1.1. LEADERSHIP FOR SAFETY

**1.1(1) Issue:** Unsafe behaviours and conditions in the plant are not always challenged and corrected by managers and supervisors in a timely manner to ensure safety of personnel and equipment.

The team noted the following:

* Two workers were working in an area in which the use of an oxygen meter was required but no oxygen meter was being used. The signage at the entry to the area as well as the safety information in the daily briefing package clearly identified the requirement to use an oxygen meter in these areas. A manager stated that having every work group bring in their own oxygen meter was impractical based on the number of workers accessing this area. A manager indicated that the posted requirements could be exempted based on regular oxygen level checks and system pressure monitoring performed by operators, however the posted requirements had not been changed.
* Outside the Diesel Generator (DG) Building for Units 3 and 4, there was welding work on a platform without protection to prevent sparks spreading to surrounding areas. There was a ventilation duct located underneath the platform. Close by, on a separate platform, grinding work was being conducted without fire resistant protection to prevent sparks from spreading. This area also had a ventilation duct underneath. Both locations were adjacent to high traffic areas yet no intervention to the conditions occurred.
* Five instances of workers performing painting or cleaning of painting equipment with volatile solvents with no respiratory protection for prolonged (all day) exposure to these fumes. Three of these workers were working in high traffic areas yet no intervention regarding the conditions occurred.
* In the Essential Service Water Supply Building, there was a vertical ladder to the access platform for pump 8PEA33AP001 without a chain, bar or gate at the platform at the top of the ladder. In the turbine building multiple access platforms do not have chains, bars or gates installed at the top of their access ladders. This resulted in an increased risk of workers on the platforms being exposed to a fall hazard of greater than 1.5 metres. No action to address this situation had been taken by the plant.
* A worker on a scaffold in the Administration Building was repairing an overhead light fixture without a helmet, safety glasses or gloves. The work area was not marked and was in a high traffic area. After prompting, the worker was challenged by a manager but was not receptive to the coaching. A few minutes later, a similar situation was observed at another light fixture with another worker.
* During a walk-through Unit 3, a manager stopped frequently to ask workers to put on their safety glasses. About 25% of the workers were not wearing their safety glasses.
* From an observation of five people using the stairs in the administration building, none were holding the handrail and two of them were walking down the stairs while talking on their cell phones. No coaching of this behaviour occurred by managers present in these cases.
* Several scaffolds were found not checked on a weekly basis as required by plant expectations. These scaffolds were last checked 4 November 2019 with the next inspection due on 11 November 2019 but had not been checked as of 19 November 2019. Examples included the scaffold next to 3JNF60CL002 in Room A003/1 and the scaffold next to 3JNG61P001.
* Damaged cladding over insulation on pipework was evident throughout the nuclear island of Unit 3. Examples include safety systems in room A0017 as well as in Steam Generator rooms A211/1. This damage appeared to be caused by personnel standing on the cladding. Managers were aware of this deviation from expected performance.
* During Manager in the Field walk downs gaps in adherence to expectations were observed. In some of these cases, there was no coaching by peers or managers on the behaviours that did not meet expectations. The deviations included fire doors blocked open or left open, safety glasses not being worn, and material left on stairs or stored inappropriately. A manager indicated that strategies for correcting behaviours in the field have not been taken in a concerted and comprehensive manner.

Plant Events:

* Repeated unplanned dose rates during radiography on Unit 3:
* On 3 Nov 2018, unplanned dose rates occurred during radiography.
* On 7 Mar 2019, unplanned dose rates occurred during radiography.
* On 9 July 2019, unplanned dose rates occurred during radiography.
* On 29 August 2019, unplanned dose rates occurred during radiography. This resulted in dose rate alarms in the Unit 2 Main Control Room.
* On 11 October 2019, unplanned dose rates occurred during radiography.
* There were two repeat events following the actuation of transformer fire suppression system in which personnel proceeded without certainty which management challenge and intervention was not able to prevent after a similar event occurred.

Unless unsafe behaviours and conditions are challenged and corrected in a timely manner, the risk of injury to personnel and equipment damage will increase.

**Recommendation:** The plant should ensure that unsafe behaviours and conditions in the plant are challenged and corrected by managers and supervisors to ensure personnel and plant safety.

