V1 NPP DECOMMISSIONING PROGRESS IN 2017 - 2019

Bohunice Programme

Co-funded by
the European Union

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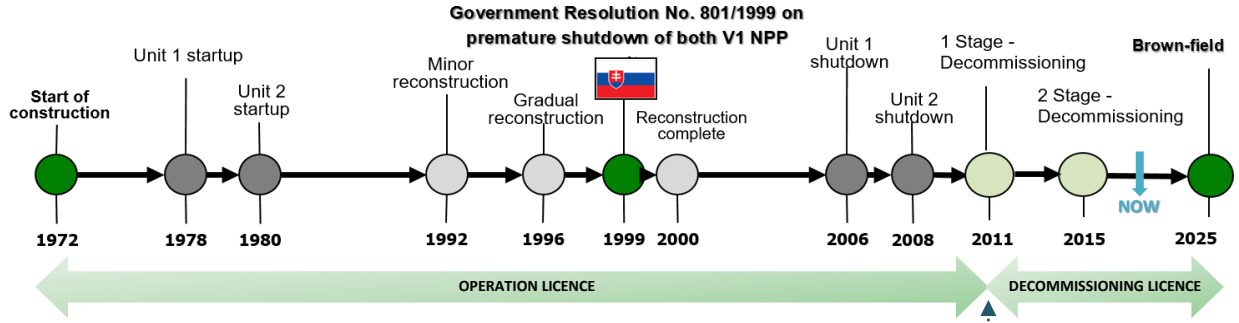
Eastern and Central European Decommissioning
Trnava, 25 June 2019

BASIC INFORMATION ABOUT V1 NPP



REACTOR TYPE: 2 x WWER 440-V230

THERMAL OUTPUT: 1375 MW_T

FUEL: UO_2 (1.8 / 2.4 / 3.6 % U-235) (modified 3.82 % U-235)

MODERATOR AND COOLANT: H_20

NUMBER OF LOOPS: 6

OPERATION TERMINATION

- Spent Nuclear Fuel aftercooling and transport to ISFS
- Preparation for decommissioning
- NPP modifications
- Decommissioning licensing
- Monitoring

STAGE 1

DISMANTLING OF NON-ACTIVE SYSTEMS

- Dismantling of non-active equipment
- Demolition of non-active buildings
- Monitoring systems
- F&D equipment
- Monitoring
- Treatment of historical RAW (except for RH waste storage)

