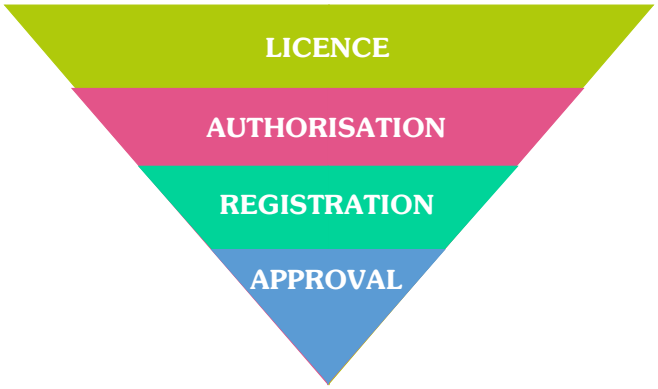
02 SAFETY SURVEILLANCE OF RADIATION FACILITIES

Radiation sources such as radioisotopes (^{60}Co, ^{137}Cs, ^{192}Ir, ^{75}Se, ^{241}Am, ^{99m}Tc, ^{85}Kr etc.) and radiation generating equipment (X-ray machines, accelerators etc.) are being used in multifarious and ingenious ways to achieve overall societal health and prosperity. The radiation sources have a wide range of applications in the industry, medicine, agriculture and research institutions and AERB regulates these facilities/institutions. These sources have the radiation hazard potential ranging from very low to high. Proper design, handling and disposal methodologies are required for ensuring safe and intended use of radiation sources.



The Graded approach in AERB Consenting Process based on Radiation Hazard Potential

2.1 SAFETY REVIEW MECHANISM OF RADIATION FACILITIES

As per the Atomic Energy (Radiation Protection) Rules, 2004 promulgated under the Atomic Energy Act, 1962, consents issued for handling the radiation sources are categorized as Licence, Authorisation, Registration and Consent/Approval categories, based on their hazard potential. Accordingly, the statutory requirements are graded and may require multiple stages of review to address the hazard, before issuance of consent to operate the facility/ equipment. Approvals are also issued as an interim consent towards the respective Licences.

Type Approvals are issued to manufacturer/ supplier for equipment conforming to the regulatory standards. No Objection Certificates (NOC) are issued to the stakeholders to import either equipment or radioactive source, after which the stakeholders need to obtain either a Type Approval or the respective consent for use.

AERB has a system of multi-tier review process for various consents depending on the hazard potential involved. The requirements for issuance of various consents is as per AERB Safety Guide on 'Consenting Process for Radiation Facilities' (AERB/RF/SG/G-3).

The transportation of radioactive material (including that of nuclear material from nuclear facilities) is governed by regulations specified in the AERB Safety Code for the 'Safe Transport of Radioactive Materials' and is in line with the international requirements specified by IAEA.

2.2 APPLICATIONS OF RADIATION SOURCES AND REGULATORY ACTIVITIES

A glimpse on various applications of radiation sources and status of licence/consent issued during the year to radiation facilities are detailed in following paragraphs.

2.2.1 Medical Applications of Radiation Sources

(i) Radiotherapy

Teletherapy

Teletherapy is a branch of radiotherapy in which tumour is treated by using ionising radiation keeping radiation source(s) at certain distance. The radioisotope like ^{60}Co and radiation generators such as Linear Accelerators are used.

Proton Beam Therapy

It is a type of radiation therapy that uses a beam of protons having energies 70 to 230 MeV. Proton beam is specifically beneficial in treating paediatric cancers and deep-seated tumours more effectively than the conventional Gamma/ X-ray radiation therapy. First-of-a-kind Proton Beam Therapy facility in the country was licenced in December 2018.

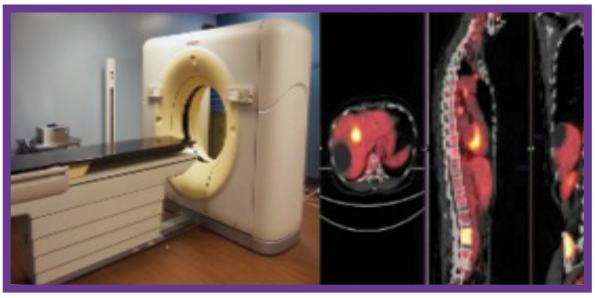
Sources and devices used in teletherapy are of high radiation hazard potential.

Brachytherapy

In brachytherapy, source is kept very near to the lesion. The radioisotopes used are ^{192}Ir, ^{137}Cs, ^{90}Sr, ^{106}Ru, ^{125}I and ^{60}Co with activity range from few MBq to GBq. They are of moderate radiation hazard potential as compared to teletherapy.

