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

## **3.1 REGULATORY INSPECTION PROGRAMME**

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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 licenced 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, 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 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 for inspection of all nuclear and radiation facilities considering the following:

- (i) potential magnitude 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 actions, if in its opinion, the licensee has violated the conditions of the licence wilfully or otherwise or misinformed or did not divulge the information having bearing on safety, after specifying the reasons for such actions. The regulatory inspection team can also initiate enforcement actions on-the-spot, if necessary, in case of serious noncompliances.

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 timeframe;
- (c) Orders to curtail or stop activity;
- (d) Modification, suspension or revocation of licence; 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 AND RADIATION FACILITIES

AERB carries out regulatory inspections of the nuclear, industrial and radiation facilities as a safety audit measure to ensure compliance with the AERB safety requirements and stipulations. In nuclear and industrial facilities, the emphasis is given on aspects related to project management, safety culture, civil construction, quality assurance, equipment storage & preservation, fabrication and 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 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 activities 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 Team (SOT), at four NPP sites

AERB SOT provides continuous surveillance over 19 Nuclear Facilities at Four NPP sites

[Rawatbhata, Kalpakkam, Kakrapar and Kudankulam]. These SOT observe activities at the operating as well as under construction plants at these sites and submit report to AERB headquarter on daily basis. 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.

In case of radiation facilities, the inspection plan envisages prioritization of inspection of the facilities having reported cases of excessive radiation exposures and the facilities from where periodic safety status report is not received (particularly inactive nucleonic gauge institutions) as per the specified requirements. As an innovative measure, awareness programmes on radiological safety aspects were conducted along with 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. In this connection, AERB continues to conduct special unannounced inspections in major cities / towns in the country and seal the facility or issue warnings to the facilities which fail to meet the regulatory and safety requirements.

Though the X-ray equipment are of low hazard potential, it is important that they are installed and operated in accordance with radiation safety requirements specified by AERB.

The regulatory inspections are carried out by HQ and its regional centres viz. the Southern Regional Regulatory Centre (SRRC), Chennai; Eastern Regional Regulatory Centre (ERRC), Kolkata and Northern Regional Regulatory Centre (NRRC), Delhi. In addition, Directorate of Radiation Safety (DRS) / Radiation Safety Agency (RSA) in some of the States are also authorised 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 and radiation facilities. The reported deviations are categorised as White, Grey, Orange and Red findings, in the increasing order of safety significance and are 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 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.

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

During the year, total 128 regulatory inspections of N&IFs covering safety (nuclear, radiological & industrial) and

128 inspection comprises of 27 NPPs under Construction, 64 Operating NPPs and 37 Fuel Cycle & other Industrial Facilities

security aspects under the purview of AERB including following inspections:

Unannounced inspections of NPPs viz. TAPS-1&2. (i) NAPS-1&2 and KGS-1&2 to cover operation and surveillance activities.

- (ii) RI during Biennial Shutdown of KGS-1 & 2 and NAPS-1 to cover radiological safety aspects.
- (iii) RI of KGS-1 & TAPS-3 to cover the Integrated Leak Rate Test (ILRT) of Reactor building containment.
- (iv) Special RIs of GHAVP and KGS-1&2 to access the nature of safety measures after fatal accident.
- (v) Special RI of RAPP-7 to observe pre-stressing activities.
- (vi) Special RI of one of the BSM facility.
- (vii) As a vendor inspection programme, carried out special RI of NFC, Hyderabad and NPC Regional QA office at Hyderabad.
- (viii) Special RI of UCIL mines viz. Jaduguda and Bhatin to cover radiological safety aspects.
- (ix) In view of media reports on cyber attack on computer systems at KKNPP-1&2, AERB carried out a special inspection of this site.

#### (x) **Special Inspection of NPCIL Headquarter**

Apart from above, a special RI of NPCIL HQ at Mumbai was conducted by AERB to verify the compliance to the requirements prescribed for the responsible organisation in the AERB safety codes for design, construction and operation of NPPs. The implementation of QA programme applicable to the activities of NPCIL HQ was also verified during this inspection with reference to AERB Safety Code on 'Quality Assurance in Nuclear Power Plants'.

The functions and activities performed by Directorate of Technical, Technical-LWR, Projects, Operations and Quality Assurance (QA) were focussed during the inspection in addition to other supporting directorates.

