBGM was submitted and reviewed during excavation clearance stage. The outcome of detailed geotechnical investigations and foundation parameters submitted as part of PSAR was reviewed during excavation clearance. Subsequent to excavation, the confirmatory geotechnical investigations reports have been submitted and review completed for safety related structures except for essential load pump house which is to be submitted and satisfactorily reviewed prior to taking up the construction of essential load pump house. The design parameters for meteorological events were submitted as part of PSAR and reviewed during excavation clearance stage. Analyses were revised based on review and revised topical documents were submitted covering all relevant aspects.

2.3 **Industrial and Fire Safety:** AERB has been regularly reviewing the industrial safety aspects of KK NPP by safety review and by conducting regular regulatory inspections to check the compliance to the Atomic Energy (Factories) Rules, 1996. The observation/deficiencies noted during the safety review/inspections have been regularly brought to the notice of the project management for implementation. NPCIL submissions related to I&FS of KKNPP-3&4 were satisfactorily reviewed

2.4 **QA Manual for Design and Construction:** Overall QA aspects are covered in PSAR Chapter-17 and in overall QA manual. These have been submitted and reviewed satisfactorily. For KKNPP-3&4, QA manual on design specifically covering the SSCs which are under Indian scope has been submitted and reviewed. Revised QA manual for Construction was submitted and satisfactorily reviewed by AERB.

2.5 **Emergency Preparedness Plan:** Emergency Preparedness Plan (EPP) Manual covers three parts i.e. (1) Plant emergency (2) Site Emergency and (3) Off-Site emergency. Emergency Preparedness Plan (EPP) manual for KKNPP-1&2 was reviewed by AERB and was subsequently issued by NPCIL in June, 2011. Due to construction activities at KKNPP-3&4, updation was needed in Site EPP manual. NPCIL was recommended to

revise EPP of KK-3 to 6 including the personnel involved in KKNPP-3&4 construction activities and any other specified requirements. NPCIL submitted the revised EPP manual considering the personnel involved in KKNPP-3&4 construction activities and based on revised AERB guidelines for site emergency preparedness plan for nuclear installations.

2.6 **Nuclear Security:** Site progressively submitted compliance to recommendations made during excavation clearance on nuclear security aspects along with a status of complying the FPC requirements. Site is complying with earlier recommendations made during excavation clearance. In case of FPC, Security aspects have been reviewed and compliance of the relevant observations were also checked during regulatory inspections.

2.7 **General:** Generic construction methodology submitted by NPCIL was reviewed. Submissions such as Construction schedule (from ground breaking to scheduled criticality), Excavation drawings (general arrangement showing all safety aspects, slopes and approaches), and Report on site grading and surface drainage were submitted and reviewed by AERB.

3.0 Compliance to MoEF & CC stipulations relevant to AERB by Applicant

The Ministry of Environment & Forests and Climate Change (MoEF & CC) had issued Environmental Clearance for KKNPP-3&4 on September 23, 2008 with validity period of 5 years. Subsequently, the validity has been extended upto December 30, 2019. In the Environmental Clearance Letter issued for KKNPP-3&4, for certain stipulations, AERB was referred. The status of compliance to MoEF & CC stipulations for KKNPP-3&4 by Applicant as relevant to AERB is brought out below:-

3.1 **AERB clearance for Site:** AERB clearance for Site shall be obtained before starting any construction work and a copy of same shall be provided to MoEF & CC.

Compliance Status: AERB granted Siting Clearance for KKNPP Units 3 to 6 (vide Ref. CH/AERB/199/KKNPP-3 to 6/2011/506) on February 9, 2011. It is noted that NPCIL has been submitting half yearly compliance status reports to MOEF. After Siting consent, AERB has granted excavation clearance after satisfactory review, allowing NPCIL to excavate the main plant area.

3.2 **Monitoring of Radioactivity Releases:** Regular monitoring of conventional gaseous pollutants, radioactive pollutants in air as well as in discharged water shall be monitored

regularly as per AERB standards. During plant operation, regular monitoring of radioactive pollutants in air through stacks will be carried out.

