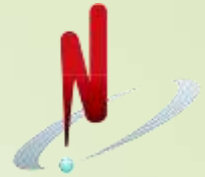




EUROPEAN TRAINING AND EDUCATION IN RADIATION PROTECTION FOUNDATION



NUCLEARELECTRICA
Puterea Viitorului

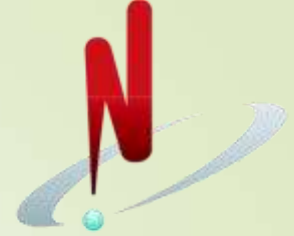
Radiation Self-Protection Workers' Basic Training Program at CNE Cernavoda NPP

Catalina Chitu, Marius Gisnac,
Alexandru Nedelcu, Ion Popescu, Dorin Dumitrescu
Health Physics Department,
CNE Cernavoda, ROMANIA

8th EUTERP Workshop 2019

10 - 12 April, 2019 - Qawra, Malta



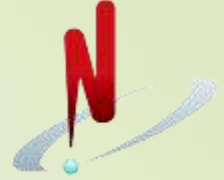


NUCLEARELECTRICA
Puterea Viitorului

CONTENTS

- Introduction
- Radiation Protection Training program structure
 - Qualification levels: skills and responsibilities
 - Refreshing courses & continuing training
- Challenges and limitations of the training program
 - RP training courses content and duration;
 - Criteria for Green qualification: RP assistants availability.
- RP Training and Qualification program optimization
 - Improved courses duration
 - New level 2 permit
 - Special training program for RP Assistants
- Conclusions

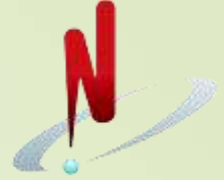
INTRODUCTION



NUCLEARELECTRICA
Puterea Viitorului

- A knowledgeable workforce is a fundamental element in Cernavoda NPP program for the optimization of protection and control of exposure.
- RP training and qualification of nuclear energy workers are essential requirements for a successful radiation exposure control process.
- Radiation protection program provide adequate theoretical and instrumental basis for exposure control, designed to minimize the combined external and internal dose.

INTRODUCTION

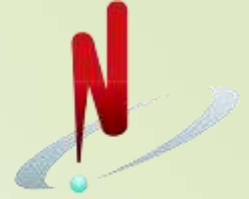


NUCLEARELECTRICA
Puterea Viitorului

- Radiation protection training program is part of plant personnel training process, based on systematic approach of training principles.
- RP Training program, approved by national regulatory body, CNCAN, consists of a set of theoretical and practical courses, and periodic refreshing courses.
- The final objective of this training is the issue of **Nuclear Activities Work Permit.**

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES

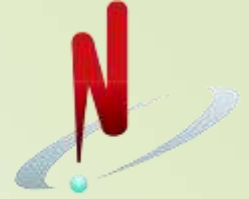


NUCLEARELECTRICA
Puterea Viitorului

- Both station personnel and contractors have radiation protection qualification according to their necessities.
- There are three qualification levels, with different skills and responsibilities.
- Untrained persons, “**RED**”, cannot enter radiological area and perform Radiation Work without special approvals, and only for certain activities with exposures lower than the limit for the public.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



NUCLEARELECTRICA
Puterea Viitorului

Level 1 permit – RP qualification “ORANGE”

• 1 Day course (8 hours, including RCA tour and examination)

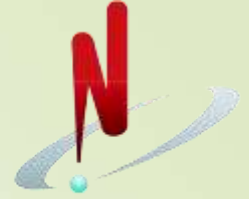
• Provides basic radiological training:

- ✓ Plant access rules – eating, drinking and smoking areas;
- ✓ Individual dosimetry;
- ✓ Contamination control – using contamination monitors.