The number of inspections conducted in each of Nuclear Facilities (Under construction & Commissioning), Operating NPP and Industrial & Fuel Cycle Facilities are given in Table 3.1, 3.2 and 3.3 respectively

# Table 3.1: Regulatory Inspections of NuclearFacilities under Construction and Commissioning

| Project   | No. of Inspections |
|-----------|--------------------|
| GHAVP-1&2 | 2                  |
| KKNPP-3&4 | 4                  |
| KKNPP-5&6 | 2                  |
| KAPP-3&4  | 3                  |
| RAPP-7&8  | 5                  |
| PFBR      | 5                  |
| DFRP      | 2                  |
| FRFCF     | 2                  |
| NFC-Kota  | 2                  |
| Total     | 27                 |

# Table 3.2: Regulatory Inspections of OperatingNuclear Facilities

| Facilities         | No. of Inspections |  |  |  |
|--------------------|--------------------|--|--|--|
| Operating NPP      |                    |  |  |  |
| TAPS-1&2           | б                  |  |  |  |
| TAPS-3&4           | 6                  |  |  |  |
| RAPS-1&2           | 4                  |  |  |  |
| RAPS-3&4           | 5                  |  |  |  |
| RAPS-5&6           | 4                  |  |  |  |
| MAPS-1&2           | 5                  |  |  |  |
| NAPS-1&2           | 6                  |  |  |  |
| KAPS-1&2           | 3                  |  |  |  |
| KGS-1&2            | 10                 |  |  |  |
| KGS-3&4            | 4                  |  |  |  |
| KKNPP-1&2          | 4                  |  |  |  |
| IGCAR Facilities   |                    |  |  |  |
| FBTR, KAMINI, IFSB | 2                  |  |  |  |
| CORAL              | 2                  |  |  |  |
| RML                | 1                  |  |  |  |
| RCL                | 1                  |  |  |  |
| FRTG               | 1                  |  |  |  |
| Total              | 64                 |  |  |  |



| Facility                        | No. of Inspections | Facility                        | No. of Inspections |
|---------------------------------|--------------------|---------------------------------|--------------------|
| HWP-Kota                        | 2                  | UCIL-Bhatin Mine                | 2                  |
| HWP-Thal                        | 1                  | UCIL-Narwapahar Mine            | 1                  |
| HWP-Hazira                      | 1                  | UCIL-Banduhurang Mine           | 1                  |
| HWP-Manuguru                    | 2                  | UCIL-Bagjata Mine               | 1                  |
| HWP-Baroda                      | 1                  | IREL-Udyogamandal               | 1                  |
| TDP/RCF-Mumbai                  | 1                  | IREL-OSCOM                      | 1                  |
| NFC-Hyderabad                   | 2                  | IREL-Manavalakurichi            | 1                  |
| ZC-Pazhayakayal                 | 2                  | BSM & NORM Facilities<br>(KMML) | 1                  |
| UCIL-Jaduguda Mill and Mine     | 4 (2 each)         | ECIL-Hyderabad                  | 1                  |
| UCIL-Turamdih Mill and Mine     | 2 (1 each)         | ECIL-Tirupati                   | 1                  |
| UCIL-Tummalapalle Mill and Mine | 4 (2 each)         | MPIL-Taloja                     | 1                  |
| UCIL-Mohuldih Mine              | 1                  | RAPPCOF, BRIT, Kota             | 2                  |
| Total                           | 37                 |                                 |                    |

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



AERB RI Teams at Nuclear and Radiation Facilities

### **3.2.2 Regulatory Inspections of Radiation Facilities**

#### (i) Routine and Special Inspections

The routine and special regulatory inspections of radiation facilities carried during the year 2019 are tabulated below.