(ii) Nuclear Medicine

Nuclear medicine facility uses very small amount of radioactive material in the form of radio-pharmaceuticals (eg.^{99m}Tc, ^{131}I, ^{201}Tl and ^{18}F) for diagnosis and treatment. Imaging equipment such as PET-CT and SPECT are used in these practices. The facilities using radio-pharmaceuticals are of moderate-to-low radiation hazard.



(iii) Diagnostic Radiology (X-ray)

X-rays are used in medical facilities as an important diagnostic tool. Following practices use X-ray for various diagnostic examinations.

Interventional Radiology equipment (Cath-Lab)

These equipment are used in operation theatres for various interventional procedures and poses moderate radiation hazard to patients and medical professionals involved in operation of the equipment.

There are 1,944 Cath Lab. equipment

Computed Tomography (CT)

CT is a non-invasive medical examination that uses X-ray equipment to produce cross-sectional images of the body. CT equipment poses moderate radiation hazard potential to both worker and patient.

There are 4,824 CT equipment

Radiography and Fluoroscopy

Radiography, Fluoroscopy, Dental X-ray, Mammography, Bone Mineral Densitometer equipment are used for diagnostic purpose. These constitute around 70-80% of all X-ray equipment that are used, and are of low-to-very low radiation hazard potential, to both worker and patients.

There are about 70,578 such medical diagnostic X-ray equipment.

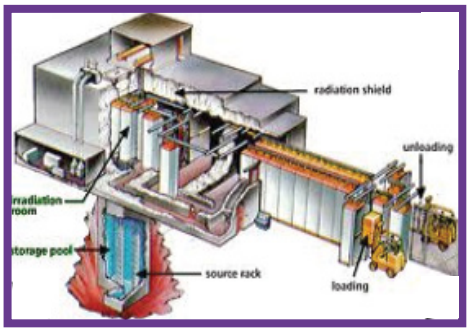
Following table provides the details of consents issued for Medical Radiation Facilities during the year.

Type of Consent ↓ / No. of Facilities (Equipment) →	Radiotherapy	Nuclear Medicine	X-ray
	503 (735 Teletherapy +316 Brachytherapy)	350	56,660 (77,346)
Licence*	206	170	19,747
Permission for Import/Procurement of Equipment	152	64	10,458
Permission for Procurement of Radioactive Sources	419	2314	---
Type Approval/Renewal (Equipment)	19	---	169
Layout Approval	325	160	---

*Licence includes Licence / Authorisation / Registration for various radiation facilities

2.2.2 Industrial Applications of Radiation Sources

(i) Radiation Processing Facilities (RPF)



RPF includes Gamma Radiation Processing Facility (GRAPF)/ Gamma Irradiators and Electron Beam Accelerators are used mainly for radiation processing of food (i.e. inhibiting sprouting, delay in ripening, microbial decontamination, insect disinfestation, shelf-life extension etc.), sterilisation of healthcare products and crosslinking of polymers in cable industries. The activity range is about few PBq (eg.10^{15} Bq) of ^{60}Co.

Industrial Accelerators Radiation Processing Facility (IARPF) operated in electron mode of energy range from 1.5 to 3 MeV are mainly used for cross linking of polymers. One of the benefits of accelerators is that, unlike radioactive sources, it produces radiation only when they are energized.

The RPF are of high radiation hazard potential.

(ii) Research Accelerators

Research Accelerators or Particle Accelerator Research Facilities (PARF) are generally installed in academic & research institutions and catering to the research needs of various fields of high energy physics, material science, radiation studies etc. Accelerators installed in our country operated in the energy range from a few hundreds of keV to GeV. The hazard associated with the facilities also diverse in nature and ranges from very high-to-moderate hazard potential. The radiation hazard potential of an accelerator mainly depends on the type of ion(s) accelerated, type of accelerator and beam parameters (e.g. energy & current, target system). Besides, other industrial hazards such as electrical, mechanical, RF, magnetic, cryogenic etc. are also present in an accelerator facility.

(iii) Gamma Irradiation Chamber (GIC)

Gamma Irradiation Chamber is basically used for research and development and also in blood banks for irradiation of blood and blood components. Radioisotopes like ^{60}Co and ^{137}Cs are used in these applications. The activity ranges from few tens of TBq to few hundreds of TBq. They are of high to moderate radiation hazard potential.

Now a days, Irradiator based on X-ray generator are also used in blood banks and research application. X-ray energy range is from 160 to 300 keV.

(iv) Medical Cyclotron

Short-lived radioisotopes that are used in nuclear medicine PET scans are generally produced in medical cyclotron facilities. In India, cyclotrons are primarily utilised for the production of ^{18}F labelled radio-pharmaceuticals. The medical cyclotron facilities are of high-to- moderate radiation hazard potential.