• Mandatory for obtaining initial access to any radiation area and for performing work in these areas.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



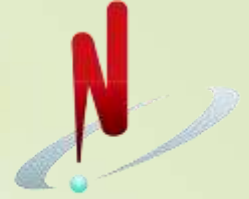
NUCLEARELECTRICA
Puterea Viitorului

Level 1 permit – RP qualification “ORANGE”

- Orange qualified persons can enter Radiation Controlled Area and perform Radiation Work only in Zone 2 and Zone 3 (contamination free, environmental background radiation dose rates) by them self.
- They are not responsible for their radiation protection in Zone 1, thus they are not allowed to perform activities in Zone 1 without a Radiation Protection Assistant.
- Fit for workers with permanent workplace inside RCA zone 2 and 3 or frequently performing activities inside RCA zone 2 and 3.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



NUCLEARELECTRICA
Puterea Viitorului

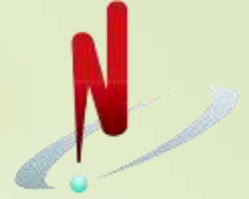
Level 2 permit – RP qualification **“YELLOW”**

Yellow training program consist of:

- ✓ 17 days RP theory course (rights and responsibilities, radiation theory, ALARA, RP instruments, dosimetry, planning and performing radiation work, etc.), followed by
- ✓ 10 days practical applications course (basic practices and principles of radiological work for radiation / high radiation areas, contaminated areas and areas with airborne activity; practical matters: how to dress and undress protective clothing, wearing hoods and gloves, respiratory protection equipment; details on ALARA techniques related to optimization of exposure: entry and exits points so that time spent in radiation areas is minimized, general dose rates in the area, hot spots, low dose waiting areas.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



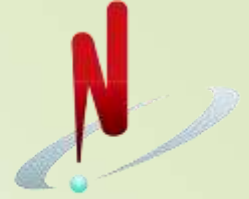
NUCLEARELECTRICA
Puterea Viitorului

Level 2 permit – RP qualification **“YELLOW”**

- **YELLOW** qualified personnel are given thoroughly knowledge for radiation protection, but without enough practical experience.
- They may perform Radiation Work without any assistance and may be held responsible only for their own radiation protection.
- Yellow qualified persons can enter Radiation Controlled Area and perform Radiation Work in Zone 1, Zone 2 and Zone 3 by them self.
- Fit for workers frequently performing activities inside RCA Zone 1 (operators, maintainers, fuel handling operators, engineering staff, supervisors, security, fire fighters, emergency response team, etc).

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



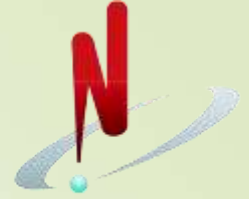
NUCLEARELECTRICA
Puterea Viitorului

Level 2 permit – RP qualification **“GREEN”**

- GREEN qualified personnel are RP experienced workers, with thorough RP knowledge.
- A “Yellow” qualified worker can become “Green” after performing and graduate a 5 days refreshing course:
 - ✓ Important changes in RP procedures;
 - ✓ Recent RP events (internal and external OPEX);
 - ✓ Monitoring and evaluation of radiological condition;
 - ✓ Working inside contaminated areas;
 - ✓ Using individual and collective protective equipment.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



NUCLEARELECTRICA
Puterea Viitorului

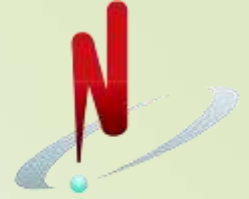
Level 2 permit – RP qualification **“GREEN”**

Green persons may act as Radiation Protection Assistants in order to ensure radiation protection:

- ✓ When in the work team are Orange qualified persons;
- ✓ For very complex activities, when the workers cannot focus both on the job itself and on RP aspects;
- ✓ For Medium and High Risk radiation work;
- ✓ For jobs with steps that cannot be interrupted (first safe step is the end of activity) and during which the radiological conditions are expected to change, leading to unplanned exposures.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

QUALIFICATION LEVELS: SKILLS AND RESPONSIBILITIES



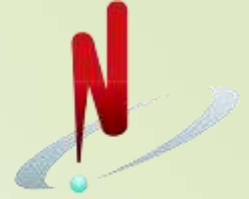
NUCLEARELECTRICA
Puterea Viitorului

Level 2 permit – RP qualification **“GREEN”**

- In the present there is not a special training course for RP assistants: in order to act as RP assistant a green qualified worker has to be involved step-by-step in the preliminary activities for the job he/she will assist.
- Dedicated training provides greater detail and could allow greater responsibilities for workers.
- Dedicated training is commensurate with the workers' risks and is given prior to the performance of any job in which exposure is high.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

REFRESHING COURSES & CONTINUING TRAINING



NUCLEARELECTRICA
Puterea Viitorului

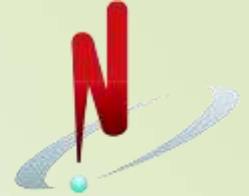
Each radiation protection qualification level requires a refresh course at 5 years.

