

**CHAPTER**

**3**

# **REGULATORY INSPECTION OF NUCLEAR AND RADIATION FACILITIES**





## 3.1 REGULATORY INSPECTION PROGRAMME

Regulatory Inspection (RI) programme is one of the key regulatory processes. AERB carries out regulatory inspections of the nuclear, industrial and radiation facilities under its regulatory purview to check compliance to regulatory requirements and consenting conditions. The inspection programme provides a high level of assurance that licensed activities are conducted in accordance with regulatory requirements and in conformity with safety and security objectives. In AERB, a comprehensive and systematic annual inspection programme is prepared to oversee various Licensing /Consenting stages of the facility viz. siting, design, construction, commissioning, operation, decommissioning and release from regulatory control.

The regulatory inspections are carried out as per the guidelines given in AERB safety guide on 'Regulatory Inspection and Enforcement in Nuclear and Radiation Facilities' (AERB/SG/G-4). The provisions of the guide as applicable to different types of facilities are further elaborated in the Integrated Management System (IMS) documents of AERB.

Inspections are carried out periodically as well as in special circumstances. Generally, the inspections are carried out with prior announcement. AERB also carries out special unannounced inspections with specific objectives. The frequency and the depth of regulatory inspections depend on the hazard potential of the facility and the consenting stage of the facility. AERB prepares a consolidated plan while applying a graded approach, for inspection of all nuclear and radiation facilities considering the following:

- (i) Probable degree and nature of the hazard associated with the facility or activity
- (ii) Outcome of safety review

- (iii) Progress of activities at the facility
- (iv) Experience of previous inspections
- (v) Available resources, and
- (vi) Guidelines provided in regulatory and IMS documents.

The inspection report is forwarded to the facility for taking corrective actions. The inspection findings made during the regulatory inspections are broadly categorised adopting a graded approach for follow up of their review and resolution. The facility is required to submit an action taken report on the deficiencies brought out during the inspection within a specified timeframe. These action taken reports (RI responses) are reviewed in AERB for disposition and need for enforcement actions, if any.

AERB may also initiate enforcement action, if in its opinion, the licensee has violated the conditions of the licence wilfully or otherwise or misinformed or did not disclose the information having bearing on safety, after specifying the reasons for such action. The regulatory inspection team can also initiate enforcement actions on-the-spot, if necessary, in case of serious non-compliances.

**The frequency and depth of regulatory inspections depend on the hazard potential of the facility & consenting stage of the facility.**

The enforcement actions may include one or more of the following:

- (a) A written directive for satisfactory rectification of the deficiency or deviation detected during inspection;

- (b) Written directive to applicant / licensee for improvement within a reasonable time frame;
- (c) Orders to curtail or stop the activity;
- (d) Modification, suspension or revocation of licence/consent; and
- (e) Initiate legal proceedings under provisions of the Atomic Energy Act, 1962.

The information on regulatory inspections conducted at various nuclear, industrial and radiation facilities during the year is given in the following sections:

### 3.2 REGULATORY INSPECTION OF NUCLEAR, INDUSTRIAL AND RADIATION FACILITIES

AERB carries out regulatory inspections of the nuclear, industrial and radiation facilities as a safety surveillance measure to ensure compliance with the AERB safety requirements and stipulations. In nuclear and industrial facilities, the emphasis is given to aspects related to project management, safety culture, civil construction, quality assurance, equipment storage & preservation, fabrication & erection of major safety related components, documentation, commissioning & operation activities, industrial & fire safety, nuclear security, radiological monitoring and emergency preparedness. AERB adopts a graded approach in conducting regulatory inspections. The number of planned inspections of a nuclear facility depends on its hazard potential and input received from other regulatory processes and may vary from 1 to 8 inspections in a year. The scope and depth of these inspections depend on the consenting stage of the facility and the activity at the site. In addition to these, additional inspections are conducted to gather information after important events or to observe specific activities.