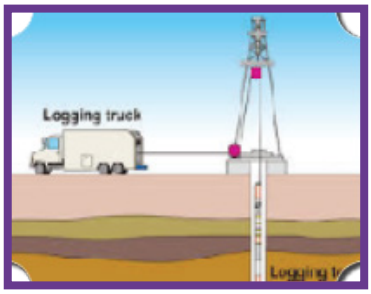
(v) Industrial Radiography (IR)

Radiography using **I**ndustrial **R**adiography **E**xposure **D**evice (IRED), is one of the important non-destructive (NDT) methods used for study / evaluation of weld joints, castings etc. Radioisotopes like ^{192}Ir, ^{60}Co, ^{75}Se and different energies of X-rays are used in the field of industrial radiography. The activity range is from few hundreds of GBq to few TBq. The X-ray energy range is from few hundreds of keV to few MeV. They are of high-to- moderate radiation hazard potential.

(vi) Nucleonic Gauges (NG)

Nucleonic Gauges also known as **I**onising **R**adiation **G**auging **D**evices (IRGD) are used for online measurement/monitoring of quality control parameters such as thickness, level, density, coating thickness, composition of material, elemental analysis etc. Sources used for nucleonic gauges comprise of gamma sources (e.g. ^{60}Co, ^{137}Cs, ^{241}Am), beta sources (e.g. ^{85}Kr, ^{90}Sr, ^{147}Pm, ^{204}Tl) and neutron sources (^{241}Am-Be and ^{252}Cf). The activity range is from MBq to GBq. They are of moderate-to-low radiation hazard potential.

(vii) Well Logging (WL)



Radioactive sources are used in well logging application for exploration of oil, coal and geophysical logging etc. The sources used are mainly ^{137}Cs for density measurement, ^{241}Am-Be and neutron generators (Deuterium-Tritium generators) for exploration of hydrocarbon. The activity range is from kBq to GBq. They are of moderate-to-low radiation hazard potential.

Some calibration sources such as ^{60}Co, ^{226}Ra, ^{232}Th of MBq activity are also used in well logging.

Following table provides the details of consents issued for Industrial Radiation Facilities during the year.

Type of Consent / No. of Facilities and Equipment/ Devices	RPF	Research Accelerators	Medical Cyclotron	GIC	IR	NG$	WL
	23 (Gamma) & 16 (IARPF)	10	21	124	612	1097	51
	21 (Accelerators)	10	21	128	2970	7212	1690 (Sources)
Licence*	11	1	4	24	243	99	09
Type Approval/Renewal (Equipment)	---	---	---	4	3	61	---
Sources				---	---	08	06
Permission for Import/Procurement of Equipment	04	---	---	---	325	400	---
Permission for Procurement of Radioactive Sources	15	---	---	---	1839	418	107
Approval (Layout/ Commissioning/ Source Storage Facility)	---	---	---	---	392	---	15

*Licence includes Licence / Authorisation / Registration for various radiation facilities.
$Nucleonic gauge institute registration and migration of equipment were in progress in e- LORA.

2.2.3 Consumer Products and Research Applications

(i) Consumer Goods Manufacturing Facilities

Consumer products such as smoke detectors, thorium gas mantles and starters, gaseous tritium luminescence devices use exempt quantity of radioactive sources. They are of very low hazard potential. However, regulatory control exists on the manufacturing facilities of these devices. The products containing radioactivity above the exempt limits have to be assessed for safety and are required to be type approved by AERB.

(ii) Container Scanner Facility

Container scanners are used at various ports (land/sea) for inspection of material inside cargo/container without opening them. These scanners are either accelerators or ^{60}Co based. They are high-to-moderate radiation hazard potential.

(iii) X-ray Baggage Scanner

Scanning facilities are used for detection of contrabands and explosives. Scanning facilities are mainly X-ray based equipment. These have extremely low radiation hazard potential. Design (Type) approval is carried out by AERB. Only the manufacturers /suppliers of equipment are regulated.

(iv) Facilities using Sealed and Unsealed Sources

Though sealed radioactive sources are used in various industrial and medical applications, but here sealed source means those used in education, research and calibration purposes. Unsealed sources are also used in various research and academic institutions such as agriculture research, veterinary science, tracer studies. The activity range is from kBq to GBq. They are of low-to-moderate radiation hazard potential.

Following table provides the details of consents issued for Consumer Products and Research Applications Facilities during the year.

Type of Consent / No. of Facilities/ (Equipment)	Consumer Goods Manufacturing Facilities	Container / Baggage Scanner	Research Facilities (Sealed and Unsealed Sources)
	25	22 (26)	262 and 186
Licence*	01	05	---
Permission for Procurement of Radioactive Sources	---	---	357
Type Approval (Equipment)	---	72	---

*Licence includes Licence / Authorisation / Registration for various radiation facilities.

