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DIRECTORATE-GENERAL ENERGY & TRANSPORT
Directorate H – Nuclear Safety & Safeguards
TREN.H.4 – Radiation Protection

Main Findings of the Commission's Article 35 verification in Portugal.

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INTRODUCTION

Article 35 of the Euratom Treaty requires that each Member State shall establish facilities necessary to carry out continuous monitoring of the levels of radioactivity in air, water and soil and to ensure compliance with the basic safety standards. Article 35 also gives the European Commission the right of access to such facilities in order that it may verify their operation and efficiency.

For the purpose of such a review a verification team from European Commission visited the Nuclear and Technology Institute (Instituto Tecnológico e Nuclear – ITN) operating the Portuguese Research Reactor (Reactor Português de Investigação – RPI) at its Sacavém campus, near Lisbon. The Sacavém campus also houses the Department for Radiological Protection and Nuclear Safety (Departamento de Protecção Radiológica e Segurança Nuclear - DPRSN). The verification activities took place between the 14th and the 17th of May 2002.

The scope of the review was to provide independent verification of the adequacy of:

- The monitoring facilities for gaseous and liquid discharges of radioactivity (effluents) from the Portuguese Research Reactor into the environment.
- The analytical laboratories for effluent sample measurements.
- The monitoring facilities for levels of environmental radioactivity on the Sacavém campus and on its perimeter.
- The analytical laboratories for environmental sample measurements.
- Within the time available, and to the extent possible, the environmental radioactivity monitoring programme for the marine, terrestrial and aquatic environment in Portugal.

MAIN FINDINGS

The Portuguese authorities proposed a verification programme covering all matters in which the Commission had expressed special interest, with the notable exception of the monitoring facilities around uranium mines. The latter were not included despite the Commission's explicit request. It was understood that in fact no such monitoring provisions are in place, the mines being no longer in operation. The absence of a representative of the responsible Ministry did not allow to check or to discuss this information. Also, the Ministry of Science and Technology, under which the Nuclear and Technology Institute operates, was not represented during the verification visit.

The proposed verification programme could be completed within the time allocated. In this regard the verification team appreciated the advance information supplied, as well as the additional documentation received during and after the verification.

The results of the verification activities performed and audit of documents provided give rise to the following main observations and recommendations.

1. Regulatory framework

- The verification team observed that, contrary to the provisions of the Basic Safety Standards provisions:
  - No operating licence with discharge authorisation has been granted to the Research Reactor.
  - The operator has not put in place a statutory discharge monitoring programme nor a statutory site-related environmental monitoring programme.
  - No independent regulatory control is carried out in order to enforce the operator's statutory obligations.

- Concerning the implementation of Article 35 of the Euratom Treaty:
  - No regulatory framework for a National Environmental Monitoring Programme exists.

2. Airborne radioactive discharges from the Portuguese Research Reactor

- The verification team noted that the calibration of the airborne discharge monitoring system has, since its commissioning in 1992, never been submitted to verification. Hence, the reliability of the measurement results is questionable. Written quality assurance and quality control procedures are not available. It is recommended that adequate quality assurance and control procedures for the airborne discharge monitoring system be put in place.

- The verification team noted that particulate Iodine-131 and Tritium are not measured. Furthermore, Carbon-14, which is a significant contributor to dose is not measured nor calculated. It is recommended that nuclide-specific measurements be performed, and that consideration be given to the routine assessment of Carbon-14 and Tritium, at least by calculation.

- The verification team observed that the hardware and software underlying the on-line stack control systems is somewhat out of date.

  In view of a possible breakdown of the hardware and the probable difficulties in obtaining spare parts should such a breakdown occur, it is recommended that the upgrade of the systems be addressed as a matter of priority.

  With respect to the software the operator mentioned that its replacement with more robust applications is intended for the year 2003. The verification team endorses this remedial action.

- The verification team noted the elevated alarm thresholds for airborne releases. It is recommended that alarm thresholds be set at levels that ensure adequate early warning capability.

3. Liquid radioactive discharges from the Portuguese Research Reactor

- The verification team noted with respect to the discharge tanks that written work instructions (procedures) are not available for sampling and discharge operations. It is recommended, for quality assurance and control purposes, that written operating instructions and procedures are put in place.

- The verification team observed that the level indicators on the discharge tanks are not operational and that the volume discharged is systematically recorded as being at nominal tank capacity. The verification team also noted that if the analysis of a discharge tank sample returns an activity concentration below the detection limit of the measurement device, then the detection limit multiplied with the nominal tank capacity is recorded as activity discharged. This approach generates over-estimation of the amount of activity discharged. It is recommended that the functionality of the level indicators be restored in order to correctly record the volumes discharged and, in order the achieve more realistic assessments, that sample measurement values below detection limit be substituted with an appropriate fraction of the detection limit actually achieved.

- The verification team noted that discharge tank emptying into the public sewers is not alarmed and that transient contamination is likely to go unnoticed. It is recommended that the discharge tanks be fitted with a continuous monitoring device alarming the operator in case an activity limit transgression occurs during discharge operations.

4. The analytical laboratory for discharge samples

- The verification team noted that there is room for improving quality assurance and quality control with respect to the measurement systems used for liquid discharge samples. For instance, measurement results obtained from a gamma spectrometry device showed the K-40 detection limits departing from standards, indicating that staff had not noticed a detector or analysis software problem. It is recommended that adequate quality assurance and control procedures for the measurement systems be put in place.

- The verification team noted that the Tritium content of the liquid discharge samples is not measured. It is recommended that consideration be given to the routine assessment of Tritium, at least by calculation.

