



EUROPEAN TRAINING AND EDUCATION IN RADIATION PROTECTION FOUNDATION

## EUTERP Workshop

### Radiation protection training in Europe – the next steps

March 28-30, 2011, Atlantica Aeneas Resort & Spa, Ayia Napa, Cyprus

#### RADIOLOGICAL SAFETY TRAINING for RADIATION WORKERS in NUCLEAR FUEL PLANT PITESTI ROMANIA

T. Ivana, Gh. Epure

Nuclear Fuel Plant  
115400 Campului No. 1, Pitesti, Romania  
[tivana@fcn.ro](mailto:tivana@fcn.ro), [gepure@fcn.ro](mailto:gepure@fcn.ro)

#### ABSTRACT

##### 1. INTRODUCTION

Nuclear Fuel Plant (FCN) is a subsidiary of National Society NUCLEARELECTRICA SA. FCN is a facility for manufacturing of the nuclear fuel bundles CANDU type with 37 elements, based on *natural uranium* (0.711% U-235) and *depleted uranium* (a small quantity with 0.25% U-235 and 0.52% U-235). The annual production is about 10,000 fuel bundles CANDU type that means about 200 tons of natural uranium in UO<sub>2</sub>. The depleted uranium is processing in campaigns only at the starting of a new unit from Cernavoda Nuclear Power Plant. The personnel working in FCN is about 420 people, and the activity is continuously.

##### 2. TRAINING of RADIATION WORKER (RW)

###### 2.1. General

The only responsibility held by the radiation worker is that he works in a safe manner. This is not only with respect to his own safety, but also to that of his colleagues and does imply a degree of basic competence. "Working safely" means respect of relevant radiation safety procedures. While the complexity of the latter will depend on the application, provided the individual knows and understands the consequences of not respecting to instructions and procedures, then the training provided has been effective. In general, the extent of the required ability is that the individual is able to recognise risks and potentially dangerous situations and know what the next step is. An understanding of the magnitude of the hazard and the degree of risk presented is vital.

There is a wide range of radiation safety training available for RWs but in FCN there are three: training the managers of compartments, training category A of exposure and training the exposure B. Typically duration is 1 or 2 days. In the main, formal courses all follow a similar format, that being a mixture of classroom presentations and handling the dosimetric equipment.

###### 2.2. Ability, competence and suitability

An effective radiation worker is one in which the individuals are competent in the roles that they undertake. In practice, what an employer requires (and this may or may not be a regulatory

requirement) is that an individual is competent in the role or function that he is required to undertake and is suitable for appointment in that role.

### **2.3. Requirements for training and education of RWs and recognison**

The specific duties of the RWs depend on the nature of the practice and have to be established by local rules and procedures. The responsibilities of the RWs are defined in the current Romanian legislation in force. Provide all personnel working in radiologically controlled areas on FCN with adequate information on RP rules, the logic behind them and their implementation. Instruct beginners on how to manage risks in radiologically controlled areas.

According to the regulations, the RWs have to respect the local rules and radioprotection procedures, are subordinated to the radioprotection technicians and RPO and have to report any abnormal situation or malfunction which could affect the safety, any incident and to participate by their established roles in emergency situations. He recognison is done by issuing the permit level 1 in the nuclear field.

#### **a) Education**

Usually high school degree (corresponding to 10-12 years of schooling) is required.

#### **b) Training**

The licensee is responsible to provide for the RWs basic knowledge and understanding of radiation properties, interaction, detection and biological effects, good knowledge of the local rules and the operational radiation protection methods, work instructions and the safety features of the devices, on the job training under the supervision of a radioprotection officer or radiation protection supervisor.

#### **c) Recognition**

The recognition of the RWs consists in a work permit issued by the licensee based on an examination. For this purpose at the beginning of each year has occurred few step that are providing by [3], [4] and [5].

**1. Course Thematic and Radioprotection Course** are sent by mail to all FCN compartment managers and persons responsible with radiological safety on authorization level 2 owner (RPO and manager compartments)

**2.** There is training for compartment managers and persons responsible separately by category A and B

**3.** The compartment managers and persons responsible are training the professional exposed personnel

**4.** The exams consist in a test with 40 questions with multiple choices shared upon the radiologically exposed category A and B. The duration of exam is an hour

**5.** Responsibilities of RW are :

- works in a safe manner accordance with the radioprotection procedures
- knows about risks and the effect of radiation to the health
- follows instruction/procedures for radiation protection.
- correct using of radiation monitor for feet and hands
- correct using of equipment for individual monitoring
- observing the correct function of collective monitoing equipment
- interpret a set of monitoring results for him or work-places
- respect the controlled areas and taking the protective measures
- recognise the warning sings
- worn the protective equipments, special the respirators
- worn the protective equipments
- report to the radioprotection techcians, RPO all the inconveniencies about radiological aspects
- correct disposal of radioactive wastes
- understands the precautions to environment
- knowledgment and apply the radiological emergency plans in the event of an emergency

### 3. FCN TRAINING and EXAMINATION by COMPUTER (TEC)

#### 3.1. TEC Application for FCN

In the future FCN has intention for implementing Training and Examination by Computer (TEC) like a complete and modern system which offers a variety of teaching, learning and examination to its users.