AERB has posted onsite observers known as Site Observers Teams (SOTs) at four NPP sites [Rawatbhata, Kalpakkam, Kakrapar and Kudankulam]. These (SOTs) observe activities at the operating as well as under construction plants at these sites and submit report to AERB Headquarter (HQ) on daily basis, which provides important inputs for safety review and RIs. This has led to establishment of continuous regulatory presence at these sites, covering twelve operating, two under commissioning, and five under

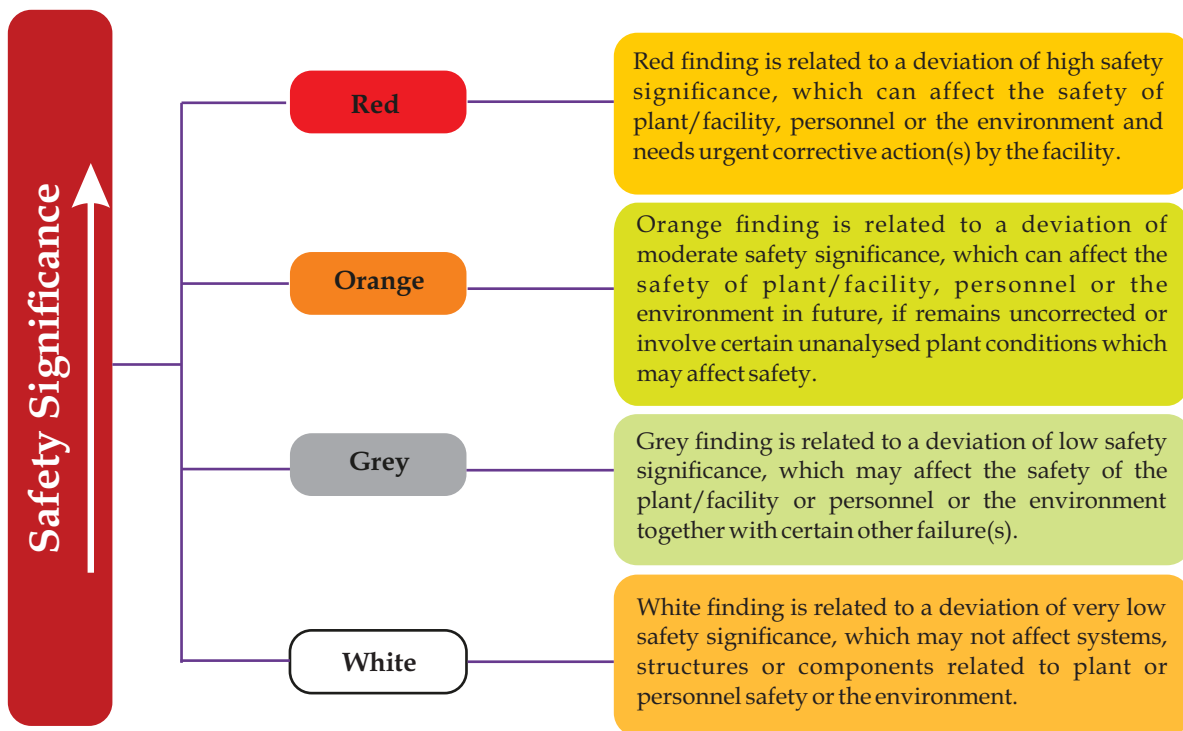
construction NPPs. At other NPP sites, AERB conducts unannounced inspections, apart from routine announced inspections to observe the actual state of the facility and the way in which it is being operated and maintained.

**AERB SOTs provide continuous surveillance over 19 Nuclear Facilities at Four NPP sites**

In case of radiation facilities, the inspection plan envisages prioritization of inspection of the facilities having reported cases of radiation exposures exceeding the prescribed dose limits, and the facilities from where periodic safety reports are not received (particularly inactive nucleonic gauge institutions) as per the specified requirements. As an innovative measure, awareness programmes on radiological safety aspects were added to routine inspection activities to improve compliance to regulatory requirements. While AERB has been effectively regulating the high hazard nuclear facilities and other radiation applications, it is facing challenges in bringing the widely spread diagnostic X-ray facilities under its regulatory control. Although, these facilities are of low hazard potential, they need to be operated in accordance with AERB's regulatory requirements.

The regulatory inspections are carried out by AERB HQ located at Mumbai and its regional regulatory centres viz. the Southern Regional Regulatory Centre (SRRRC), Chennai; Eastern Regional Regulatory Centre (ERRC), Kolkata and Northern Regional Regulatory Centre (NRRRC), New Delhi. In addition, Directorate of Radiation Safety (DRS) / Radiation Safety Agency (RSA) in some of the States are also authorized to carry out regulatory inspections for ensuring radiation safety of medical diagnostic radiology X-ray equipment installed in the respective States.

