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NPP Cernavoda activities

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“ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM AT CERNAVODA NPP”

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INTRODUCTION

- Cernavoda Nuclear Power Plant is dedicated to produce electrical & thermal power in a safe and efficient manner for at least 30 years, using CANDU (CANadian Deuterium Uranium) technology, which uses heavy water (D_2O) both as moderator and cooling fluid in PHT system.

INTRODUCTION

- The Environmental Control Laboratory of Cernavoda NPP is located at about 2 km far from the plant and has a modern and high performance analysing systems for determination of natural and artificial radionuclide content in the environmental samples taken from the surrounding area of NPP.

INTRODUCTION

- Environmental Control Laboratory covers all necessary activities to measure the environmental radioactivity and to assess the radiological impact on public health and environment, due to the emission from Cernavoda NPP.

ENVIRONMENTAL MANAGEMENT SYSTEM AT CERNAVODA NPP

As part of activities, performed in the power plant, the following activities can be identified which ensure that the public health and environment are adequately protected:

- Source control;
- Effluent control;
- Effluent monitoring;
- Environmental monitoring – performed by the ECL.

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

- The Environmental Radioactivity Monitoring Program at Cernavoda NPP is being performed since March 1996.

- Before starting the environmental program, Cernavoda NPP has implemented a Preoperational Monitoring Program during 1984-1996 period to establish a reference level for evaluating the impact of the nuclear power plant operation.

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

- At the base of the Environmental Monitoring Program is “Emission Derived Limits” document specific for Cernavoda NPP. This document identifies all radionuclides which could be evacuated with the most probability and the most probable transfer pathways in the environment.

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

Environmental Monitoring Program is designed to meet the following objectives under normal nuclear power plant operating conditions:

- to measure the radionuclide concentrations in the environmental media and to assess the increased radiation level in specified environmental pathways;

- to provide an independent assessment of the effectiveness of the source control, effluent control and monitoring based on measurements in environment;

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

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- to validate the models and parameters used in calculation of the Derived Emission Limits (DELs);

- to provide data for the development and evaluation of models and methodologies that adequately describe the movement of the radionuclides through the environment.

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

The major components of the Environmental Monitoring Program are the following:

1. Monitoring locations;
2. Environmental media and specific nuclides;
3. Monitoring frequency;
4. Analytical frequency;
5. Assessment of source control effectiveness;

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

6. Operating Procedures, Quality Assurance Program and calibration methods of measurement systems;

7. Periodical reporting of Environmental Radioactivity Monitoring Program data and estimation of public received doses, both to the power plant and the regulatory authorities.

SAMPLE TYPE, SAMPLING AND ANALYTICAL FREQUENCY

SAMPLE TYPE	SAMPLING FREQUENCY	ANALYTICAL FREQUENCY
Airborne particles (filter)	Monthly (integrated sample)	Monthly
Iodine in air (filter)	Quarterly (integrated sample)	Quarterly
Tritium in air (molecular sieve)	Monthly (integrated sample)	Monthly

SAMPLE TYPE, SAMPLING AND ANALYTICAL FREQUENCY

SAMPLE TYPE	SAMPLING FREQUENCY	ANALYTICAL FREQUENCY
Gamma dose rate (TLD)	Quarterly (integrated sample)	Quarterly
Drinking Water	Monthly	Monthly
Surface Water (from Danube River)	Weekly	Monthly (composed sample)
Cooling Water (from CCW duct)	Weekly (integrated sample)	Weekly
Underground Water (from infiltration)	Monthly	Monthly
Deep Underground Water	Monthly	Monthly

SAMPLE TYPE, SAMPLING AND ANALYTICAL FREQUENCY

SAMPLE TYPE	SAMPLING FREQUENCY	ANALYTICAL FREQUENCY
Soil	Twice a year	Twice a year
Sediment	Twice a year	Twice a year
Grass	Monthly	Monthly
Milk	Weekly	Weekly (gamma and H-3) Monthly (global beta and C-14 on composed sample)
Deposition	Monthly (integrated sample)	Monthly

