

N.4: TASAR activities during COVID-19 pandemic

RRCAT has initiated a Trade Apprenticeship Scheme at RRCAT (TASAR) under National Apprenticeship Promotion Scheme (NAPS) to professionally train ITI pass youngsters by providing them access to modern engineering infrastructure under the guidance of experienced and knowledgeable technocrats of RRCAT. This scheme also provides semi-skilled technical manpower to the organisation.



Apprentices being trained in electrical maintenance.

COVID-19 pandemic brought a brief gap in the training scheme. RRCAT continued to pay stipend to the apprentices to support them during the difficult times. The training of second batch, which was about to be completed when the lockdown was announced in March 2020, was completed soon after the lockdown was lifted. The training of third batch has now started and it is progressing in full scale. The team of young technocrats constituting TASAR Internal Assessment Sub-Committee (TIAS) has taken care of the apprentices to safeguard them against pandemic. All apprentices have been provided with high-quality masks and hand sanitizer spray bottles to help them in exercising COVID-19 related precautions.

There were some heart-warming news from previous TASAR batches. Over ten apprentices of first batch have been placed in premier national organisations such as BARC, RRCAT, NPCIL, IGCAR, ISRO, and Railways. Four apprentices of the second batch have made it to top ten merit list of Madhya Pradesh in 110th All India Trade Test. The details are given in the table below:

Madhya Pradesh state rank holders from the second TASAR batch.

Name	Trade	State Rank	Trade Rank
Neeraj Kumar	Turner	1	1
Mohit Saini	Electrician	2	1
Anuj Sharma	Electroplater	7	1
Tarun kumar	Fitter	9	1

The state rank holders of the second TASAR batch have also topped their respective trades. Such achievements during the fledgling stages of the TASAR are results of combined efforts of TASAR coordination committee, TASAR faculty members, TASAR internal assessment sub-committee, RRCAT technocrats and the apprentices. They have played a crucial role in proving TASAR's worth in making swift progress towards meeting the noble objective of NAPS of providing excellent technical manpower for nation building.

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N.5: Industrial and radiation safety in RRCAT

Industrial safety: Fire & Safety Cell strives to ensure that safe working environment prevails in RRCAT and everyone in the Centre adheres to safe work practices and complies with all administrative controls. To meet the above objective, safety inspections are carried out at various levels, the purpose of which is to find and remove possible hazards and unsafe practices in jobs to avoid accidents. Safety review sub-committees for the five groups of RRCAT regularly visit various laboratories and buildings of RRCAT to monitor, review and ensure implementation of various safety measures. Committees observe the industrial safety aspects and gives recommendations to improve safety, wherever necessary. These safety inspections are carried out in the presence of Building Safety Officer (BSO) and deputy BSO of the respective buildings, and the reports are submitted to the Apex Safety Committee (ASC).

Internal Safety Inspection Committee for laser ensured that everyone using laser was aware of the risks; watches and other jewelries were not allowed in the laboratory; all non-optical objects that were close to the optical beam had a matt finish in order to prevent specular reflections; adequate eye protection was provided to everyone in the room if there was a significant risk of eye injury; alignment of beams and optical components were performed at a reduced beam power wherever possible.

Similarly, Internal Safety Inspection Team for Accelerator ensured that radiation fields and other hazardous factors in accessible areas were within the relevant regulatory stipulated limits; no one remained trapped or was present inside the areas with high radiation fields during operation while the primary particle beam was switched on; there was protection against noxious fumes and gases that might be formed during the accelerator beam operation or in radiation processing of materials; an efficient fire protection system was in place; safety was adequately taken care of against all other conventional and industrial hazards, and non-ionizing radiation, which might arise from operation in various subsystems in the facility. The fire protection system was checked to ensure that it was working efficiently and there was adequate protection against noxious fumes and gases.

A separate Construction Safety Committee is working to look into safety concerns at construction sites. The committee ensured that every worker who was involved at construction site was trained to use Personal Protective Equipment (PPE), like full body harness, helmet, shoes and gloves, etc.