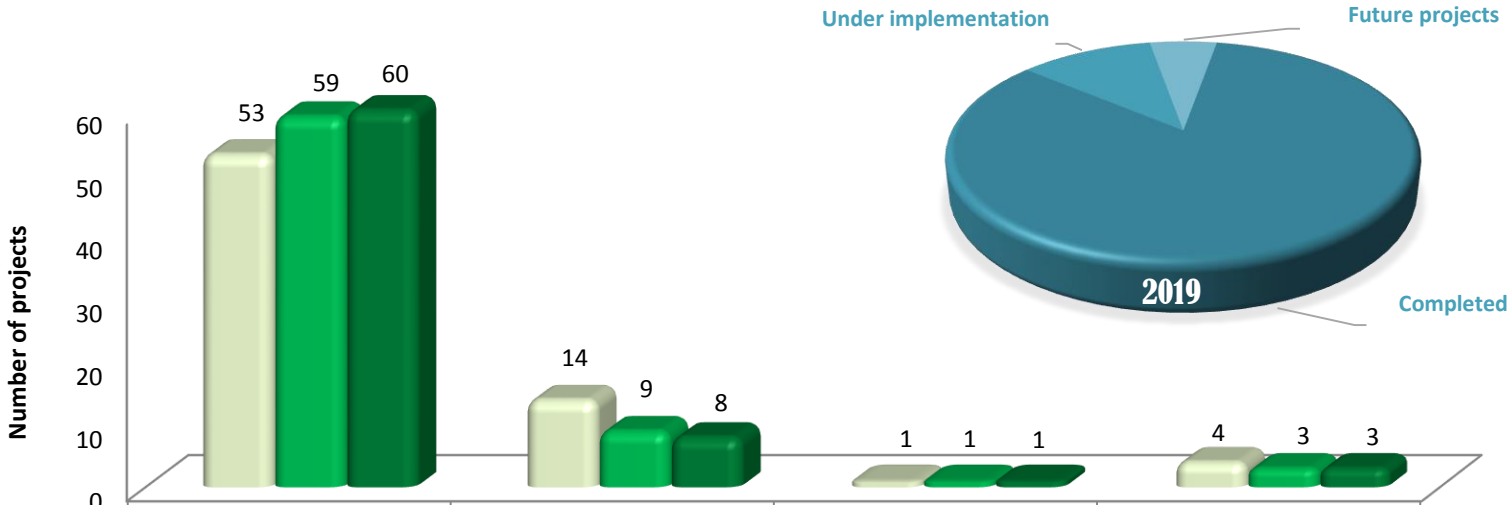
STAGE 2

DISMANTLING OF ACTIVE SYSTEMS

- Dismantling of contaminated and activated equipment
- Demolition of buildings
- RAW management
- Free release of materials
- Monitoring
- Emptying and dismantling of RH waste storage

2025

V1 NPP DECOMMISSIONING PROJECT STATUS



	Completed	Under implementation	Under procurement	Before granting
December 2017	53	14	1	4
December 2018	59	9	1	3
June 2019	60	8	1	3

COMPLETED PROJECTS

2017

C8	Interim Storage of RAW at Bohunice Site
D2–A	Decontamination of the Primary Circuit - II Stage

2018

A5–A3	Optimisation of Electric Scheme
C15–A	Integrated Computer System for V1 NPP Decommissioning Logistic System
D2.1	Decontamination of Spent Fuel Pools and Other Contaminated Tanks – Part 1
D3.1B	Dismantling and Demolition of V1 NPP Cooling Towers
D4.4A	Auxiliary Buildings System Removal – Stage 1
D19.1	Upgrade of the PMU hardware equipment

2019

C9.4	Design and Erection of New Disposal Facilities for LLW and VLLW from V1 NPP Decommissioning at NRR Mochovce

COMPLETED PROJECTS - HIGHLIGHTS

C8 INTERIM STORAGE OF RAW AT BOHUNICE SITE

PROJECT SCOPE:

- **Erection of a new interim storage** of radioactive waste at Bohunice site for solid RAW coming from A1 and V1 decommissioning – i.e. waste that can be released into the environment (decay function), RAW intended for further processing that can be disposed in the Mochovce NRR (buffer function) and wastes that require safe long-term storage (storage function). Its design life is **70 years**.

The facility consists of **two modular storage halls** and a technical equipment annex building.

Technological equipment enables **storage and handling of RAW in approved package forms** (FCC, CASTOR, ISO, 2EM-01, MEVA).

2017

INTERIM STORAGE OF RAW


REMOTE CONTROL


MODULES


PACKAGE FORM

COMPLETED PROJECTS - HIGHLIGHTS

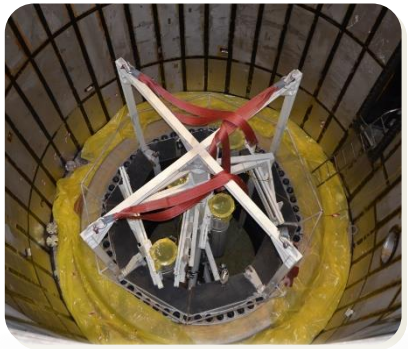
D2/D2-A DECONTAMINATION OF THE PRIMARY CIRCUIT

PROJECT SCOPE:

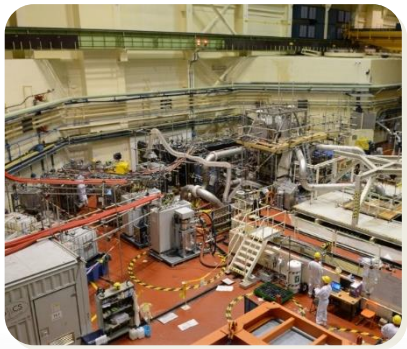
Pre-dismantling chemical decontamination of primary circuits of both V1 NPP units using the DfD decontamination facility in order to:

- **remove contamination** from the primary circuit components;
- **reduce the dose rates levels** around piping and equipment to **minimize the potential for spreading contamination** during following decommissioning activities;
- reduce the contamination of components to such levels that they may be disposed of at a **lower waste disposal category.**

2017



"SPIDER"



DECONTAMINATION LINE

DECONTAMINATION

DOSE RATE MEASUREMENT

COMPLETED PROJECTS - HIGHLIGHTS

D2/D2-A DECONTAMINATION OF THE PRIMARY CIRCUIT

Activity removed after decontamination of Unit 2

LOOPS	REMOVED ACTIVITY FROM LOOPS	REMOVED ACTIVITY FROM SGS
1 & 4	**99.3 %**	**98.2 %**
3 & 6	**99.4 %**	**93.5 %**
2 & 5	**98.2 %**	**91.8 %**

Activity removed after decontamination of Unit 1

LOOPS	REMOVED ACTIVITY FROM LOOPS	REMOVED ACTIVITY FROM SGS
1 & 4	**98.6 %**	**99.2 %**
3 & 6	**94.7 %**	**87.3 %**
2 & 5	**91.5 %**	**95.3 %**

ACTIVITY REMOVED IN LOOPS RANGES FROM **91.5 %** TO **99.4 %**
ACTIVITY REMOVED FROM SGS RANGES FROM **87.3 %** TO **99.2 %**

REDUCTION OF WORKERS' DOSE RATES

COMPLETED PROJECTS - HIGHLIGHTS

D2.1 DECONTAMINATION OF SPENT FUEL POOLS AND OTHER CONTAMINATED TANKS (P1)

PROJECT SCOPE:

- **Remove the loose surface contamination of internal surfaces of the tanks, storage pool and universal pit** to reduce the risk of spreading radioactive contamination of workplaces, working environment and workers during decommissioning as well as was to prepare the technologies for further dismantling and disposal to be implemented in other projects.
- **Remove sludge, sediments**, etc. of the tanks, storage pool and universal pit.

2018

REMOVAL OF HERMETIC CASES FROM SPENT FUEL POOL

DISMANTLING OF MAIN RACK (UNIT 1)

DECONTAMINATION OF SPENT FUEL POOL

CLEANED TANK AFTER DECONTAMINATION

COMPLETED PROJECTS - HIGHLIGHTS

D3.1B DISMANTLING AND DEMOLITION OF V1 NPP COOLING TOWERS

PROJECT SCOPE:

- **Demolition of the V1 NPP cooling towers** (CT) and connecting channels;
- Dismantling of all equipment installed in buildings and surroundings;
- **Backfilling, surface grading and grassing, waste disposal**, etc.

The demolition attracted widespread attention of the public since it was a visible demonstration of the site's progress towards its clean up.

2018

PARAMETERS:

Height of towers: 120 m
Base diameter: 84.4 m
Diameter in the highest part: 53 m
Thickness of reinforced concrete: 15 - 60 cm
Depth of the pool: -5m
Asbestos: 4 800 tons (all 4 towers)
Volume of concrete debris per tower: 20,500 m^3
Pool capacity: 26,400 m^3
Demolition duration: 02/10/2017 – 01/10/2018
Demolition of 1 tower: approx. 3 months

BEFORE DISMANTLING (2017)

TOWER CRANE

"FLY DEMOLITION SYSTEM"

ALL COOLING TOWERS DEMOLISHED

COMPLETED PROJECTS - HIGHLIGHTS

D4.4A AUXILIARY BUILDINGS SYSTEM REMOVAL – STAGE 1

PROJECT SCOPE:

- **Dismantling and removal of technological equipment** within the Controlled area of V1 NPP;
- **Modification of emptied spaces for the purpose of handling and temporary storage of very low-level radioactive waste** originated from V1 NPP decommissioning;
- The subject of dismantling and modification were: Annex of Auxiliary Building *(CB 801a:V1)*
  Cementation Facility Building *(CB C809:V1).*