SAMPLE TYPE, SAMPLING AND ANALYTICAL FREQUENCY

SAMPLE TYPE	SAMPLING FREQUENCY	ANALYTICAL FREQUENCY
Fish	Twice a year	Twice a year
Meet	Yearly	Yearly
Vegetables	Yearly	Yearly
Wheat	Yearly	Yearly
Corn	Twice a year	Twice a year
Fruits	Yearly	Yearly

ANALYTICAL TECHNIQUES AND MEASUREMENT EQUIPMENTS

NUCLEARELECTRICA

ANALYTICAL TECHNIQUE	MEASUREMENT EQUIPMENT
Gamma Spectrometry	Gamma Spectrometer Canberra GeHp detector, APEX software
Liquid scintillation analysis (H-3)	Liquid scintillation counter Quantulus 1220 ULL
Liquid scintillation analysis (C-14)	Liquid scintillation counter Quantulus 1220 ULL

ANALYTICAL TECHNIQUES AND MEASUREMENT EQUIPMENTS

ANALYTICAL TECHNIQUE	MEASUREMENT EQUIPMENT
Global beta analysis	Low background global alpha/ beta measurement system Canberra LB 4100W
Thermoluminescence dosimetry	Automatic TLD reader Panasonic UD-710A and UD-814 AS1 TLDs

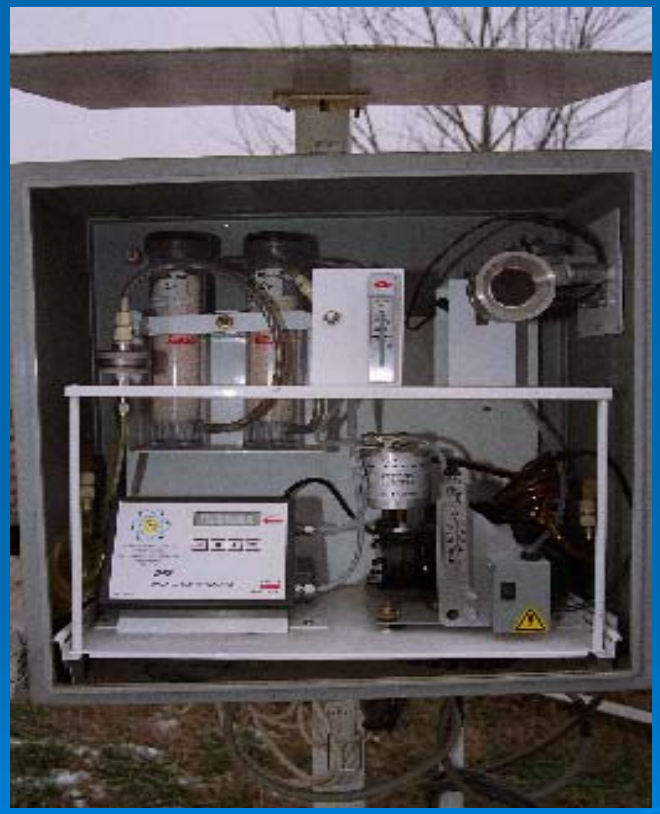
ENVIRONMENTAL CONTROL LABORATORY

Environmental Control Laboratory has a Quality Assurance Program according to the appropriate international standard.

