

NUCLEAR AND RADIOLOGICAL SECURITY AND SAFETY TRAINING COURSES. REGIMIENTO NBQ – CIEMAT EXPERIENCE.

R. QUESADA¹, I. CASTRO¹, A. ÁLVAREZ², J. C. SAEZ² J. QUIÑONES²

¹*CBRN Regiment, Avda Corts Valencianas 49, 46980 Paterna Valencia, SPAIN*

²*CIEMAT, Avda Complutense 40. 28040 - Madrid, SPAIN.*

1. Introduction

The Amendment to the Convention on the Physical Protection of Nuclear Material – ACPPNM – establish that every state is responsible for ensuring that appropriately trained personnel support its nuclear security infrastructure. Furthermore, international community recognises the increase in illicit trafficking of nuclear and other radioactive material as a significant security threat.

Council Directive 2013/59/EURATOM of 5th December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionizing radiation establishes that every States shall ensure that emergency workers who are identified in an emergency response plan or management system are given adequate and regularly updated information on the health risks their intervention might involve and on the precautionary measures to be taken in such an event. This information shall take into account the range of potential emergencies and the type of intervention.

In this frame, in the Kingdom of Spain cooperation between the Armed Forces (Regimiento NBQ Valencia nº 1) and National Research Centre (CIEMAT) was implemented for designing, developing, and assessment training for first responders. This enlightening experience began on 2013. During the last 4 years, the scope of the training exercises and the scenarios have been modified as a consequence of the critical review done together at the end of the exercise.

2. Organizations capabilities

The NBQ Regiment has a wide experience in CBRN activities including participation in International Missions (such as: Kosovo, Afghanistan, Iraq, Lebanon, among others). Due to the specific field of work, they need a continuous training on nuclear forensic (i.e., radiochemical, chemical and physical characterisation of bulk materials), detection, prevention and decontamination. It is performing at training grounds that allow outdoor use of radioactive sources for detection by the mobile vehicle.

The other partner is the National Research Centre CIEMAT, which has nuclear and radioactive facilities, radiological detection equipment's and a specific vehicle designed for measuring in nuclear and radiological emergencies. These capabilities permit the design and implementation of different scenarios for training courses. The exercises carried out at CIEMAT facilities have been performed by the NBQ Regiment according to its procedures, while CIEMAT researchers participated as observers. The same scheme of action has been followed when the scenario has been prepared by the Regiment and it has been the staff of

the CIEMAT vehicle that has performed the radiological measurements in the training ground. Critical evaluation meetings were held at the end of each day to analyse the work that was carried out and mistakes made in order to develop a list of lessons learned that will be useful to improve the procedures of both organizations.

All the practices have been optimized from the point of view of radiation protection so, although different types of radioactive sources (encapsulated, drums of radioactive waste, etc.) are used, the adequate use of times and shielding has allowed to optimize the practices in a way that the collective dose in all activities was less than the trivial dose (10 μ Sv).

3. Training Activities - IR-17 Facility

The activities carried out in the CIEMAT radioactive facilities included several practical sessions in the operational radioactive installation IR-17 "Solid radioactive waste conditioning plant and temporary storage of very low-level and free release waste". This facility includes waste storage and laboratories with glove boxes for the disassembly and conditioning of radioactive sources. These dependencies are classified as controlled areas with risk of irradiation and contamination and therefore before leaving these areas there is a scanner in order to ensure absence of external contamination. The scenarios prepared by CIEMAT in this facility are as follows:

3.1 Practical use of shielding for radiological protection and confinement of radioactive sources.

In a room of this installation that includes boxes of gloves for the disassembly and conditioning of radioactive sources and equipment of characterization of drums, a scenario was designed whose technical objectives were to locate hidden sources, to identify them and to confine them in suitable shields.

3.2. Identification and sampling

In a solid radioactive waste drums storing vessel, a scenario was designed whose technical objective was for the personnel of the regiment to perform with their equipment dose rate measures from background values to a few μ Svh⁻¹ to exercise equipment use and compare the results of the measurements with the equipment of the same type available in CIEMAT. In another storage place, they were trained in the application of smear sampling procedures on waste drums for analysis in a reference laboratory.

At the end of the exercises, the Regiment set up their own decontamination line to exercise the correct use of personal protective equipment. Finally, all personnel were checked again with the scanner portal available in the IR-17 facility before leaving the controlled area.

4. Underground training activities

The second type of scenario was the radiological characterization of a network of drainage manifold headers at CIEMAT premises. It is a special survey that includes detection, identification of isotopes and detailed mapping with underground radiological information of dose rate and surface contamination.

Training activities were carried out in confined spaces under the supervision of the Occupational Hazard Prevention Service of CIEMAT. Regiment personnel were equipped with oxygen control detectors and explosive atmospheres, carrying a portable continuous gas monitor to perceive oxygen, carbon monoxide and combustible gases. Operational

dosimetry and protection measures were coordinated by the Radiological Protection and Occupational Hazards services of CIEMAT.

The technical objectives for training were the use of the instrumentation and equipment of the Regiment and the development and execution and of characterization procedures in sewage of urban areas. In addition, the procedures for classification of zones, exposure levels (dose rates) and calculations of permitted times in the confined spaces was practiced.

Measurements using portable measurement systems of the radiation levels and polyvalent surface contamination probe were performed. When a significant reading was produced, according to internal procedures samples are taken and "in situ" spectrometric identification is attempted.

All the radiological information is adequately recorded in several media (hardcopy, digital) that facilitates the report and data analysis. In particular, the production of three dimensions plans of the radiological results has been extremely useful for CIEMAT.

5. Emergency vehicle training activities

The CIEMAT emergency vehicle participated in 2015 in the "Pandora" exercise that was carried out in a training center of the Ministry of Defense.

The scenario involved consisted in an accident of a military aircraft containing radioactive and nuclear material in the territory of an allied country. As a consequence, the Regiment was called on a NATO support mission to determine whether the area had been contaminated, to manage the contaminated products detected and to advise the host nation authorities in taking protective measures.

CIEMAT participated in this exercise collaborating in the technical direction, as an observer during its development, as a participant with the emergency vehicle and giving a lecture on the radiological characterization of land.

The CIEMAT staff during the exercise was integrated with the Regiment teams and participated in the detection, localization, identification and quantification of radioactive sources. For this purpose, the technical equipment available to the vehicle was used, allowing the measurement of the equivalent environmental dose rate and gamma spectrometric analysis.

6. Conclusions

The authors would like to point out that this collaboration provided a good chance for showing to the public opinion how the government integrates the state capabilities in order to train the personal and achieve the best results for response in case of CBRN threat. The main conclusion of these training exercises is the synergy and trustworthy communication pathways between whole technical research, expert and units of each organisation.

Finally, it should be noted the high level of technical and human resources of the NBQ Regiment for the characterization of scenarios with radiological risk. To maintain this level of excellence in the future, it is of high importance to continue the collaboration between first responders and CBRN national research laboratories.