2.2.4 Disposal of Disused Radioactive Sources

The radiation sources are either procured from Indian supplier or imported from other counties. All the radioactive sources must be safely disposed of once they reach the end of their useful life or not in use for intended purpose. As per the terms and condition of the licence and policy, these disused sources need to be send back to the original manufacturer/supplier for its safe management.

During the year about 348 approvals were issued for export of radioactive sources and 63 approvals for return the sources to Indian supplier/disposal agency for disposal of sources at authorised radioactive waste management sites in India.

2.2.5 Safety Committees for Radiation Facilities

The safety committees review the radiation safety aspects of medical, industrial and research institutions which use radioactive sources/ radiation generating equipment. Number of meetings conducted by various committees for safety review of radiation facilities and transport of radioactive material during the period is given in Table 2.1.

The committees also recommend issuance of licence for operation or issuance of Type Approval, based on their review. The committees consist of experts in the field from the industry, medicine and academic institutions apart from the experts from BARC, BRIT and AERB.

2.2.6 Approval of Radiological Safety Officers

While the built-in safety of the equipment and institution's operational preparedness towards safety are ensured by adhering to requirements specified by AERB in various safety documents, the implementation of radiation safety is carried out by AERB approved Radiological Safety Officers (RSO). The RSOs are thus not only acting as extended arms of the regulatory body at every radiation facility, but they are also the pivotal interface between the radiation facility and the regulatory body.

The number of RSO approvals/renewals issued for different practices during the year are as given in Table 2.2.

2.2.7 Other Regulatory Activities

(i) Approval of Classification Designation of ^{106}Ru Eye Plaque

BRIT has indigenously developed ^{106} Ru eye plaque for brachytherapy treatment of eye cancers. BRIT

Table 2.1: Meetings of Safety Review Committees of Radiation Facilities

Name of Committee	Number of Meetings
Safety Review Committee for Applications of Radiation (SARCAR)	3
Safety Review Committee for Radiation Processing Plants (SRC-RPP)	4
Committee on Safe Transport of Radioactive Material (COSTRAM)	2
Safety Committee for Hadron Therapy Facilities (SCHTF)	2
Accelerator and Laser Safety Committee (ALSC)	6
Committee for Investigation and Review of Exposure in Nuclear Fuel Cycle and Radiation Facilities (CIRENURA)	4
Total	**21**

Table 2.2: Approval of Radiological Safety Officers in Radiation Facilities

Type of Practice	Number	Type of Practice	Number
Radiotherapy	443	Radiation Processing Facilities	65
Nuclear Medicine	172	Industrial Radiography	449
Diagnostic X-ray	1911	Nucleonic Gauges & Well Logging	485
Research Centres	75	Consumer Product Manufacturer & Scanner Facilities	31

submitted application for approval of Classification Designation of radioactive sources. AERB officers witnessed the testing of classification of ^{106}Ru-*eye* plaque source. Based on review of application along with the test results, AERB issued approval of Classification Designation to ^{106}Ru-*eye* plaque.

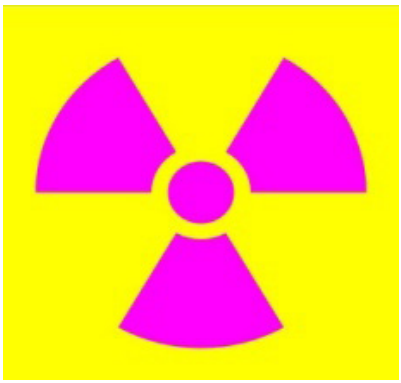
(ii) Strengthening Control over Movement of Devices Containing Radioactive Sources

Based on lessons learnt from recent incidences of loss/theft of radiation sources during movement, AERB directed all well-logging and industrial radiography (IR) facilities to affix legible and durable radiation warning sign (trefoil symbol with radiation hazard caution ENGRAVED in ENGLISH, HINDI and Local Language) and institute details (engraved on a steel tag) on the container / devices having radioactive sources which are frequently transported for field job. Further all the IR facilities were directed that, during transport of Industrial gamma radiography exposure devices (IGRED), the facility shall ensure that the IGREDs are anchored to the vehicle (e.g. with metal chain and pad lock). Similarly, during storage the IGREDs shall be suitably anchored.

The above action was initiated to minimize the chances of mishandling of radioactive sources, in case of loss of equipment or container in the public domain. The warning sign will serve as a supplementary to the radioactive symbol (trefoil) for warning to the public to keep away, if such device (containing radiation source) is found in the public domain.

The sketches of the Warning Sign and Metallic tag are as shown below.

