The project of special autonomous facility for fragmentation of RMs large parts began in parallel with this stage in 2011, because there isn't workplace equipped with suitable technology for fragmentation of large components at the A1 NPP site. The detailed project was worked out in 2012 and manufacture, delivery and mock-up tests of facility were performed in 2013.

The facility for fragmentation of large components is designed as a mobile facility placed on standardized rail chassis of type RmmS. It is placed in O-P corridor (transport corridor) in the building No. 30 (the main production building) and it is connected to the existing distribution of electric power, demineralised water and ventilation system. The basis of the facility is ISO container, which is divided into a workplace part and operational part. The workplace part have hydraulic tilting roof for inserting and withdrawing RAW. The workplace is equipped with diamond wire saw with clamping system of fragmented pieces and tension pulleys of wire.

The facility was put into operation in 2014. The tube shielding of RM's pressure vessel with length 4.5 m, outside diameter 920 mm and weight 10.5 t has been fragmented. The shielding was fragmented to 11 segments with average weight 950 kg.

Optimization of cutting conditions, selection of optimal diamond wire and optimization of several operational functions of fragmentation workplace were performed during fragmentation of the shielding.

THE ASSESSMENT OF V1 NPP STEAM GENERATOR DISMANTLING FROM THE PERSPECTIVE OF EXTERNAL EXPOSURE

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During decommissioning of nuclear power plants several dismantling procedures have to be carried out. One of the specific task is the dismantling of so-called large components (reactor pressure vessel, reactor internals, pressurizer and steam generator). The activity inventory of these components is mostly a result of neutron activation (reactor pressure vessel, reactor internals) or contamination (pressurizer and steam generator). For planning of dismantling procedure of each component many factors have to be taken into account (e.g. site-specific conditions – plant design, possibilities of treatment, conditioning, storage and final disposal of resulting radioactive waste).

The paper deals with the dismantling of steam generator used in Slovak NPP V1 in Jaslovské Bohunice. This plant was closed after almost 3 decades of standard operation and is currently in the second decommissioning stage (duration between 2015 – 2025). During this period, the dismantling of activated and contaminated parts will be realised. From this reason it is necessary to carry out complex analysis regarding the prediction of external exposure during partial dismantling activities.

In the paper, the following subjects will be presented and analysed:

- The proposed dismantling procedure of steam generator,
- The calculation of external exposure using VISIPLAN 3D ALARA code,
- The influence of additional shielding during several dismantling steps on the external exposure,
- The influence of time decay on the exposure of workers (based on considered nuclide vector).

Moreover, the issues connected with the source term (non-linear distribution of contamination, the application of decontamination technologies) will be discussed.

DECOMMISSIONING OF THE NPP A-1 HEAVY WATER MANAGEMENT SYSTEM

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The paper deals with experience and techniques in the application of decontamination technology and remotely controlled robotic devices for the decontamination and dismantling of the heavy water management

system during undergoing decommissioning process of the A-1 NPP as well as treatment of arising liquid waste All of these activities are characterized by high level of radioactivity and contamination.

During operation of the A-1 NPP the heavy water management system fulfilled several functions: (1) cooling of the moderator, (2) topping up of the moderator in the active zone, (3) drainage, feed and storage of heavy water, (4) capture of leaked heavy water. Closely associated with heavy water management were systems for separation and isotopic purification of heavy water (distilling station, removing organic impurities station, isotopic purification station).

The NPP heavy water system is located inside the power block building in several rooms where the inner surface contamination is up to the level of 10E4 Bq.cm-2, dose rate up to 15,0 mGy.h-1 and the feeding pipeline contained liquid RAW with high tritium content.

Pre-dismantling decontamination of the heavy water management system and associated systems had to be performed with the intention of improving the radiation situation, i.e. reducing contamination of internal surface and dose rates in the vicinity of the equipment.

Various sophisticated procedures such as retrieval of sludge using remotely operated devices and loop chemical decontamination of internal surfaces were applied. The generated radioactive waste such as spent decontamination solutions and sludge were immediately solidified on-site into a geopolymer matrix using a mobile conditioning facility.

For dismantling and fragmentation of some devices, mobile robotic systems MT80 and MT15 were applied which had been developed, designed and constructed as general-purpose decommissioning equipment. Special tooling was developed for application with the robots, such as hydraulic shears, circular saw, reciprocating saw, circular pipe cutter and a system for quick tool-change without direct intervention of the operators. Most of the operations are remotely controlled on basis of visual information from four cameras, with consistent radiation protection of the operators.

The implementation of partial decommissioning tasks in such hard and unfavorable radiation conditions (moreover accompanied by generation of specific high-content alpha radwaste) has introduced in practice several new unique decontamination and dismantling techniques and new procedures for the effective on-site processing of generated secondary radioactive waste, including sludge and sorbents. These advantageous techniques, equipment and experience will be exploited in the continuation of the A-1 NPP decommissioning process which has been organized according to distinctively licensed phases.

ENVIRONMENTAL IMPACT OF A1 NPP DECOMMISSIONING

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The aim of this paper is to evaluate the decommissioning project of A1 NPP in terms of environmental impact. This activity follows the Government Resolution No. 266/1993 Coll., which imposed to "Prepare a comprehensive project to establish radiation safe conditions in A1 NPP". For the third and the fourth stage of A1 NPP decommissioning an Environmental Impact Assessment Report has been elaborated according to the Act No. 24/2006 Coll. as amended, which is currently under review process. Basic parameters of decommissioning have been evaluated, including: radioactive waste production, production of hazardous and other waste, irradiation of workers and the public, duration and costs. A1 NPP decommissioning process is divided into five stages that form continuous variant with expected completion by 2033. Currently the second stage of decommissioning is being completed and elaboration of licensing documentation is carried out for the third and the fourth stage. Proposed time schedule of stages (i.e. another two 4-year stages and the final 9-year stage) creates good conditions for the successful completion of the entire process.