AERB follows a graded approach in determining the safety significance of the deviations observed during regulatory inspections of nuclear, industrial, and radiation facilities. The reported deviations are categorised as White, Grey, Orange and Red findings, in the increasing order of safety significance, as described below:



AERB follows-up the implementation of all the actions for resolution of the reported deviations. Orange and Red findings are reviewed for appropriate follow-up or enforcement actions. The closure of the Grey, Orange and Red findings of nuclear and industrial facilities are considered by AERB after review and acceptance of the corrective actions. The Licensee has its own internal mechanism for resolution of White findings, which is checked by AERB inspectors on sample basis during subsequent inspections.

Radiation facilities have to submit the action taken report for all types of inspection findings for review and consideration by AERB for closure.

### Remote Regulatory Inspection during COVID-19 Pandemic

The regulatory inspection programme faced a major challenge during the COVID-19 pandemic, which restricted the movement of people across the country. In last week of February 2020, AERB took the first step by deciding not to depute inspectors, who have known medical issues. Subsequently, in March 2020 as the travel restrictions were imposed by Govt. of India, Management of AERB suggested to identify alternative means for conducting regulatory inspections.



As an interim measure, AERB developed remote regulatory inspection process to continue its regulatory oversight over the licensed activities/facilities. This remote inspection involves,

- (i) Assessment of the activity/facility by the utility itself as per the self-assessment checklists specially developed by AERB;
- (ii) Review of self-assessment checklist by an inspection team for identifying the need for additional / supporting submissions (including records, documents, photographs, videos on sample basis) from the utility/facility;
- (iii) Video conferencing with the licensee to verify certain compliances, as necessary; and
- (iv) Issuance of inspection report after review of the evidences and submissions.  
The self-assessment checklists developed

for the remote regulatory inspections contain the checks done by the AERB inspectors at site during routine regulatory inspections. With the introduction of self-assessment by the licensee using checklists for various plant systems, functional areas and activities etc., responsibility for safety by the licensee gets reinforced and will certainly help in developing a better safety culture.

Being very light on resources, such remote inspection was introduced during work from home. Subsequently, AERB has established all necessary infrastructural support by setting up a remote inspection centre with audio visual systems and secured video conferencing facility for carrying out remote inspections simultaneously at multiple facilities.

Although AERB was one of the pioneer among regulatory bodies in quickly responding to COVID-19 challenges through introduction of remote inspections, it had conducted special or surprise inspections at Radiation Facilities as necessary by sending inspectors from RRCs and HQs after taking all required protections. AERB SOTs were visiting site on regular basis with due approval of respective authorities after taking appropriate protective measures.

Certain key lessons were learnt from the experience of regulatory oversight of Nuclear and Radiation Facilities (NRF) during pandemic situation. The remote regulatory inspection has its own limitations. While it is more suitable for inspections of facilities with low hazard potential and less source security concern, onsite presence is essential for more secured and some high hazard facilities. Also, unannounced inspections and reactive inspections require physical presence at site. However, remote inspection can be suitably integrated into the AERB's future inspection programme of the NRFs using a graded approach to optimize resources.

### 3.2.1 Regulatory Inspections of Nuclear & Industrial Facilities (N&IF)

During the year, total 74 regulatory inspections (35 physical & 39 remote RIs) of nuclear power projects, operating NPPs and fuel cycle facilities under the purview of AERB, were carried out covering safety (nuclear, radiological & industrial) and security aspects.

Regulatory Inspections carried out physically on-site include:

- (i) Unannounced inspections of NPPs viz. NAPS-1&2, TAPS-1&2, TAPS-3&4 and KGS-3&4.
- (ii) RI of KAPS-3&4, KGS-1&2 and 3&4 and HWP-Manuguru to cover aspects of Nuclear Security.
- (iii) RI of TAPS-1 and KKNPP-2 to cover Refuelling Shutdown (RSD) activities.
- (iv) RI during Biennial Shutdown (BSD) of KGS-4 to cover radiological safety aspects.
- (v) A Special Inspection of IREL-OSCOM was carried out in response to dangerous occurrence of collapse of concrete supporting structure of FRP tanks.

Special Inspection of KAPP-3 was carried out through virtual mode to check plant status, verify the compliance to the requirements for the Phase-B commissioning and preparedness for Phase-C commissioning activities.