RADIATION WARNING SIGN



CAUTION:* *RADIATION, KEEP AWAY

सावधान: विकिरण, दूर रहिये ।

LOCAL Language:

METALLIC TAG

(Following to be engraved)

Name of the institution & City:

Contact no.:

Warning: This container contains ***RADIOACTIVE*** *material. If found* **DO NOT OPEN.** *Please inform to the above address or inform nearby police station.*

Radiography device with Legible and Durable Radiation Warning Sign

(iii) Assessment of Excessive Exposure Cases for Radiation Facilities

Radiation dose to worker in excess of regulatory constraint of 10 mSv in a monitoring period is reported by personnel monitoring service provider to AERB, which is communicated further to respective user institution for investigation. Such investigation reports are reviewed by AERB for not only assigning the dose to the worker but also to initiate regulatory actions to prevent such recurrences. For resolution of such reported cases, the investigation report has to undergo through multi-tire review process in AERB. At present, depending upon the radiation dose, the report is reviewed by three safety committees.

In the recent past, a large number of excessive exposure cases got accumulated for final resolution due to several reasons. One of the major reasons for which is non-receipt of investigation reports with necessary inputs from the user institution in-spite of multiple reminders. It is worth noting that delay in resolution of excessive exposure cases defeats the purpose of personnel monitoring in protecting the workers from unsafe work practice, if any. To resolve these pending cases an In-House Review Group (IHRG) was constituted in AERB.

Analysis of the previously investigated cases shows that around 90% of the reported cases are from Diagnostic Radiology (DR) practice and out of the reported cases from DR practice, about 95% cases are found to be non-genuine, where the persons were not actually exposed to the reported radiation dose. Such cases are mainly due to storage of TLD badge inside the X-ray room, using the bare TLD card, wearing the TLD badge over lead apron (which normally reduced the exposure level by around 90%). Keeping this in view and based on the experience in resolution of excessive exposure cases in the past, IHRG framed criteria for resolution of excessive exposure cases.

Several steps were also initiated by AERB, including spreading awareness to the workers about proper use of TLD and safe work practice, which resulted in reduction of excessive exposure cases in DR practice. Secondly, the procedure of assessment of excessive exposure cases have been revised for their expeditious resolution. With this multipronged approach not only the number of reported cases were reduced but also the reported cases were expeditiously resolved to avoid further accumulation in future.

2.3 UNUSUAL OCCURRENCES AND ENFORCEMENT ACTIONS

(i) Loss of Oil Well Logging Source

An oil-well logging container housing ^{137}Cs source of activity 80 GBq (~2 Ci) belonging to a well logging institute in Rajahmundry got lost on January 14, 2019 during transport. Later on, this source container was recovered from a scrap dealer on January 23, 2019 with the efforts of Law Enforcement authorities, National Disaster Response Force (NDRF) and personnel from well logging institute. No damage to the source container and source assembly was observed. Subsequently, AERB officers visited the incident site and verified the status of the source & sources container. It was established that incident occurred due to inadequate security arrangements for the source.

Enforcement Action:

AERB issued a show-cause notice to the licensee organisation. The incident was discussed in AERB Safety Review committee where representatives of licensee organisation were also called for personal hearing. Subsequently a warning letter was issued to licensee of the organisation. Incident has been reported in IAEA-INES and Incident and Trafficking Database (ITDB).

(ii) Use and Storage of Radiography Device at Unauthorised Site

AERB conducted surprise regulatory inspections during January 17-21, 2019 at various sites in Agra and Rajkot and sealed four industrial radiography devices (belonging to two different radiography facilities) for storage/use at unapproved/unauthorised sites.

Enforcement Action:

AERB issued show-cause notices to both the radiography facilities. After review of responses from the facilities, AERB initiated enforcement actions by suspending operation of two devices for a period of three months.

(iii) Theft of Industrial Radiography Device

A car carrying industrial radiography device model Delta-880 containing ^{192}Ir source of about 1.53 TBq (41.4 Ci) belong to Navi Mumbai based radiography company met with an accident on June 26, 2019 near Pune. Post-accident, RSO of radiography agency reached

the accident site and could not locate the radiography device containing the source. The radiography agency lodged a police complaint regarding theft of the radioactive source from the accident site at the nearest police station.

Later on, the radiography device was recovered on June 28, 2019 from a scrap dealer located about 10 km away from the accident site by the licensee institution. Device and source were recovered in intact condition and no radiological safety concern was reported.

(iv) Theft of Nucleonic Gauge with Sources

Three numbers of ^{60}Co source containers used in mould level gauges were removed from the installed location in one of the steel company located at Bhandara, Maharashtra and these sources along with their shields were transferred to the source storage room under lock and key in March 2019. After a month, plant personnel notice that the lock of the source storage room was broken and two numbers of containers with ^{60}Co sources (~20.72 MBq (0.56 mCi) each) are missing from the room and third gauge with source in the container was found to be intact. Institute lodged police complaint about the theft. After a reach operation, one container with source was recovered from the plant premises, whereas second container could not be recovered till date.