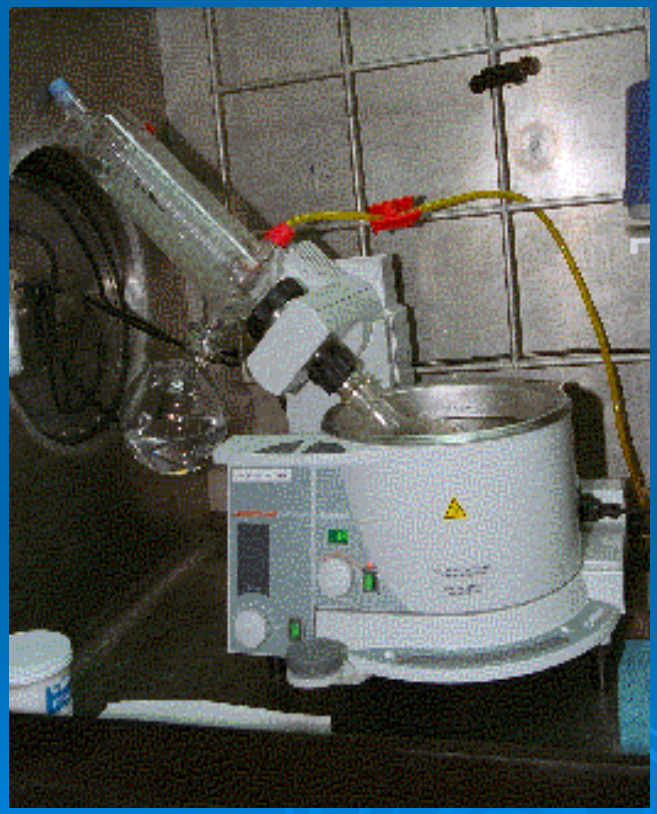
In this respect, Environmental Control Laboratory:

- performs daily and weekly procedures for verification of measurement equipment parameters (QA);
- keep data records of measurement reports in an Environmental Data Base;
- participate, with very good results, at intercomparison exercises (since 2001) organized by the PROCORAD Association from France and at proficiency tests (since 2006) organized by ALMERA Network of IAEA.

ENVIRONMENTAL CONTROL LABORATORY EQUIPMENT



Fixed air monitoring station



Azeotrope distillation installation

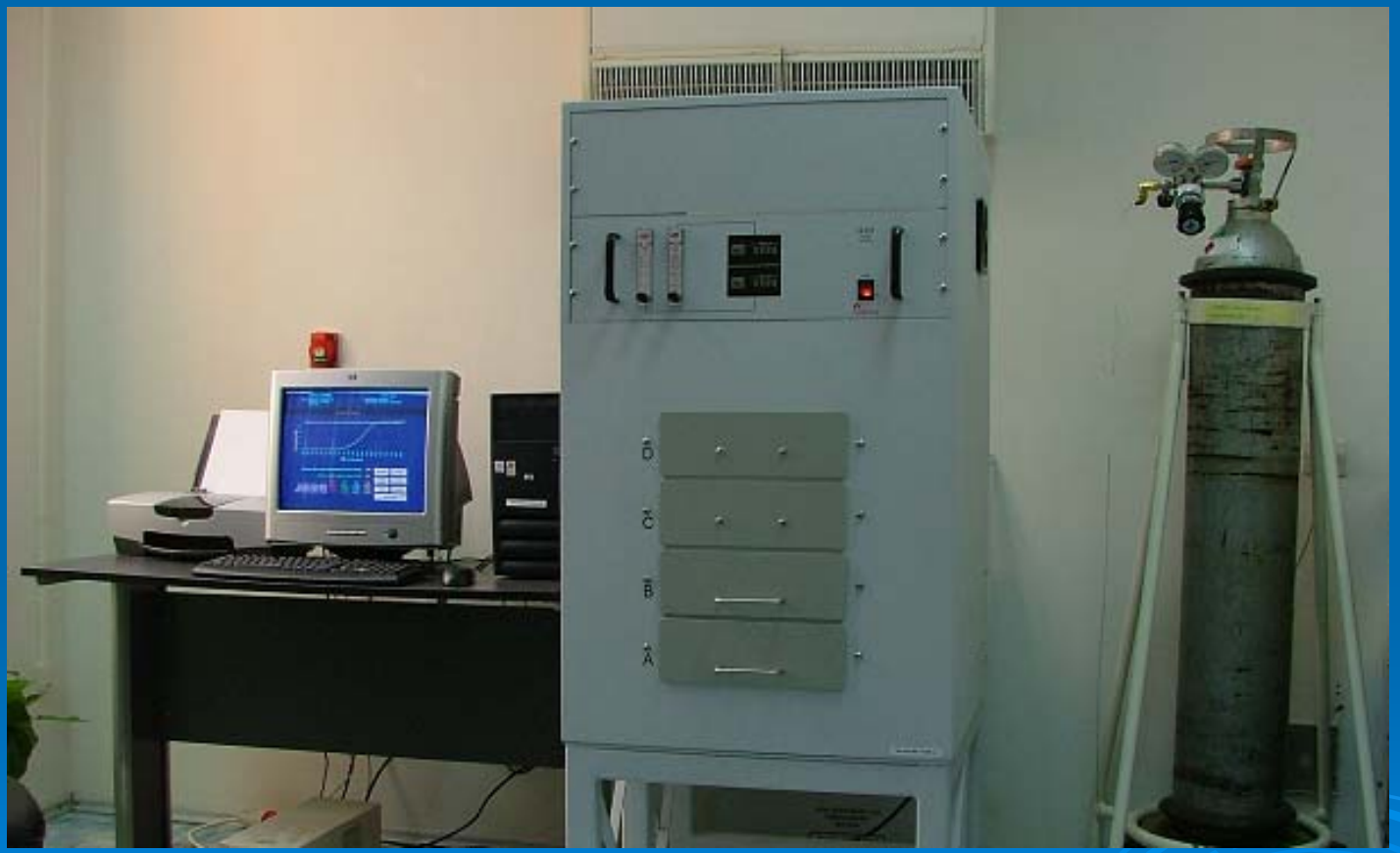
ENVIRONMENTAL CONTROL LABORATORY EQUIPMENT

Gamma Spectrometer – Canberra GeHp detector, 1510 MCA

ENVIRONMENTAL CONTROL LABORATORY EQUIPMENT

Liquid scintillation analyzer for H-3 and C-14 – Wallac, Quantulus 1220 Ultra Low Level

ENVIRONMENTAL CONTROL LABORATORY EQUIPMENT



Low background global alpha/ beta system – Canberra, LB 4100-W

ENVIRONMENTAL RADIOACTIVITY MONITORING PROGRAM

- Since 1996, all radionuclide analysis (14108 measurements on 8415 samples, during 1996 to 2006) have been performed in the Environmental Control Laboratory.

MEASUREMENTS, SAMPLES, LOCATIONS

- MEASUREMENTS / YEAR 1380
- SAMPLE / YEAR 850
- SAMPLING LOCATIONS 114

ENVIRONMENTAL CONTROL LABORATORY STAFF

- 2 SPECIALISTS(Eng.)
- 5 LAB. TEHNICIANS
- 1 MAINTAINER

ENVIRONMENTAL CONTROL LABORATORY STAFF

Monitoring of radioactive emissions

- Total emissions of gaseous and liquid radioactive effluents are weekly compared with administrative limit and established limits,at Cernavoda NPP, through assumed commitments at defining of the environmental objective.

- Emissions are controled not to exceed 5% of weekly DEL for gaseous emissions and 5% of monthly DEL for liquid emissions.

Monitoring of radioactive emissions

- Administrative limit **represents an environmental objective and its scope is to control annual radioactive emissions so that the resulted exposure of critical group to be restrictive at dose values of about 50 μSv/year, representing 5% of legal limit.**

- Assumed environmental objective **represent the Cernavoda NPP commitment regarding the maintaining of radioactive emissions under the value of 1% of DEL.**

CONCLUSIONS

- Results of the environmental radiological monitoring are permanently compared with results of Preoperational Environmental Monitoring Program performed between 1984 and 1996 to demonstrate the impact of nuclear power on the environment operation of Cernavoda .
- No modifications of environmental radioactivity levels in Cernavoda area have been detected, except tritium nuclide in the locations close to the power plant.However the indication are far below the legal limit.

THANK YOU!