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THE 30th AND 29th ANNIVERSARIES OF THE REACTOR ACCIDENTS IN A-1 NUCLEAR POWER PLANT JASLOVSKÉ BOHUNICE

Kuruc, J., Mátel, Ľ.

Department of Nuclear Chemistry, Faculty of Natural Sciences, Comenius University, 84215 Bratislava, The Slovak Republic

kuruc@omegainfo.sk

SUMMARY

The facts about reactor accidents in A-1 Nuclear Power Plant Jaslovské Bohunice, Slovakia are presented. There was a reactor KS150 (HWGCR) cooled with carbon dioxide and moderated with heavy water. A-1 NPP was commissioned on December 25, 1972. The first reactor accident happened on January 5, 1976 also during fuel loading. The second serious accident in A-1 NPP occurred in February 22, 1977 also during fuel loading. This INES level 4 of reactor accident resulted in damaged fuel integrity with extensive corrosion damage of fuel cladding and release of radioactivity into the plant area. The A-1 NPP was consecutively shut down and is being decommissioned in the present time. Both reactor accidents are described briefly.

Key words (INIS): Bohunice A-1 reactor; reactor accident; INES; reactor decommissioning; surface contamination

INTRODUCTION

In this year we are commemoriate the thirtieth anniversary of the first incident and the twentieth-ninth anniversary of the second accident in the nuclear reactor KS 150 in A-1 NPP. The prototype nuclear power plant A-l located in Jaslovské Bohunice was a HWGCR with channel type reactor KS 150 with natural uranium (refuelling during operation) and capacity of 143 MW_e. The steam rising from the primary circuit of the reactor with a temperature of 410 °C moved ahead into six modules of steam generators and then into the turbines with generators. Fuel change was realised during the operation of reactor. The construction of the NPP started in 1958, it was commissioned on December 25, 1972. This NPP produced 916.1 MWh of electric energy during quadrennial operation (9).

THE FIRST INCIDENT ON A-1 NPP JASLOVSKÉ BOHUNICE

Before 30 years the first incident (the failure of the closing mechanism of technological channel) happened on January 5, 1976 (Nuclear Regulatory Authority of the Slovak Republic, (6)). Fresh fuel assembly (together with the technological plug) ejected to the reactor hall. Coolant (carbon dioxide) flowed out from the reactor during short time until the refuelling machine was reconnected with open technological channel and stopped coolant leakage. Immediately the personnel were not irradiated. Two people out of the hall, who did not respond tothe warning system, were suffocated by carbon dioxide. No radioactive substances escaped into the atmosphere. The public was not informed about the progress of incident, while the population was not endangered. This incident was described in detail in the paper of Frišová's paper (3). This incident to the reactor A-1 NPP has not been evaluated according to the INES scale up to present time (INES, The International Nuclear Event Scale User's Manual (4)). In our opinion the

incident to the reactor A-1 of 1976 year should be classified at least at third level of INES scale. The reactor was consecutively deplaned, shut down and reconstructed by the end of 1976.

ACCIDENT ON A-1 NPP JASLOVSKÉ BOHUNICE

During refuelling, the insufficiently transmissive fuel assembly was charged into the reactor core on February 22, 1977. Local overheating of fuel, the technological channel and heavy water circuit tube caused a loss of barrier integrity between the heavy water moderator and fuel with cooling gas. Cladding and steam generator tube corrosion under water saturated by carbon dioxide occurred and resulted in a contamination of the primary and secondary circuit (2). In 1979 a final decision was made to decommission this plant. There were 439 of total of 571 spent fuel assemblies transported to the former Soviet Union from 1984 to 1990. 132 damaged fuel assemblies were sent to PA Mayak (Russia) in 1999 (6).

In 1991 International Atomic Energy Agency introduced INES scale (*The International Nuclear Event Scale*, (10) with 7 levels. Subsequently, the second accident on A-1 NPP was classified as an accident at the fourth level of the INES scale. During the accident it was alleged that no leakages of radioactivity into the environment occurred (*Nuclear Regulatory Authority of the Slovak Republic* - (6)).

Abnormal rainfall on A-1 NPP site and insufficient countermeasures against flooding led to a flooding of rooms in the plant-controlled area in June 1978. A huge amount of contaminated water was produced. The contaminated water subsequently was released into the reservoir of the Dudvah River and then to Vah River. Notwithstanding the increased radioactivity of the effluents, no immediately countermeasures for the mitigation of consequences were taken. Water from these rivers is used for irrigation of fields (8).

After the second accident the Government of the CSSR decided on decommissioning of A-1 NPP with the resolution No. 135 of May 17, 1979. The actual decommissioning started in 1995. Around eight billion Slovak crowns (~267 million $) were spent on decommissioning of A-1 NPP from 1995 to end of 2005 (1). It is necessary to add also the finances spent up to 1995 to the expenses for liquidation of A-1 NPP.

Some papers have been published about the radiation consequences of the accident to A-1 NPP and about the monitoring of the environment. Their short review was published in the *Proceedings of the Third Radiobiological conference* (5).

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