Enforcement Action:

AERB issued show-cause notice on regulatory violations committed by the institution.

(v) Loss of Nucleonic Gauges containing decayed Sources

Three numbers of nucleonic gauges containing radioactive sources {2x^{137}Cs (~ 0.22 GBq (6 mCi) & ~ 2.3 GBq (62 mCi)} respectively and one ^{14}C (~ 333 KBq (90μCi)) were reported missing from the storage room of institution at Dahej, Bharuch. The institute lodged a police complaint about the incident. Despite of search operations by the institution, the missing sources could not be traced. Unsecured storage and inadequate surveillance to the disused sources at storage area led to the above incident.

Enforcement Action:

AERB issued show-cause notice on regulatory violations committed by the institution.

2.4 INITIATIVES TOWARDS MAXIMUM GOVERNANCE, MINIMUM GOVERNMENT

(i) Management of Disused Sealed Radioactive Sources (DSRS)

The disused sealed radioactive sources (DSRS) are those sealed radioactive sources that are not intended to be used, for the practice for which an authorization was granted. The sources are obtained either through indigenously or through import. There are large number of disused radioactive sources of varying hazard potential (Category-1 to 5, high to low hazard) which are in possession of various institutions located all over the country. As per the terms and condition of the licence and policy, these sources after its useful life need to be returned back to the original supplier for its safe management. However, in certain cases, the Licensee is unable to return the DSRS to the supplier owing to various reasons which include non-existence of original supplier abroad, non-availability of proper documentation for export, exorbitant cost quoted by the original supplier and financial constraints etc.

AERB oversees the safety and security of these DSRS possessed by various Institutions. Apart from review of periodic safety status reports and pursuing them for disposal of DSRS, AERB inspects these facilities based on the hazard potential.

AERB followed up the matter pertaining to disposal of DSRS with Department of Atomic Energy (DAE) which is the nodal agency as per the Atomic Energy Act, 1962 to provide control over radioactive substances or radiation generating equipment, to establish an appropriate formal mechanism to address the issue of DSRS. Accordingly, DAE has constituted an expert committee to review the request for safe management of DSRS. The Committee has taken on priority the issue of disposal of Category-1 DSRS used in (Teletherapy and gamma irradiation Chamber) and initiated discussion with institution and source supplier to facilitate them to initiate the actions for safe management of DSRS.

(ii) Amendment of Safety Code on Industrial Radiography

Based on the lessons learnt from recent incidences w.r.t. handling of radiography devices by untrained persons and feedback of stakeholders regarding scarcity of trained personnel in industrial radiography practice, need was felt to infuse more trained manpower to

elevate the level of safety in the practice. In view of this, the Safety Code on Industrial Radiography [AERB/RF-IR/SC-1 (Rev.1) 2015], was amended. As per newly approved requirement, a candidate with minimum one year course from Industrial Training Institute (ITI) and with one year working experience is also eligible to undergo Training Course on 'Radiological Safety for Industrial Radiographer' at par with candidate possessing 10+2 or equivalent examination with science subjects. The term 'trainee' in radiography is changed to 'intern'.

One of the stringent requirements of six months 'prior' experience is replaced with field experience of six months in an approved industrial radiography institution as an 'intern' after completion of the training. This modification is aimed at improving the availability of qualified industrial radiographers and also accommodating the fresher's entering in this field without compromising on radiation safety. The amendment in this regard has been issued on August 02, 2019, details of which is available on AERB website.

(iii) Upgrades in e-LORA System

The regulatory consenting process for all stakeholders of radiation facilities is executed through e-Licensing of Radiation Applications (e-LORA) system. To ensure availability and performance of system and to make it more user friendly, certain changes are implement, as required, in the architecture of e-LORA. During the period, following upgrades were carried out in the Internet Interface Module (IIM) for external users and in Back Office Module (BOM) for AERB users:

(a) New functionalities are augmented in e-LORA by which user can easily change User ID, update Institute details as well as contact details.

(b) New feature has been constructed to display application processing statistics at e-LORA Home page.

(c) News Item Screen to broadcast important news items or safety promotional materials.