**IAEA Bases:**

GSR Part 2

3.1. The senior management of the organization shall demonstrate leadership for safety by:

1. Establishing, advocating and adhering to an organizational approach to safety that stipulates that, as an overriding priority, issues relating to protection and safety receive the attention warranted by their significance;
2. Acknowledging that safety encompasses interactions between people, technology and the organization;
3. Establishing behavioural expectations and fostering a strong safety culture;
4. Establishing the acceptance of personal accountability in relation to safety on the part of all individuals in the organization and establishing that decisions taken at all levels take account of the priorities and accountabilities for safety.

3.3. Managers at all levels in the organization:

1. Shall encourage and support all individuals in achieving safety goals and performing their tasks safely.

4.25. Senior management shall ensure that individuals at all levels, including managers and workers:

1. Are competent to perform their assigned tasks and to work safely and effectively;
2. Understand the standards that they are expected to apply in completing their tasks.

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3.2. Managers at all levels in the organization, taking into account their duties, shall ensure that their leadership includes:

1. Setting goals for safety that are consistent with the organization’s policy for safety, actively seeking information on safety performance within their area of responsibility and demonstrating commitment to improving safety performance;
2. Development of individual and institutional values and expectations for safety throughout the organization by means of their decisions, statements and actions;
3. Ensuring that their actions serve to encourage the reporting of safety related problems, to develop questioning and learning attitudes, and to correct acts or conditions that are adverse to safety.

3.3. Managers at all levels in the organization:

1. Shall encourage and support all individuals in achieving safety goals and performing their tasks safely;
2. Shall engage all individuals in enhancing safety performance;

4.35 Monitoring of safety performance shall include the monitoring of: personnel performance; attitudes to safety; response to infringements of safety; and violations of operational limits and conditions, operating procedures, regulations and licence conditions. The monitoring of plant conditions, activities and attitudes of personnel shall be supported by systematic walkdowns of the plant by the plant managers.

NS-G-2.4

3.6. The operating organization should establish high performance standards for all activities relating to safe operation of a plant, and should effectively communicate these standards throughout the organization. All levels of management should promote and require consistent adherence to these high standards. Management of the operating organization should foster a working environment that encourages the achievement of high standards in safe operation of the plant.

GS-G-3.1

2.11. The management system should assign responsibility to achieve the organization’s objectives and should empower the individuals in the organization to perform their assigned tasks. Managers should be responsible for achieving quality and safety in the final outputs of work under their responsibility within the organization. Individuals should take responsibility for quality and safety while carrying out the work that is assigned to them. In order to discharge this responsibility, individuals should be technically competent in using the appropriate hardware, equipment, tools and measuring devices and should have a clear understanding of the work processes.

2.16. The actions of managers and supervisors or team leaders have a strong influence on the safety culture within the organization. These actions should promote good working practices and eliminate poor practices. Managers and supervisors or team leaders should maintain a presence in the workplace by carrying out tours, walk-downs of the facility and periodic observations of tasks with particular safety significance.

GS-G-3.5

2.15. Senior managers should be the leading advocates of safety and should demonstrate in both words and actions their commitment to safety. The ‘message’ on safety should be communicated frequently and consistently. Leaders develop and influence cultures by their actions (and inactions) and by the values and assumptions that they communicate. A leader is a person who has an influence on the thoughts, attitudes and behaviour of others. Leaders cannot completely control safety culture, but they may influence it. Managers and leaders throughout an organization should set an example for safety, for example, through their direct involvement in training and in oversight in the field of important activities. Individuals in an organization generally seem to emulate the behaviours and values that their leaders personally demonstrate.

**Plant Response/Action:**

In response to the OSART Team recommendation, the plant needed to ensure that unsafe behaviours and conditions in the plant were challenged and corrected by managers and supervisors to ensure personnel and plant safety:

**Cause:**

* The Observation and Feedback Programme activities and walkdown controls performed by operating organization personnel were not at the correct level.
* The Manager in the field programme process monitoring tools did not provide sufficient feedback to enable the efficiency of the programme to be assessed.
* The training and encouragement of leaders and senior employees in their role as promoters of expectations and in the provision of safe workplaces and safe behaviours needed improvement.