- The verification team noted that the measurement results for liquid discharge samples are not systematically validated. These data are transmitted to international organisations in the framework of conventions and may be used for publication. It is recommended that adequate data quality validation procedures are put in place, for instance by systematic peer-review of results obtained.

- The verification team noted the absence of structured record keeping and archiving procedures for discharge data. It is recommended that a comprehensive system of record keeping and archiving be put in place, preferably as an integrated database application.

5. The site-specific environmental monitoring programme

- The verification team observed that the ASS-500 high volume sampler and the thermo-luminescent dose meters, in their function as site-related monitoring devices, are not optimally located with respect to the position of the reactor stack and the locally prevailing wind directions. It is recommended that the ASS-500 and the dose meters be relocated to positions where the dispersion of the airborne releases from the reactor may contribute to inhalation exposure and external exposure respectively.

6. The national monitoring programme

- The verification team notes that the DPRSN has made efforts, in the absence of a regulatory authority and on a voluntary basis, to develop a monitoring programme comparable to that in place in other Member States. While priority was given to the installation of monitoring stations for a "sparse" network, the establishment of a "dense" network is lagging behind. Provisions for continuously monitoring airborne particulates and for ambient gamma dose rate recording are missing or unsatisfactory. Only a few dose rate probes, operated by the Ministry of Environment, have been installed along the border to Spain. There is, however, no exchange of data between the Ministry of Environment and the DPRSN. It is recommended that well-defined communication channels between organisations having responsibilities in the area of radiation protection be put in place.

  The verification team also notes that, in the event of a radiological emergency, Portugal may not have sufficient capability to assess such a situation in an appropriate and satisfactory manner.

- The verification team noted that milk samples are taken from supermarkets. In doing so knowledge about the exact date and location at which the milk was produced is not available. This lack of information can result in the analysis software returning significantly biased measurement results, especially when it comes to assess the short-lived radionuclides, more in particular Iodine-131. The current milk sampling procedures are not providing sufficiently representative samples for activity trend analysis. It is recommended that representativeness of milk samples be ensured by

taking them from dairies and, in order to ensure trend analysis capabilities, that sampling be done at one and the same representative dairy for each of the geographical regions of Portugal.

- The verification team noted that for river water samples current practice consists of taking spot samples without measuring the river's flow-rate at the sampling point. It is recommended, in order to achieve representativeness, that river water samples be taken over defined periods of time and that river flow rates be recorded during this period.

- The verification team noted that a third party, the Portuguese Food Agency, collects the mixed diet samples for the national monitoring programme. This activity takes place without it being duly formalised. Strictly defined sampling procedures with which the third party has to comply are not in place. It is recommended that sampling activities devolved to third parties be duly formalised and that contractual responsibilities be clearly defined.

- The verification team notes that over the years the national environmental monitoring programme has improved in its scope. The plan for the year 2002 addresses the marine environment for the first time and designates new media for sampling such as sediments, seaweed and mussels. The verification team welcomes these efforts. It is recommended that the DPRSN be given the necessary means to ensure that the development of its environmental monitoring capabilities is continued.

7. The laboratory for environmental samples

- The verification team understood that the DPRSN is the only body in Portugal having specialised equipment and competent staff in the area of radiological environmental impact assessment. However, the DPRSN is currently facing a slow but continuous reduction in staff due to retirements without replacement. It is recommended that DPRSN staff and competence be maintained at adequate levels.

- The visit of the environmental laboratory demonstrated that the DPRSN is expanding its laboratory infrastructure: extensions are currently being built, including a low-background laboratory and a dedicated laboratory for medium-activity sample analysis. The verification team endorses the efforts made to enhance infrastructure and capacity of the DPRSN laboratory.

- The verification team noted that working documents, pertaining to measurement results below detection limit or pertaining to results invalidated by staff as not being plausible, are not kept. Independent controls cannot be performed to their full extent when a part of the source documents is missing. It is recommended that all source documents with respect to measurements performed on environmental samples be adequately filed.

- The verification team noted that in general the detection limits of the measurement devices in place are well below the reporting levels recommended by the Commission [(1)]. On the other hand the verification team noted that insufficient attention is paid to

[1] Reporting levels as laid down in the Commission Recommendation of 8 June 2000 on the application of Article 36 of the Euratom Treaty (OJ L-191 of 27/07/2000).

quality assurance and control, the calibrations of the various instruments as well as background measurements are not subject to well-defined procedures. It is recommended that adequate quality assurance and control procedures be put in place.

- The verification team noted that measurement results are not systematically nor independently validated. Environmental measurement data are transmitted to the European Commission in the framework of Article 36 of the Euratom Treaty and may be used for publication or may be transmitted to international organisations in the framework of conventions. It is recommended that adequate data quality validation procedures are put in place, for instance by systematic peer-review of results obtained.

- The verification team noted the absence of structured record keeping and archiving procedures for environmental data. It is recommended that a comprehensive system of record keeping and archiving be put in place, preferably as an integrated database application.

- The DPRSN publishes the results of the site-specific and the national environmental monitoring programmes since 2002. The verification team noted that these reports are suffering from a lack of quality control: a number of inconsistencies between source documents and published data were detected. It is recommended that the reports be submitted to an adequate internal quality control prior to publication. Furthermore, in order to achieve better transparency and to reach a larger audience, it is recommended that the reports also be made publicly available on the Internet.

- The verification team stresses the importance of achieving accreditation, as it will provide the laboratory with an internationally approved certificate of excellence. Accreditation may add to the public perception of the activities performed by the laboratory and the reports it issues. It is recommended that the DPRSN be given the necessary means to obtain accreditation.

8. Final remark

The European Commission would appreciate being kept informed about investigative results and remedial actions that the Portuguese government may undertake in the framework of the above observations and recommendations.

[signed]

A. Janssens

Head of Sector