Re-qualification training includes a reminder of the initial basic worker training and a review of new regulations, guidance documents and work protocols relevant to the concept of optimization.

Re-qualification for Level 1 permit “Orange” is a half day (4 hours) course, including testing, and is a reminder and update of the information in initial qualification course.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

REFRESHING COURSES & CONTINUING TRAINING



NUCLEARELECTRICA
Puterea Viitorului

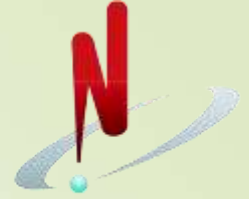
- “Yellow” and “Green” qualified workers must perform and graduate a 5 days refreshing course, every 5 years:
 - ✓ Important changes in RP procedures;
 - ✓ Recent RP events (internal and external OPEX);
 - ✓ Monitoring and evaluation of radiological condition;
 - ✓ Working inside contaminated areas;
 - ✓ Using individual and collective protective equipment.

YELLOW and **GREEN** qualified workers’ practical abilities are tested twice between refreshing courses (after every 18 months): accessing rubber area; selecting proper equipment; using RP field instruments; using RWP etc.

As a pre-requisite for this testing they have to study (CBT) a refreshing course on RP Fundamentals.

RADIATION PROTECTION TRAINING PROGRAM STRUCTURE

REFRESHING COURSES & CONTINUING TRAINING

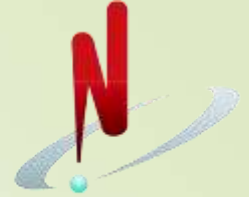


NUCLEARELECTRICA
Puterea Viitorului

- **Mock-up training** and exercises allow workers to practice tasks without the associated risk. Individuals can perform a walk through or dry run that can help to find any problems. This also helps to identify any shortcomings in either the individuals' skills or to the tools that may be used to perform the task. This training also helps to reduce the time needed to perform the task as well as to prevent the possible errors.
- Important events (involving individual and collective exposure or near-misses; RP procedures violation, etc.), are subjects of **information materials** as Info Supervisors, RP bulletin, Subject of the Month.

CHALLENGES AND LIMITATIONS OF THE TRAINING PROGRAM

RP TRAINING COURSES CONTENT AND DURATION



NUCLEARELECTRICA
Puterea Viitorului

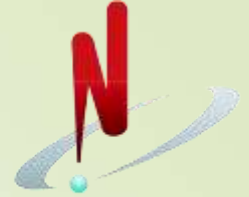
- **ORANGE** course content is very rich and diverse.

It is not adapted / adaptable to the level of instruction of the trainees.

Five years interval between two consecutive verification of knowledge and practical abilities is too long.

The refreshing course content is almost as wide as the initial course and it's duration is only 4 hours.

As a result the graduation of this refreshing Orange course become a problem even for experienced workers.



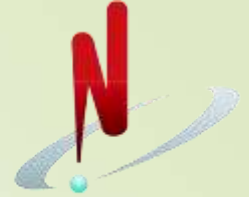
- **RP Theoretical** course content provides much and diverse information, some of that not helping workers to better protect themselves during radiation work.

It is not adapted / adaptable to the level of instruction of the trainees, and very difficult to graduate for people with a low level of instruction.

RP practical applications course contains a lot of theory, some of the chapters being almost identical with those in the theory course.

The 27 days duration of both courses (mandatory for a level 2 Permit) is prohibitive for some workers that cannot afford to miss 6 weeks from their workplace.

CHALLENGES AND LIMITATIONS OF THE TRAINING PROGRAM CRITERIA FOR GREEN QUALIFICATION: *RP ASSISTANTS AVAILABILITY*

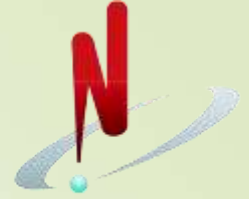


NUCLEARELECTRICA
Puterea Viitorului

In present, despite the fact that we provide continuous training for 840 green qualified workers, but during planned outages, when we need them more, we found out that the number of available RP assistants is very much lower.

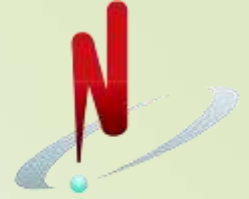
WHY?