**Actions performed:**

In November and December 2019, 70 managers and leaders of the operating organization took part in work meetings related to the Value and Behaviour Model. The aim of these meetings was to improve the influence of the senior leader in effective promotion of expected behaviour in workplaces during work execution and coaching in case of observed deficiencies with ultimately, the suspension of works, if the situation was not remedied.

In the second half of 2019 and in the first quarter of 2020, the operating organization organised a week-long seminar in conjunction with SE University in the presence of the General Director Where the main topic was leadership.

In January 2020, regular walkdowns of senior leaders and industrial safety technicians of the operating organization with the period of one week were introduced into the walkdown inspection programme in Unit 3. Employees performing walkdown inspections also monitored:

* the application of the expected behaviour in compliance with the Value and Behaviour Model; if any deficiency is found, they correct the unwanted behaviour,
* correct use of personal protective equipment by the operating organization personnel as well as by contractors in general and for example, during welding and grinding operations
* correct installation and use of safety equipment in technological systems,
* behaviour to eliminate the fire risk,
* whether employees use the specified routes in technological areas,
* correct application of requirements for scaffolds, the date of its erection, and intervals of performed inspections

In January 2020, the power plant improved the coordination and management of radiography in Unit 3. The operating organization and the construction and commissioning organization developed a common weekly and daily activity plan. It also contained details of the industrial safety, fire protection and radiography conditions to check as well. It is available for all employees of the operating organization taking part in commissioning and the organization ensuring construction and commissioning, and it was communicated through coordination meetings.

A webinar in occupational health and safety and criminal liability of senior leaders was organized for senior leaders in September 2020. Four hundred employees took part in the webinar.

In March 2020, site rules and rules for use and inspection of scaffolds were added to the Unit 3 entry instruction. If the scaffold has any deficiencies or had not been inspected within the prescribed interval, the senior leader has to forbid the use of the scaffold.

Entries into all areas requiring the use of an oxygen meter were marked by safety marking. The oxygen meters are available, and personnel have been instructed in their use. The power plant required that senior leaders promote the consistent use of the oxygen meters in these areas.

The power plant inspected all platforms in Unit 3, and protective equipment was added where it was missing. The senior leaders were reminded that deficiencies related to safety equipment of civil structures should also be identified and reported.

In 2020, places with damaged insulation sheet covers in Unit 3 were mapped. Even though the damaged insulation sheets still fulfils their function, they are to be replaced.

In September 2020, the same work management process that is in use in units 1&2 (IPSEC -Identification, Preparation, Scheduling, Execution, Close) was implemented in Unit 3. The works are also assessed from the fire risk viewpoint. If such risk is identified, measures identical with those in the operating units are applied, e.g., hot material as a by-product of welding, grinding and cutting is enclosed using non-flammable sheets.

There is a system of penalization of employees for not observing safety requirements by yellow and red cards. The employee’s entry to the power plant can be suspended if persistent violations are recorded. Workers were issued 915 yellow cards in 2019, 407 yellow cards in 2020 and 224 yellow cards in 2021 to August. Workers were issued 163 red cards in 2019, 129 red cards in 2020 and 77 red cards in 2021 to August.

**Actions in progress to achieve success:**

In the individual topics of the safety culture seminars for the years 2020 - 2022, the role of managers in promoting the expectation of a safe workplace and safe behavior in the workplace were specifically emphasized and discussed.

A programme of periodic industrial safety training was supplemented by including the role of managers in promoting the expectation of a safe workplace and safe behavior in the workplace. Periodic trainings occurred and the effectiveness of the training was evaluated in accordance with the requirements of the staff training process.

In cooperation with the OSH peer group, a plan was prepared to improve the NPP OSH programme to strengthen its effectiveness at Units 3 and 4. The individual steps were being implemented according to this plan.

**Results and Effectiveness:**

Selection, preparation and development of senior leaders is a part of a continuous activity in the organization. Based on the recommendation, the power plant focused in 2020 on the strengthening of the behaviour of senior leaders in safety.

The power plant has improved the application of expectations of its Value and Behaviour Model, and its promotion by senior leaders. Senior leaders of the operating organization were involved in the week-long seminar at SE University; and the system of walkdown inspections in Unit 3 has improved. The safety behaviour of all employees is promoted within the Human Performance Programme by observation and provision of immediate feedback.