Compliance Status: Plant design ensures that radioactive gaseous discharges do not exceed the limits prescribed by AERB. The design features for assuring the above requirements are submitted in PSAR on "Radioactive Waste management". These design aspects were reviewed and found acceptable. The requirements on monitoring as well as limiting values will be translated into Technical Specification for Operation and same will be reviewed by AERB prior to issuing clearance for Initial Fuel Loading of KKNPP-3&4. During plant operation, radioactivity of sea water at main outfall point and other discharges will be regularly monitored.

3.3 **Emergency preparedness Plan:** A disaster management plan and Emergency Preparedness Plan shall be prepared and put in place as per norms of AERB.

Compliance Status: Emergency Preparedness Plan (EPP) Manual covers three parts i.e. (1) Plant emergency (2) Site Emergency and (3) Off-Site emergency.

Emergency Preparedness Plan (EPP) manual of KKNPP-1&2 was reviewed by AERB and was subsequently issued by NPCIL in June, 2011. Due to construction activities at KKNPP-3&4, updation was needed in Site EPP manual. NPCIL submitted the revised EPP manual considering the personnel involved in KKNPP-3&4 construction activities and based on revised AERB guidelines for site emergency preparedness plan for nuclear installations.

EPP manual of KKNPP-3&4 will be prepared and issued prior to start of operation of KKNPP-3&4. AERB ensures the availability of EPP manual and implementation of its requirement prior to issuing clearance for initial fuel loading.

3.4 **Treatment & Management of Radioactive of Radioactive Wastes:** Radioactive waste shall be managed as per norms prescribed by AERB.

Compliance Status: Details on design features of KKNPP-3&4 solid, liquid and gaseous waste management system were reviewed and found to be acceptable. AERB through its regulatory inspections will also ensure compliance with these requirements once plant is made operational. Please see 3.2 above

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Annexure-2

AERB Stipulations and Conditions for First Pour of Concrete for KKNPP-3&4

S.1 The 28 day compressive strength for M35 concrete from batching plant is found to meet the requirements of minimum strength. NPCIL shall complete the required trials to demonstrate other properties including workability at the point of pumping and temperature control of the concrete prior to start of first pour.

S.2 Geotechnical assessment of safety related areas indicates adequacy of strata for Reactor Building (UJA) and Reactor Auxiliary building (UKZ). For Emergency Safety DG Building (UKD), Shielded Control Room (UZM) and Fresh Fuel Storage Building (UFC), where certain localized patches/intrusions in founding strata are observed, NPCIL should furnish information regarding strength and disposition of these for review. In addition, for UFC, the revised geological map of the foundation pit after removal of loose materials should be submitted. FPC activities for these buildings shall be started after satisfactory review and approval by Chairman, AERB.

S.3 The excavation of essential load pump house (UQC) and its associated tunnels can be done only after making temporary dyke. Geotechnical investigations and geological mapping of UQC and its associated tunnels shall be submitted post completion of its excavation for satisfactory review by AERB. Construction activities of these buildings shall be started after satisfactory review and approval by Chairman, AERB.

S.4 PSAR and associated safety analyses of all safety related buildings have been satisfactorily reviewed by AERB. In addition, certain design sample checks with respect to AERB civil standards have been identified for all these buildings at different elevations. The design checks at different elevations shall be completed by NPCIL. Commencement of construction for these identified elevations in respective buildings shall be started after satisfactory review and approval by NPSD, AERB.

S.5 In addition, the following stipulations shall always be adhered to:

- Safety requirements of the Atomic Energy (Factories) Rules 1996 and relevant AERB Directives/Notifications;
- Adequate QA shall be effectively implemented to ensure compliance to AERB Safety Code on 'Quality Assurance in NPPs'; AERB/SC/QA (2009);
- Regulatory requirements related radiation protection and emergency preparedness;
- Significant Event or Change should be reported as per ECRP guidelines.