The number of inspections conducted in each of Nuclear Facilities (under construction & commissioning), Operating NPPs and Industrial & Fuel Cycle Facilities are given in Table 3.1, 3.2 and 3.3 respectively.

**Table 3.1: Regulatory Inspections of Nuclear Facilities (under Construction and Commissioning)**

Project(s)	No. of Inspections
KKNPP-5&6	1
KKNPP-3&4	1
KAPP-3&4	4
RAPP-7&8	2
PFBR	2
DFRP	1
FRFCF	2
NFC-Kota	1
<b>Total</b>	<b>14</b>

\* out of 14, total 5 RIs conducted physically

**Table 3.2: Regulatory Inspections of Operating Nuclear Facilities**

Facilities	No. of Inspections
<b>Operating NPP</b>	
TAPS-1&2	5
TAPS-3&4	4
RAPS-1&2	2
RAPS-3&4	2
RAPS-5&6	3
MAPS-1&2	2
NAPS-1&2	3
KAPS-1&2	1
KGS-1&2	5
KGS-3&4	6
KKNPP-1&2	2
<b>IGCAR Facilities</b>	
FBTR, KAMINI, IFSB	1
<b>Total</b>	<b>36</b>

\*Includes 50% inspections through physical and virtual method.



**Verifications of Industrial Safety Aspects - NPPs**

**Table 3.3: Regulatory Inspections of Industrial and Fuel Cycle Facilities**

Facilities	No. of Inspections
HWP-Kota	2
HWP-Thal	1
HWP-Hazira	1
HWP-Manuguru	2
NFC-Hyderabad	2
UCIL-Jaduguda Mill	2
UCIL-Jaduguda Mine	1
UCIL-Turamdih Mill and Mine	2(1 each)
UCIL-Mohuldih Mine	1
UCIL-Bagjata Mine	2
UCIL-Bhatin Mine	2
UCIL-Narwapahar Mine	2
UCIL-Banduhurang Mine	1
IREL-Udyogamandal	1
IREL-OSCOM	2
<b>Total</b>	<b>24</b>

\*Includes 50% inspections through physical and virtual method.



**Glimpses of Remote Regulatory Inspection of Nuclear Facilities**



Verification of Industrial Safety Aspects-NPPs



Remote RI of Industrial and Fire Safety Aspects-NFC/HWPs

### 3.2.2. Regulatory Inspection of Radiation Facilities

The periodic and special regulatory inspections of radiation facilities carried out during the year 2020 are tabulated below. Most of the inspections are carried out through virtual means.

**Table 3.4: Regulatory Inspections of Radiation Facilities**

Radiation Facility	Type of Inspection	No. of Facilities/ Institutes Inspected
Radiotherapy	Periodic	111
Nuclear Medicine	Periodic	85
Diagnostic Radiology	Periodic	97
	Special - Excessive Exposure	4
Diagnostic Radiology Supplier	Periodic	1
Industrial Radiography	Periodic	44
	Special - Excessive Exposure	1
Nucleonic Gauges	Periodic	17
Well Logging	Periodic	6
Gamma Irradiation Chamber	Periodic	12
Gamma Radiation Processing Facility	Periodic	4
Industrial Accelerator Radiation Processing Facility	Periodic	2
Particle Accelerator Research Facility (PARF)	Periodic	2
Medical Cyclotron	Periodic	5
Calibration Laboratories	Periodic	1
Diagnostic Radiology, X-ray Baggage, Consumer Products	Type Approval Testing	32
Radiation Processing Facilities, Medical Cyclotron, Container Scanner	Consenting	6
Radiotherapy, Nuclear Medicine, Diagnostic Radiology, Medical Cyclotron	Special (Reactive/DR QA tool verification)	10
<b>Total</b>		<b>440</b>



In addition to periodic remote inspection of nuclear, industrial and radiation facilities, AERB has carried out need-based physical inspections for type approval and pre-commissioning tests of medical radiation equipment. Besides, surprise inspections at specific radiation facilities were also carried out by deputing inspectors from RRCs and HQ while adhering to all safety precautions and guidelines of Covid-19 pandemic.



Glimpses of Remote Regulatory Inspection of Radiation Facilities



Remote RI of Radiotherapy Facility



Remote RI of Industrial Radiography Facility