The power plant corrected all findings and after implementation of measures no radiography events have been recorded. Managers in the field activities are monitored and evaluated, and if deficiencies are observed, they remedy the situation and instruct employees in case of inappropriate behaviour.

**IAEA comments:**

The plant has analyzed this recommendation and determined that the observation and feedback programme and walkdown activities performed by operating organization personnel were not sufficient. In addition, the plant determined that the training and encouragement of leaders in their role to promote expectations of safe behaviours needed improvement.

In November and December 2019, the plant conducted working meetings with senior leaders related to the Value and Behaviour Model. The aim of these meetings was to improve the influence of the senior leaders in the effective promotion of expected behaviours during work execution. The plant also organized a week-long seminar in the presence of the General Director with the main topic of leadership.

In January 2020, the plant implemented regular walkdowns by senior leaders and industrial safety technicians to monitor and correct:

* the application of the expected behaviours in compliance with the Value and Behaviour Model
* proper use of personal protective equipment
* proper installation and use of safety equipment in technological systems
* behaviours to eliminate fire risk
* correct application of the requirements for scaffolds

The plant improved the coordination of industrial safety, fire protection and radiography activities using a common weekly and daily activity plan communicated through coordination meetings.

The plant organized a webinar in occupational health and safety and criminal liability for senior leaders in September 2020.

The plant inspected all platforms in Unit 3 and protective equipment was added where the necessary.

In September 2020, the work management process was updated in Unit 3 to match the process used in the operating units.

The plant implemented a system of yellow and red cards to penalize employees that did not observe safety requirements. The plant issued 915 yellow cards in 2019, 407 yellow cards in 2020 and 224 yellow cards in 2021 to August. The plant issued 163 red cards in 2019, 129 red cards in 2020 and 77 red cards in 2021 to August.

However, at the time of the follow-up mission there is insufficient data to demonstrate the effective implementation of the improvement actions. Furthermore, the current Human Performance Index has declined from 96.4 to 92.8, and the Human Factors in Operations Index has declined from 94 to 88 over the 7-month period starting January 2021.

In addition, during the follow-up mission, the team noted several instances of inappropriate storage of equipment without the required permits in the RCA on top of the reactor deck. Two unidentified electrical distribution boxes with movable wheels were not secured, and they had the potential to impact the adjacent equipment.  In addition, the team noted that the work area for welding on the non-seismic fire protection equipment did not have any safety barriers in place and there was poor housekeeping and control of materials in the area.

**Conclusion:** Satisfactory progress to date

7.1. ORGANIZATION AND FUNCTIONS

**7.1(1) Issue:** Some aspects of the radiation protection programmes are not complete and some worker practices are not always conducted in a manner that ensures the safety of personnel and dose minimization.

The team noted the following:

Radiation protection control measures:

* The operational procedure for accessing very high radiation areas had no provision for approval from the plant’s radiation protection officer; this allowed entries in very high radiation areas without evaluation or authorization from a radiation protection officer.
* The keys for accessing very high dose rate areas at the plant were kept on a board on the wall in the main radiation protection control room. However, there was no locker for such keys.
* On the radiation work permit, there was no information regarding the alarm set points of the electronic dosimeter to be respected by the worker.
* The set point for generic works in controlled area at low levels of radiation was set too high to allow for earlier detection of possible abnormalities, for example, with an ambient dose rate of 50 microSv/h, the alarm set point was 1000 microSv/h.
* The radiation work permits did not include information regarding alpha contamination levels.
* The plant did not have a complete programme for alpha hazards control. The susceptibility for alpha internal contaminations was not known, based on the surveys and/or on the ratio of beta, gamma and alpha classification.
* The plant did not have a formal programme for source term reduction, more specifically regarding hot spots. The plant had a list of hot spots, but there were no regular interdisciplinary meetings, no history or types of actions to eliminate the hot spots. The survey status was not updated, it was dated from 2018 or early 2019.
* The plant´s ALARA committee was a group drawn from the radiation protection organization, chaired by the radiation protection manager and included only radiation protection supervisors as regular members. Any other participation was under invitation, and the presence of managers from other plant areas was not mandatory, potentially compromising the ALARA principle. In addition, there was no formal process to get ALARA feedback from other departments in the plant.
* The database of radiation surveys was not integrated in a single platform, but spread in several Microsoft Excel files. The maps were not indexed with the recorded data, and there was no history of a building, a room, a system, or a point. Since there was no regular, established frequency for surveys to be performed on the plant, except following outages or for special services demanding a radiation work permit, the files containing the record of the plant´s surveys were not current. The last recorded survey was on 26 April 2019.
* The radiation surveys were not performed on entire roofs but were limited to the area close to ventilation stacks. Surveys were made on internal routes in uncontrolled areas after movement of fuel or radioactive materials during outages, but there was no regular frequency to perform radiation and contamination surveys on the uncontrolled areas of plant buildings.
* Workers coming from controlled areas were instructed to wash their hands before going to the portal contamination monitor. As a result, contamination on the hands, caused by very high activity of a point source, could go undetected, resulting in dose to skin not being assessed.
* There was no contamination monitor at the exit of each radiochemistry laboratory or from the chemistry area.
* Radiochemistry laboratories were not posted with contamination levels.
* Radiation hazard notices were not posted on several baskets containing contaminated bags in the radwaste processing facility, resulting in personnel not being informed of possible radiation levels.
* On leaving the posted contamination-controlled area in the environmental laboratory, workers were required to use a hand and foot monitor. However, the monitor was installed inside the posted contaminated area, increasing the probability of contamination of the detectors and increasing background radiation levels, thus adversely impacting the minimum detection level of the equipment.

Related to worker practices:

* A radiation protection technician entered a room with a post on the door indicating a hot spot of 48 mSv/h inside the room. The technician only used a handheld monitor, and not an extendable probe detector, to identify and measure the hot spot. When challenged, instead of going back and fetching an extendable probe detector, the technician decided to continue. This was not challenged by his supervisor.
* Three workers undertaking work in the controlled area were not aware about the set point of alarms on their electronic dosimeters.
* At the posted contamination-controlled area of an environmental laboratory, the workers were stepping in and out without wearing or removing cover shoes as required.
* The plant recently experienced five events related to radiography. In one of the events, a chemist was authorized to pass through a fenced area to collect samples when radiography operation was on going which resulted in an alarm on their dosimeter.

Without complete radiation protection programmes and proper work practices, the safety of personnel and the goal of dose minimization could not be ensured.

**Recommendation:** The plant should improve its radiation protection programmes and work practices in some areas to ensure safety of personnel and minimization of radiation dose.

**IAEA Bases:**

GSR Part 3

3.77. Employers, registrants and licensees:

(a) Shall involve workers, through their representatives where appropriate, in optimization of protection and safety;

(b) Shall establish and use, as appropriate, constraints as part of optimization of protection and safety.

3.94. Employers, registrants and licensees…

(c) Shall make the local rules and procedures and the measures for protection and safety known to those workers to whom they apply and to other persons who may be affected by them;

(d) Shall ensure that any work in which workers are or could be subject to occupational exposure is adequately supervised and shall take all reasonable steps to ensure that the rules, procedures, and measures for protection and safety are observed; …

3.96. Registrants and licensees, in cooperation with employers where appropriate, shall establish, maintain and keep under review a programme for workplace monitoring…

3.97. The type and frequency of workplace monitoring:

(a) Shall be sufficient to enable:

(i) Evaluation of the radiological conditions in all workplaces;

(ii) Assessment of exposures in controlled areas and supervised areas;

(iii) Review of the classification of controlled areas and supervised areas.

(b) Shall be based on dose rate, activity concentration in air and surface contamination, and their expected fluctuations, and on the likelihood and magnitude of exposures in anticipated operational occurrences and accident conditions.

3.110. Employers, in cooperation with registrants and licensees:

(a) Shall provide all workers with adequate information on health risks due to their occupational exposure in normal operation, anticipated operational occurrences and accident conditions, … and adequate information on the significance of their actions for protection and safety; …

5.13. All plant personnel shall understand and acknowledge their individual responsibility for putting into practice the measures for controlling exposures that are specified in the radiation protection programme. ...