CHALLENGES AND LIMITATIONS OF THE TRAINING PROGRAM CRITERIA FOR GREEN QUALIFICATION: RP ASSISTANTS AVAILABILITY



NUCLEARELECTRICA
Puterea Viitorului

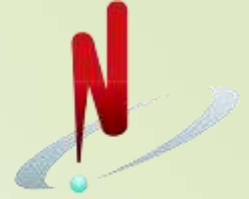
- There are a lot of jobs / positions that requires a level 2 Nuclear Activities Work Permit, and most of these job descriptions do not involve that the worker will act as a RP Assistant (ever).
- Being “green” qualified worker is not an option, it is the result of the score at the end of the refreshing course.
- During planned outages, experienced (skilled) RP Assistants are very busy, so is difficult to find support for those activities managed by working group that do not have their own RP assistants.



The actual structure of RP training program involves a lot of resources :

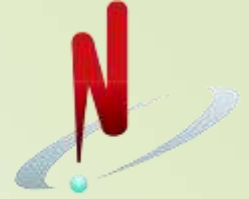
- **human – RP experienced people involved almost daily in teaching and examining Yellow and Green workers;**
- **Training materials;**
- **Time – spent both by the trainees and the instructors,**

that we can make the most of.

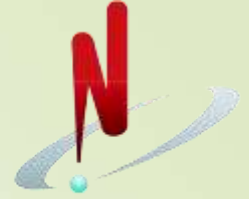


- The training time for the initial issue of a level 2 permit (Yellow) - 17 days RP theory and 10 days practical applications – will decrease to 15 days;
- “Yellow” qualified workers will perform a 3 days refreshing course (instead of 5 days)
- Increased share of practical application aspects in the training materials.
- Yellow qualified workers, after graduating the refreshing course will only can keep or loose their qualification, but wont become “green”.
- Orange qualified people will follow annually a CBT refresher course.

All these modification are based on RP courses improvement.



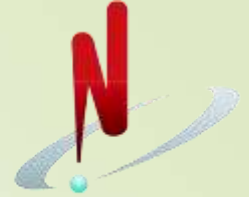
- For those jobs / positions that requires a level 2 Nuclear Activities Work Permit, and do not involve practical radiation work, but inspection type activities, like:
 - ✓ Supervisors and Managers;
 - ✓ Physical security technicians, fire fighters, quality controlers, regulatory body employees;
 - ✓ Equipment Engineers;
 - ✓ Work plans assessment;
 - ✓ Observation & Guidance, etc,
- a new level 2 permit will be available - **“Blue”**.



Same as Yellow workers, **Blue** ones may perform Radiation Work without any assistance and may be held responsible for their own radiation protection, excepting activities in contaminated areas or “high radiation risk” activities, when they’ll need the supervision of an RP Assistant.

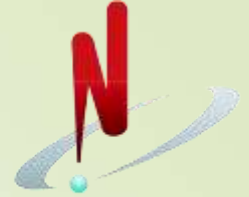
Blue qualified workers must perform and graduate a 1 day refreshing course, every 5 years.

Annually they have to study and graduate a CBT refreshing course on RP Fundamentals.



GREEN qualified personnel include RP experienced personnel, with thoroughly RP knowledge. These persons may act as **Radiation Protection Assistant** .

Now there is not a special training program for RP assistants: in order to act as RP assistant a green qualified worker has to be involved step-by-step in the preliminary activities for the job he/she will assist.



Starting 2020 a special course will be available for training
Radiation Protection Assistants:

- Reinforcement of RP main responsibilities and attributes;
- Learn form internal and external OPEX.

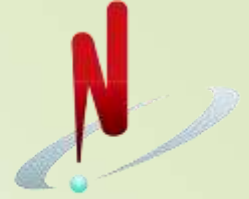
Level 2 permit “GREEN” will be issued only to RP Assistants.

Each supervisor will assigned a number of workers (CNE employees and contractors) that will be trained as RP assistants.

The number of workers trained to become RP assistants will have to cover all the necessities of each compartment, for normal operating period and planned outages.

CONCLUSION

EXPECTED RESULTS



NUCLEARELECTRICA
Puterea Viitorului

- **RP Training program is intended to improve practical abilities.**
- **Fewer but better Yellow and Green qualified workers.**
- **Medium and high radiological risk activities performed under the supervision of an RP Assistant.**
- **A more efficient use of human, material and time resources.**
- **Using modern advanced technology: radiation simulators for training purpose (ADEPT & Oculus)**

Thank you for your attention!

Questions?