All other safety review sub committees at RRCAT checked the safety issues related to design, modification, operation and maintenance works, etc., and gave their recommendations to improve safety features and ensured the compliance for shortcomings, if found. All the recommendations and reports were put up for review and approval of ASC of RRCAT. ASC also reviewed the recommendations of AERB inspection team for the relevant period. The status of occupational health check-up of employees working in laser labs, workshops, chemical facility and radiation zone were also reviewed by ASC. Besides, ASC also reviewed the status of testing and maintenance of pressure vessels and cranes, status of earth-pits through measurement of resistance and maintenance, status of occupational health check-up of employees of different categories such as of employees engaged in hazardous jobs, radiation workers, drivers, welders, eye check up of employees working in lasers, audiometry of employees working in noisy area, medical examination of contractor workers engaged in preparation and serving of food in guest house and canteens, etc., status of license from MP Pollution Control Board for operating Chemical Treatment Facility in RRCAT, status of operation and maintenance of fire pump house, status of license for inflammable store, status of recruitment of Safety Officer, compliance status of deficiencies observed in illumination and noise levels at various locations of work, compliance status of adherence to work permit system in Indus complex, compliance status of corrective measures taken after an accident, compliance status of recommendations of Internal Safety Inspection Committees, etc.

Necessary documents and records in compliance with AERB guidelines were maintained for Regulatory Inspection by the regulator. Regular coordination and data collection from Administration, Medical Centre, Security, CISF, and other Sections/Divisions on various aspects of industrial safety and reporting to the regulator was done in the form of “Quarterly Status Report of RRCAT on Safety, Health and Environment, Industrial Hygiene Surveillance Report, Industrial Safety Report, Plant Accidents Details Report, etc.”. These reports include data on injury statistics of different categories of employees including contractor workers, number of reportable injuries (both fatal and non-fatal), man days lost, frequency rate (FR), severity rate (SR) and injury index (II), fire incidents, significant events and dangerous occurrences as per Factory Act 1948, records and compliance status of regulatory inspections/safety audit by regulatory authority, records and compliance status of internal safety inspections, records of emergency exercises/mock drills, records of apex level, sectional level and other safety committee meetings, major observations and salient points discussed, modification carried out in the plant having safety significance, distribution of employees of different categories in the age band of five years (as per AEFR-1996 and AERPR-2004), details of employees working with rotating machines, lifting machines and material

handling equipment (as per AEFR-1996), details of employees working with low, medium and high voltage (as per AEFR-1996), details of employees working at height (as per AEFR-1996), details of biological monitoring of employees working in Chemical Treatment Facility to ascertain the concentration of chromium, copper and nickel, details of employees exposed to more than annual permissible radiation limit, details of first-aid (non-reportable) injuries and findings of investigations, if any, etc. It also deals with near miss accidents, occupational and notifiable disease, availability of Indian Standards/ OSHAS certification, authorization of Safety Officer, information on non-operation of unit, information on suspension of operating consent or suspension of construction, if any, investigation of accidents, information on general and electrical safety work permit system, status of internal safety audit as per IS : 14489, review of safety policy/safety objective by the management, etc.

Radiation safety: RRCAT houses several radiation facilities, which includes Indus-1 and Indus-2 synchrotron radiation sources, industrial electron linacs, Infra-red Free Electron Laser (IRFEL), high power laser plasma facilities and gamma irradiation chamber. In addition, there are many sealed radioactive sources and gamma camera used for testing and calibration of radiation monitoring instruments. In order to ensure radiation safety of staff, during the period July-December 2020, radiation surveillance was provided to all the radiation facilities. Indus-1 was operated with beam currents up to 125 mA at 450 MeV and Indus-2 up to 162 mA at 2.5 GeV. Radiological surveillance was provided during the operation of the synchrotron beamlines in Indus-1 and Indus-2. Induced radioactivity survey on accelerator components and response check of area monitors and survey instruments were carried out during Indus shutdown. Testing of various personnel safety interlocks of different accelerator facilities for ensuring their intended functionality was carried out. Personnel dosimetry of 461 radiation workers (including temporary workers) was carried out during the period. Dose report of the radiation workers received from RPAD, BARC showed no cases exceeding the annual dose limit of 20 mSv or quarterly investigation limit of 2 mSv (based on data up to September 2020 as data of Oct-Dec 2020 quarter is awaited). The biometrics of 23 radiation workers was uploaded on National Occupational Dose Registry System. In view of the COVID-19 pandemic, modification in Shift Health Physics (SHP) Office at Indus-1 was carried out in order to comply with the COVID-19 work environment management guidelines of RRCAT. Dosimeter issue and return counter was made operational at SHP office at Indus-1 to limit crowding of personnel. A UV-C sanitization chamber is installed at SHP office for disinfecting pocket dosimeters, which are returned after use by radiation workers on daily basis. Additionally, a training module is prepared for imparting training to synchrotron radiation users online. Quarterly testing of the equipment of Emergency Response Centre was carried out and kept in a preparedness state for responding to any radiological emergency.

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