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

| Radiation Facility   | Type of Inspection                        | No. of Facilities /<br>Institutes Inspected |
|--|---|---|
| Radiotherapy   | Routine                                   | 131   |
|  | Special -Excessive Exposure Investigation | 1   |
| Radiotherapy Equipment Supplier  | Routine                                   | 4   |
| Nuclear Medicine   | Routine                                   | 75  |
|  | Special -Excessive Exposure Investigation | 2   |
| Nuclear Medicine Manufacturer & Supplier   | Routine                                   | 10  |
| Diagnostic Radiology*  | Special                                   | 168   |
| Diagnostic Radiology   | Special -Excessive Exposure Investigation | 39  |
| Diagnostic Radiology Equipment Manufacturer & Supplier                                   | Routine                                   | 76  |
| Industrial Radiography   | Routine                                   | 157   |
|  | Special -Excessive Exposure Investigation | 5   |
| Industrial Radiography Equipment Supplier  | Routine                                   | 15  |
| Nucleonic Gauging Device   | Special                                   | 146   |
| Nucleonic Gauge Manufacturer & Supplier  | Routine                                   | 25  |
| Well Logging   | Routine                                   | 8   |
| Gamma Irradiation Chamber  | Routine                                   | 45  |
| Gamma Radiation Processing Facility  | Routine                                   | 4   |
| Industrial Accelerator Radiation Processing Facility                                     | Routine                                   | 1   |
| Particle Accelerator Research Facility   | Routine                                   | 3   |
| Medical Cyclotron  | Routine                                   | 4   |
| BRIT   | Routine                                   | 2   |
| RRCAT  | Routine                                   | 1   |
| VECC   | Routine                                   | 1   |
| Container Scanner  | Routine                                   | 4   |
| Consumer Products Manufacturer   | Routine                                   | 10  |
| Diagnostic Radiology Equipment, Consumer<br>Products                                     | Type Approval Testing                     | 73  |
| Radiation Processing Facilities, Medical Cyclotron<br>Facilities                         | Consenting                                | 14  |
| Radiotherapy, Nuclear Medicine, Diagnostic<br>Radiology and Medical Cyclotron Facilities | Special                                   | 14  |
| Total  |   | 1038  |

\*RI carried out by AERB and DRS/ RSA

#### (ii) Enforcement Inspections of X-Ray Facilities

Installation and operation of medical diagnostic X-ray equipment in the country require approval from AERB in the form of Registration/Licence. The X-ray facility has to comply with certain safety & regulatory requirements as specified by AERB in its regulatory documents to ensure safety of the occupational radiation workers, the patient and the public. As part of the nation-wide radiation safety campaign, AERB has been continuing the unannounced inspection of such facilities with on-the-spot enforcement actions. A followup inspection is also carried out by AERB to oversee the compliance to the enforcement actions.

Total 11 X-ray equipment were 'Sealed' and 91 were issued 'Warning for Seal' noticing the noncompliance with radiation safety and specified regulatory requirements by Medical diagnostic X-ray facilities.

Whereas, four industrial radiography devices were 'Sealed' in enforcement action against radiography facilities.

AERB takes this opportunity to spread awareness among the users and educate all the stakeholders about radiation hazards, safety and regulatory requirements.

Special inspection-cum-enforcement actions were carried out in Imphal, Bishnupur, Shillong, Guwahati, Tinsukia, Dibrugarh, Digboi, Dimapur and Kohima in the North-Eastern States of the country viz. Manipur, Assam, Meghalaya and Nagaland during September 2019. Inspection teams from AERB have visited 53 institutions (including eight State Government hospitals / Medical colleges) covering 207 equipment. Eleven equipment were 'Sealed' and issued 'Warning for Seal' to 91 X-ray for violation of major safety & regulatory requirements. Information on such inspections is shared with local print media and television media to spread awareness among the users on radiation safety.

#### (iii) Unannounced Inspection of Industrial Radiography Facilities

AERB team carried out two unannounced inspections of industrial radiography facilities at Agra, Rajkot and Jamnagar during January 2019. During visit it was observed that the Ionizing Radiation Exposure Devices (IRED) were in use without obtaining AERB approvals. One device was found stored in a residential building and also without any safety warnings. Considering the violations of regulatory and safety requirement, officers sealed four IREDs at the site.

#### (iv)Hand-holding Inspections with DRS - Andhra Pradesh

Consequent to the formation of Directorate of Radiation Safety (DRS) in the State of Andhra Pradesh vide the Memorandum of Understanding (MoU) between AERB and the State of Andhra Pradesh on January 04, 2018, and delegation of powers to Head, DRS-AP by Competent Authority to inspect all the Medical Diagnostic X-ray installations in the State. AERB officers carried out hand-holding inspections-cum-training along with staff of DRS-AP and familiarized them with the Regulatory Inspection process and inspection methodology.



News on 'Enforcement action against X-ray facilities' appeared in local newspapers of Imphal



AERB Officers carrying out Regulatory Inspection of Radiation Facilities