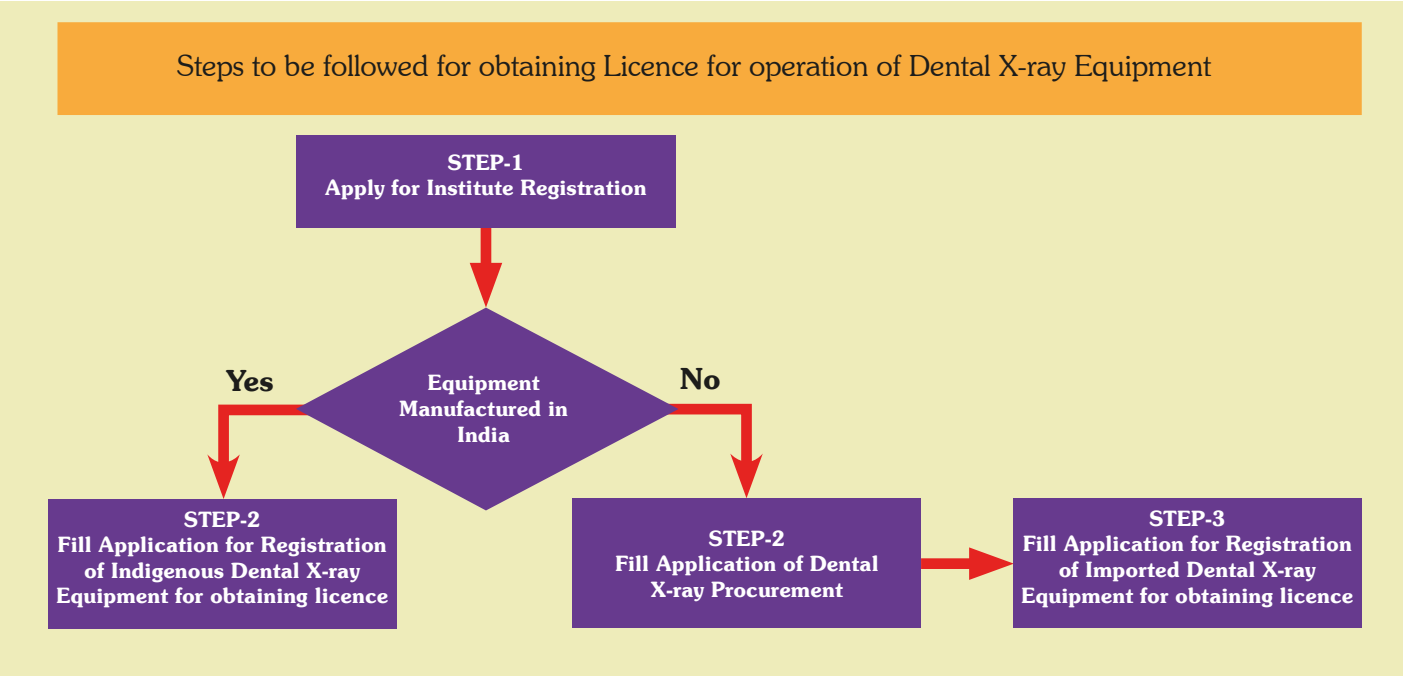
(d) Simplified the method of submission of excessive exposure reports by user and its processing flow at AERB.

(e) 'Quick Help' page has been created to make easy availability of certain FAQ and answers related to e-LORA.

(f) Revised version of Inspection Module has been implemented in order to automate inspection intimation process.

(g) Safety Status Report submission system has been made more effective.

Similarly, at the BOM side for AERB users, new functionalities such as inserting comment against institutions, modified MIS reports, global search options and legacy record management are constructed for better usability and faster review of applications.