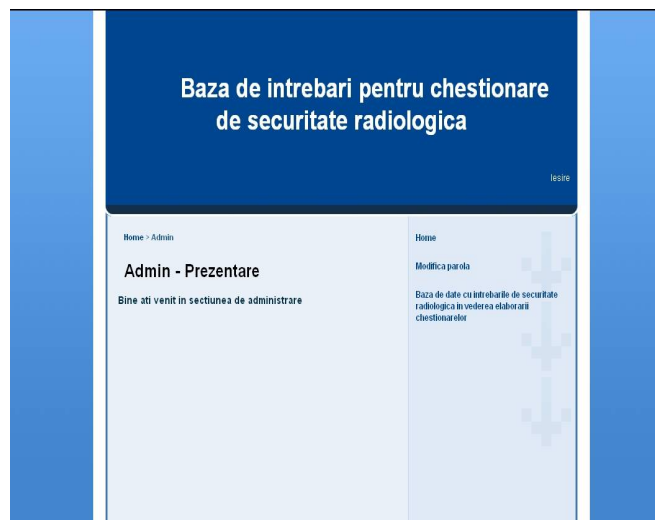
**3.2.** The **first** stage (I) is to providing access to users which want self-teaching and verifying the knowledgement. For teaching and learning the radioprotection course is posted in the FCN intranet and any person who wishes to widen his/her area of knowledge (category A or B of exposure and radioprotection technicians). The interest persons can uses the FCN intranet with questions about radiological safety. The intranet course is structured around 10 objectives (nuclear legislation, biological effects of radiation, uranium and their compounds, work-places radiological monitoring, individual radiological monitoring,

radioactive waste management, radiological areas control, warning of protective equipment, warning of respirators, radiological emergencies)

**3.3.** The **second stage (II)** will be in the future to connect the data base for radiological questions from intranet specific data given the specialised option (exposure A or B, sealed or open sources, radioprotection technicians).

**3.4.** The **third stage (III)** is the evaluation and testing of knowlegment. The evaluation test is made by 40 items (questions) from the objectives with different participation which will differs year to year.

TEC is a very useful tool scalable, and interchangeable and in continuos improvement and offers an enjoyable training/teaching/learning/examination experience for its users.



Aprobat  
Director DSN  
Gh. Epure

Programul și tematica de instruire pe linie de securitate radiologică  
Materie Primă Nucleară - Fabricație Elemente Combustibile (MPN-FEC)

PROGRAM	"Curs de Securitate Radiologică pentru obținerea/vizarea/prelungirea permisului de exercitare activități în domeniul nuclear, nivel 1"			
PERIOADA	19.01.2009 - 30.01.2009			
Domeniu-Specialitatea	Materie Primă Nucleară - Fabricație Elemente Combustibile			
Nr. Crt.	TEMA	Nr. de întrebări	Modalitatea de instruire	Perioada
1	Legislație în domeniul nuclear. Norme CNCAN Legea 111/1996 republicată în 2006 Norme CNCAN Radiații ionizante și surse Mărimi dozimetrice și de radioprotecție (cf. NSR-01, Anexa 1) Limite de doză (cf. NMR-01, NSR-06) Radioprotecție operațională în prelucrarea materiei prime nucleare și fabricație combustibil nuclear	10	Studiu individual pe baza suportului de curs	Ianuarie 2009
2	Monitorizarea radiologică Monitorizarea mediului de lucru Monitorizarea individuală Determinarea dozei efective totale pentru expunși profesional în activități de prelucrare a materiei prime nucleare și fabricare a combustibilului nuclear Evaluarea impactului radiologic asupra populației și mediului generat de activități de prelucrare a materiei prime nucleare și fabricarea combustibilului nuclear	15	Studiu individual pe baza suportului de curs	Ianuarie 2009
3	Modul de utilizare a echipamentului individual de radioprotecție la radiații ionizante (EIR) Mijloace de protecție colectivă Mijloace de protecție individuală Măsuri și mijloace de protecție împotriva contaminării. Zonare FCN Reguli pentru purtarea echipamentului de protecție și a celui de monitorizare	10	Studiu individual pe baza suportului de curs	Ianuarie 2009
4	Gospodărirea deșeurilor radioactive provenite din prelucrarea materiei prime nucleare și fabricarea combustibilului nuclear Măsuri tehnice de combatere a noxelor în activitatea de prelucrare a materiei prime și fabricare a combustibilului nuclear Supravegherea medicală Responsabilități pentru securitate radiologică și managementul deșeurilor (conform MSR și NMR-01) ale expușilor profesional la radiații ionizante și posesori de permise de exercitare de nivel 1	5	Studiu individual pe baza suportului de curs	Ianuarie 2009
5	Verificarea cunoștințelor (test scris)	40 întreb. 1 oră	Comisia de examinare	

\*Suportul de curs a fost înaintat șefilor de compartiment prin mail - intranet în ian. 2008

Responsabil cu Securitatea Radiologică  
Ing. T. Ivana

## **6. CONCLUSIONS**

### **1. Radiation Workers**

Knowledge, competency and suitability are key personal factors for persons working with radiation and there is a danger that training events concentrate just on knowledge provision, while competency and suitability are not addressed. Radiation workers at all levels need to be competent to work safely, and competence can be assessed, either as part of a training event or as part of a certification process. Suitability, however, cannot be achieved just by attendance at a training course.

**2. Main features** of the system are the following:

- a) Publishing of interactive course material online
- b) Testing and examination online

## **6. REFERENCES**

- [1]** Law no. 111/1996 on the safe deployment, regulation, authorization and control of the nuclear activities, republished in 2006
- [2]** Fundamental Radiological Safety Norms approved by CNCAN's president order no. 14/2000 and published in Official Gazette of Romania no. 404/2000
- [3]** Norms for granting the work license and for recognizing the qualified experts approved by CNCAN's president order no. 202/2002 and published in Official Gazette of Romania no. 936/2002
- [4]** FCN Radiological Safety Manual, edition five 2009
- [5]** CN-RP-62 - Training on radiological safety and issuing of permit level 1 for FCN personnel
- [6]** BSS – IAEA Basic Safety Standards
- [7]** Council Directive 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation