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# **ACCIDENT MANAGEMENT APPROACH IN ARMENIA**

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Prevention/Mitigation of Severe Core Damage"**

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Ladies and Gentlemen,

Following the decision of Armenian Government to resume operation of ANPP WWER-440 (V-270) Unit 2 operation, the complex analysis of the existing safety level has been carried out by the General Designer – NIAEP (Nizhny Novgorod) in 1994.

The most significant accident sequences, ways of safety enhancement and specific measures aimed at improvement of reliability of NPP's systems and components had been identified in this analysis by using the deterministic and probabilistic approaches based on existing unit design and taking into account the modifications implemented prior to unit shut down in 1988 and a set of measures implemented before restart of Unit 2.

List of DBAs had been precised by General Constructor, OKB Gydropress, and the relevant analyses of accident modes had been performed. Based on the results of these analyses the "Instruction on Accident Elimination at ANPP Unit 2 reactor facility" had be revised. This instruction is the basic document specifying the operator actions and consists of two parts: deviations from normal operation not resulting in safety systems or reactor protection system actuation (HO-1); deviations from normal operation causing the actuation of the reactor protection system or the safety systems.

List of BDBAs had been developed by OKB Gydropress in 1994. 13 accident sequences were included in this list. The relevant analyses had been performed in VNIIAES and the "Guidelines on Operator Actions for Beyond Design Basis Accident Management at ANPP Unit 2" had been prepared.

These instructions are event-oriented and contain for each deviation/accident:

- ❖ Protections actuation;
- ❖ Alarms in control room;
- ❖ Change in basic unit parameters and automatic actions;
- ❖ Operator actions.

In case of event occurrence operator's actions are specified in the first part of "Instruction on Accident Elimination" aimed at prevention of emergency protection or safety system actuation and restoration of normal operation mode.

If during the deviation elimination the emergency protection or safety systems actuates, then the operator should act as it is prescribed by the second part of "Instruction ..." aimed to prevent the accident evolution into BDBA and bring the NSSS to safe, stable, controllable state.

In case of BDBA occurrence the operating personnel shall act according to "Guidelines ..." aimed at prevention of severe active core damage, radioactive material release or, at least, delay these processes, as far as possible, personnel protection, notification of relevant services and bringing the unit to safe, controllable state/mitigating the consequences of the beyond design basis accident.

By the end of 1999 and during Outage-2000 some measures shall be implemented preventing and mitigating considerably the consequences of severe accidents. Some of them are presented below:

- ❖ Replacement of steam generators and pressurizer safety valves;
- ❖ MSIVs installation on SG steam lines upstream the MSH;
- ❖ Leak detection system from primary to secondary circuits;
- ❖ Diagnostic systems installation: leak detection and lose and loosen parts detection system in primary circuit (is implemented);
- ❖ Diesel-driven pump installation to supply feedwater into SG during the unit black-out;
- ❖ Essential service water supply system (spray ponds) commissioning;
- ❖ Installation of fire doors in cable tunnels and new fire protection automatics;
- ❖ Safety Parameters Display System (SPDS) implementation and some others.

Based on abovementioned modifications the procedures should be revised completely. It is envisaged to carry out analyses of efficiency of preventive/mitigative measures, as well as verification and validation of these procedures.

Some measures are implemented are now at different stages of implementation:

- ❖ Multifunctional simulator;
- ❖ In-depth PSA, data base collection;
- ❖ Putting into practice the RELAP, MELCOR codes.

Emergency Preparedness Service was established at ANPP in 1995, regulating its activities based on regulations of Russian Federation. The following documents have been elaborated:

- "Classifier of Emergency Situations"
- "Instruction for the Personnel Actions during Emergency Situations"
- "Procedure for Notification during Emergency Situations".

Four shelters are constructed for 1080 individuals. Crisis Center is located in one of these shelters equipped with communication and notification means both for on-site services and off-site relevant institutions. It is planning to bring out to Crisis Center display the critical parameters, characterizing the state of reactor and to install the display of SPDS.

ANPP personnel training is carried out in compliance with the guidelines valid at ANPP, PORP-89. They are performed according to special programme. Two out of nine annual exercises for each shift are devoted to accidents.

International Regional Exercise for Nuclear Accident is scheduled to carry out in 2001 under the IAEA aegis. ARAGATS' 99 Exercise have been carried out in Armenia on 6-7 September 1999 in framework of preparation to this Exercise, sponsored by IAEA and European Commission to evaluate the preparedness of the National System of Emergency Response in Armenia in case of nuclear accident at ANPP.

ANRA, ANPP, Department of Emergency Situations of RA, Internal Affairs Ministry, Ministry of Foreign Affairs of Armenia, Metsamor city and Armavir Region local authorities, IAEA, IPSN (France) IBRAE (Russian Federation), NRC (USA) participated in Exercise preparation and conduct.

Exercise objectives:

- Review of procedures, especially classification and notification, including international level;
- Equipment testing and review of information exchange procedures between organizations of the National Systems of Emergency Response, as well as between the Crisis Centre of ANRA and IAEA and the communication centres of the member countries of South Regional Group (Russia, Kazakhstan, Iran, Turkey, Georgia, Armenia);
- More precise emergency planning, roles and responsibilities of emergency response organization of the National System of Emergency Response.

As it was noticed by the Team Leader of foreign observers this Exercise was successful, as a whole, in spite of some comments concerning the emergency response plans and available equipment of Crisis Centers of some organizations – exercise participants. The final results/evaluation of this exercise will be presented by the end of this year.

In conclusion, I think it necessary to note that a great number of safety upgrade measures have been implemented or are underway thanks to technical and financial support of IAEA, European Commission (TACIS-96) and US DOE.

Thank you for attention.