5.16. The radiation protection programme shall ensure control over radiation dose rates for exposures due to activities in areas where there is radiation arising from or passing through structures, systems and components… It also addresses plant chemistry activities as well as exposures due to radioactivity of substances in the fuel coolant (liquid or gas) and associated fluids. The programme shall make arrangements to maintain these doses as low as reasonably achievable.

GSG-7

2.23. Requirement 5 of GSR Part 3 [2] states that “The principal parties shall ensure that protection and safety are effectively integrated into the overall management system of the organizations for which they are responsible.” For occupational exposure in planned exposure situations, the principal party is the employer. ...

3.48. The management should plan work programmes so as to ensure, to the extent possible, that workers do not receive a dose corresponding to a significant proportion of the relevant dose limit in a short period of time, such that subsequent exposures might result in the annual dose limit being exceeded.

3.96. … In addition to a description of the work to be performed, the radiation work permit can include:

(a) A detailed dose rate map of the working area and possible hot spots, produced from a survey made prior to the work or otherwise estimated;

(b) An estimate of contamination levels and how they could change during the course of the work;

…

(g) Details of any time restrictions or dose restrictions;

7.234. The wearing of warning (alarm) dosimeters (or dose rate meters) can be effective in preventing serious exposures and may help in considerably reducing the dose incurred in the event of accidents...

**Plant Response/Action:**

In response to the OSART recommendation, the plant improved the Radiation Protection Programme for Unit 3. Improvement to the awareness of personnel of radiation measures, procedures, monitoring programs, and radiation monitoring system were introduced. The main causes for the Issue were identified as:

**Cause:**

Personnel in the RCA did not always follow radiation protection rules and procedures and some dose control procedures were missing, not clear or insufficient. Some weaknesses were observed in the radiation survey database system. The information about contamination levels, pre-set dose and dose rates alarms was missing. Insufficient attention was dedicated to places with high dose rate (measurement, evaluation, records, procedures for their elimination, etc.).

**Actions performed:**

* The operating procedure for entry with expected high radiation areas in Unit 3 was completed with the rule that a Radiation Protection representative of the operating organisation must approve the entry.
* A lockable cabinet was installed in the radiation monitoring control room, to store keys for rooms with expected high radiation areas of controlled areas of Units 1, 2, and 3.
* Entry to the controlled area was enabled only using a radiation work permit, which defines conditions, rules of movement, protective actions, permitted time of work in exposed environment etc. Moreover, the power plant defined a requirement in the regulation for execution of works using a radiation work permit, and this permit contains values of pre-set alarms of doses and dose rates of electronic personal dosimeters. Employees were trained in the use of these arrangements.
* The alarm setting for personal dosimeters for general works using a radiation work permit in Unit 3 was set to 100 micro Sv/h and uploaded to the software for electronic personal dosimeters.
* The power plant defined a requirement in the regulation for the execution of works using a radiation work permit, and this permit is amended with values of measured results of alpha contamination in Unit 3.
* Near exits from radiochemical laboratories within the radiologically controlled areas of the Unit 3, the power plant installed several devices for measurement of skin contamination by alpha radionuclides. In order to define internal contamination by radionuclides, the power plant uses a verified software. Correlation relations to gamma radionuclides are used for the determination of activity of hardly detectable alpha radionuclides and pure beta radionuclides. The power plant has implemented a programme for monitoring, trending, evaluation and reporting of conditions and development of potential internal and external contamination of people. Based on this finding, the power plant added an evaluation of impacts of alpha radiation to the programme.
* The power plant regularly checks recorded so-called hot spots in the controlled area in the operated units. Activities are performed to map and eliminate them, or where it is not technically achievable, the ALARA principle described in the operating regulation ALARA Application Principles was applied. The database of history of hot spots, actions for their elimination, as well as a requirement for regular interdisciplinary meetings described in the ALARA Application Principles was added to the regulations for radiation work permits and radiation monitoring.
* The power plant updated the procedure describing the ALARA Application Principles. Within the update of the procedure, the statute of the ALARA committee was modified by the inclusion of personnel outside of the radiation protection department.
* An integrated database containing details of radiation areas was developed for Unit 3, This included the indexing of recorded data and history of monitoring within buildings, rooms, system and so-called hot spots. After the establishment of the controlled area of Unit 3, the monitoring is performed in regular intervals and the database is regularly updated.
* A radiological database has been developed for Unit 3, which includes recording of radiological data for roofs and roads. Regular monitoring is performed and the database is updated.
* The unit 3 controlled area training will emphasize the need to use the hand contamination monitors where they are installed within the radiologically controlled area.
* Within the Radiochemical laboratories, at the exit of the laboratory where there is no contamination monitor present, routine access through this exit will be prevented. Furthermore, personnel within the laboratories have been instructed to use the contamination monitor whenever they leave the laboratory.
* Radiological Information boards were installed in radiochemical laboratories of the Unit 3 controlled area, to record values of dose rates and contamination after radiological mapping.
* Unit 3 adopts the same system as in the other operating units for the recording of radiological data for the baskets containing bags of contaminated waste.
* The boundaries of the controlled area in the Off-site Radiation Monitoring Laboratory (LRKO) in Levice designated for analysing of samples outside the power plant site and surrounding were changed, and the LRKO personnel were instructed in the correct entering and leaving of the controlled area in LRKO Levice.
* An interview was made with the radiation protection technician and his superior. They were instructed that their behaviour was not in compliance with the expectation within the operating documentation on monitoring dose rates of hot spots.
* Entry to the Unit 3 controlled area is permitted only using a radiation wok permit, which defines conditions, rules of movement, protection actions, permitted time of work in exposed environment etc. The power plant implemented the request to the regulation Performance of Works using radiation work permits that values of pre-set alarms of doses and dose rates on electronic personal dosimeters would be added to the radiation work permits. This will ensure informing of every employee entering the controlled area. The employees are informed of this fact also during trainings, the passing of which is a fundamental condition for entry.
* An interview was made with Off-site Radiation Monitoring Laboratory technicians and their superior. They were instructed that their behaviour was not in compliance with the expectation within the operating documentation on correct exit from RCA.
* In January 2020, the power plant implemented the management of radiography in Unit 3 into the commissioning coordination system. Since that time, no similar events have occurred.