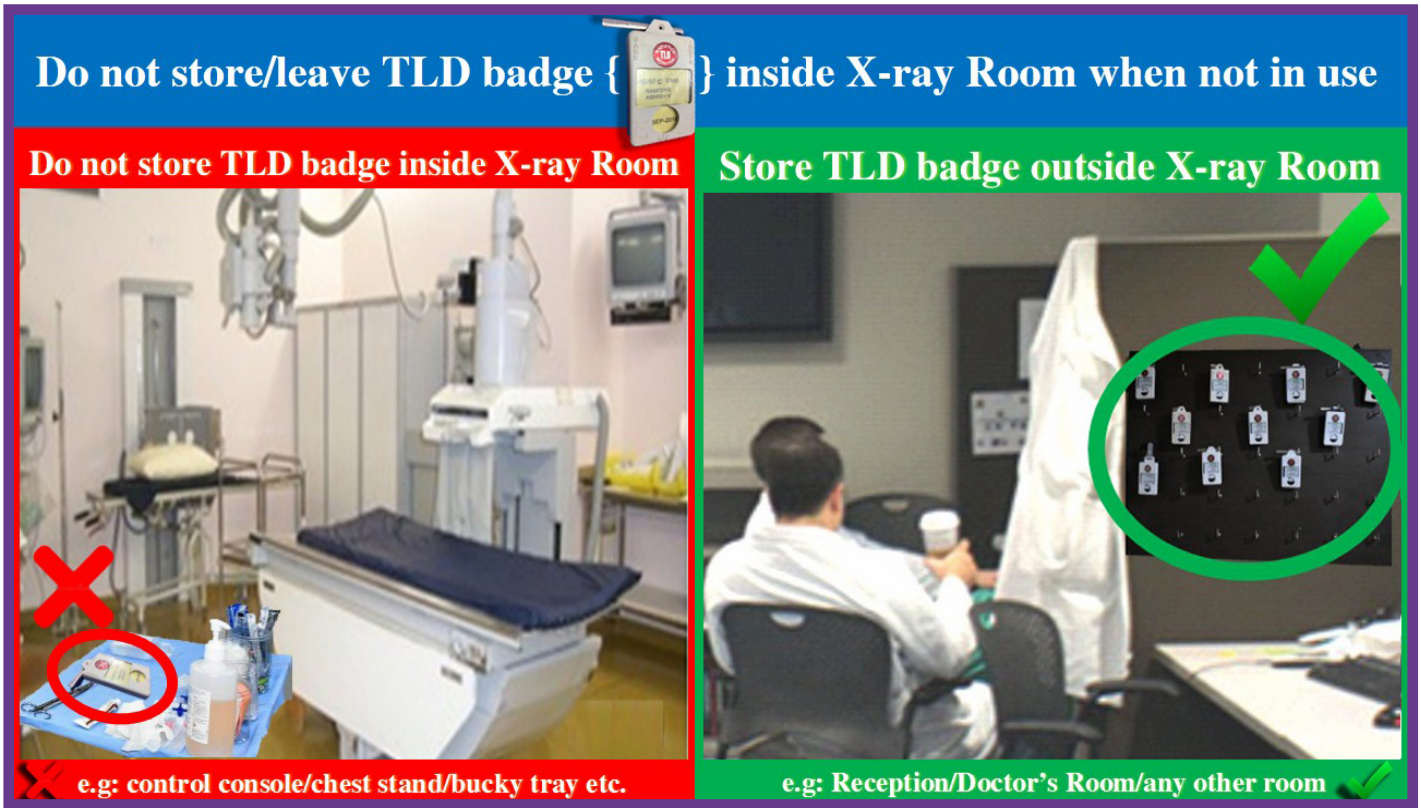


(iv) Simplification in Registration of Dental X-ray Equipment

The module for processing applications for Licence (in the form of Registration) for operation of Dental X-ray equipment has been simplified and made functional in AERB's e-LORA system. Now, the Registration for operation of dental X-ray equipment manufactured in India can be obtained in two steps and equipment manufactured abroad can be obtained in three steps process. Also, validity of Registration Certificate of all types of dental X-ray equipment has been extended from existing five years to ten years.

(v) Awareness on Proper Storage of TLD

Personnel Monitoring Service (TLD Badges) are used to monitor radiation doses received by personnel working in radiation facilities. Many cases of Excessive Exposure to operators (e.g. X-ray technologists, medical practitioners) working in diagnostic X-ray facilities are reported to AERB. During review of these cases, one of the common observation for these exposures is the TLD badges left/ stored inside X-ray room is resulting in non-genuine excessive exposures. In order to minimise such non-genuine excessive exposure cases, AERB has prepared an informative poster on proper storage of the TLD badges and circulated to all the X-ray facilities.



Awareness Posters on Proper Storage of TLD

Caution Symbol for Radioactive Source

Government of India

Atomic Energy Regulatory Board

Attention Owners and Users of Ionising Radiation Sources

Caution Symbol for X-rays

Concerned about radiation safety?? .... Ask for AERB compliance !!!

Obtaining Licence from AERB for safe handling of radiation sources is a statutory requirement under Atomic Energy (Radiation Protection) Rules, 2004.

Societal Benefits Accrued from Radiation Sources include

Radioactive Sources used in:

- Research, Academic Institutions and Universities
- Nucleonic Gauge and Well Logging
- Industrial Radiography using gamma rays
- Gamma Chamber
- Gamma Radiation Processing Plants
- Nuclear Medicine
- Tele-cobalt and Brachytherapy units of Radiotherapy

Radiation Generating Equipment used in:

- Research, Academic Institutions and Universities
- Industrial Radiography using X-rays
- Accelerators based Radiation Processing Plants
- Medical Accelerators for Radiotherapy
- Medical Cyclotron
- Industrial & Research Accelerator
- Diagnostic Radiology - CT/ Cath Lab / X-ray Machines
- X-ray Baggage Scanner, etc.

Obtaining Licence from AERB is easy through AERB's web based system e-LORA (e-Licensing of Radiation Applications). No fee is charged for AERB Licence.

For detailed information and accessing e-LORA system, visit AERB website

www.aerb.gov.in

Radiation Sources found to be in possession and / or in operation without a valid Licence from AERB can be SEIZED or SEALED without further notice and owner is liable for legal prosecution.

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