**Results and Effectiveness:**

The power plant has implemented the Radiation Protection Programme, which is comprehensively managed by the operating documentation:

* Radiation protection
* Radiation Protection Safety Rules
* Radiation control in SE-EMO
* ALARA principles in SE-EMO
* Radiation work permit procedure

This programme is valid not only for operational Units 1 & 2 but it is also applied in Unit 3.

The power plant adopted and implemented the action plan, eliminated deficiencies and adopted steps which will ensure that activities and procedures in radiation protection in Unit 3 will be performed in such a way as to ensure the radiation safety of employees and the minimisation of dose.

**IAEA comments:**

The plant analysed the recommendation within the Pre-OSART report and determined that it should revise its Radiation Protection programme for Unit 3 to ensure personnel, monitoring programmes and monitoring systems in radiation protection areas were sufficient to minimise dose levels to employees.

The plant undertook a thorough review of the issues identified within the Pre-OSART report and had implemented corrective actions against all of the findings. Evidence was provided to demonstrate actions were complete which includes the review and update of operating procedures, the installation of new equipment to support procedural control and monitoring and the resetting of standards and expectations in staff behaviours.

The operating procedure for entry to controlled areas of Unit 3 with anticipated high dose rates was amended to include approval by a suitably authorised Radiation Protection representative.

Lockable cabinets were installed in the radiation monitoring control room to manage entry into high radiation areas within Units 1, 2, and 3 and the procedure for handling the keys has been incorporated into the operating regulation 0-PI/8207 Radiation control in the plant.

The alarm value of personal dosimeters for general works using a radiation work permit has been reviewed and changed from 1000 micro Sv/h to 100 micro Sv/h to enable earlier detection of abnormal conditions.

Additional hand monitors were installed in laboratories with multiple doors to enable employees to monitor themselves when leaving the laboratory.

Additional information boards have been installed to communicate contamination levels within controlled areas including chemical laboratories 1, 2, and 3. Information boards were installed in units 1 and 2 on baskets containing contaminated bags to identify measured dose rates, and the same system was been adopted in Unit 3.

Standards and expectations in the behaviours of Radiation Protection technicians and supervisors were reset following training.

The plant has implemented the action plan and demonstrated that it has responded to the findings of the Pre-OSART mission.

**Conclusion:** Issue resolved