2018

DISMANTLING OF EQUIPMENT (CEMENTATION FACILITY)

DISMANTLING OF SILOS (CEMENTATION FACILITY)

APPLICATION OF DECON-GEL

FRAGMENTATION OF THE TANK

COMPLETED PROJECTS - HIGHLIGHTS

C9.4 DESIGN AND ERECTION OF NEW DISPOSAL FACILITIES FOR LLW AND VLLW FROM V1 NPP DECOMMISSIONING AT NRR MOCHOVCE

PROJECT SCOPE:

- Erection of **facility for disposal of Low Level Waste (LLW)** originated from V1 NPP decommissioning based on the existing disposal system (double-rows of reinforced concrete vaults) at NRR Mochovce – commissioned in 12/2017;
- Erection of **facility for disposal of Very Low Level Waste (VLLW)** originated from V1 NPP decommissioning based on a multi-barrier shallow landfill concept preventing radionuclides from migrating into the environment – commissioned in 04/2019.

2019

VLLW REPOSITORY

VIEW FROM INSIDE OF HANDLING BUILDING (VLLW)

LLW DISPOSAL FACILITY

VIEW FROM INSIDE OF LLW DISPOSAL FACILITY

PROJECTS UNDER IMPLEMENTATION - HIGHTLIGHTS

COMPLETION: 2020

C7-A4 Metallic RAW Melting Facility

D4.1 Modification of the Plant and Installation of New Equipment

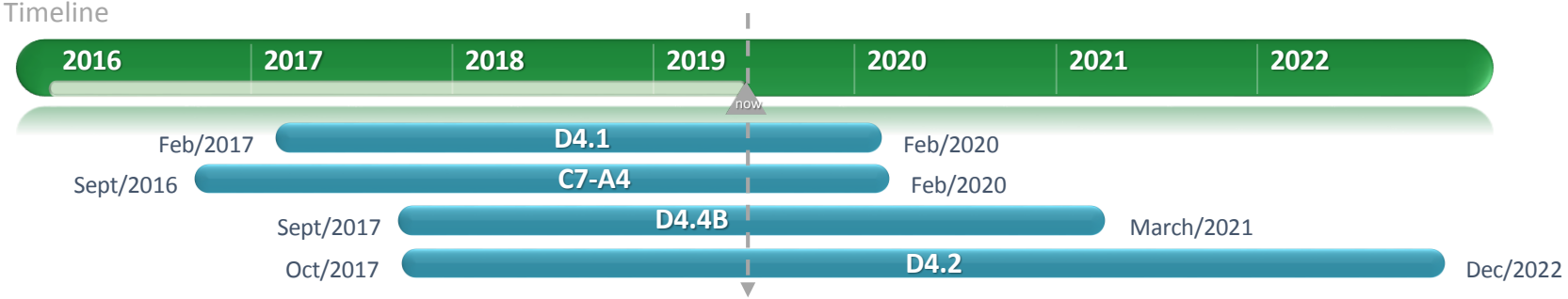
2021

D4.4B Dismantling of Systems in V1 NPP Controlled Area – Part 1

2022

D4.2 Dismantling of Reactor Coolant System Large Components

Projects Timeline



PROJECTS UNDER IMPLEMENTATION - HIGHLIGHTS

C7-A4 METALLIC RAW MELTING FACILITY

PROJECT SCOPE:

- Provision of a workplace including facilities at Bohunice site for **melting of metallic material coming from A1 NPP and V1 NPP decommissioning**, which will complete the existing complex of technologies for treatment and conditioning of radioactive waste by RAW handling method. The melting facility will be located in the former A1 NPP turbine hall;
- To enable **release of a considerable quantity of metal waste**. For ingots exceeding limits for releasing, to achieve material decontamination and the **minimization of the RAW volume**, thus saving capacity of the RAW repository in Mochovce.

COMPLETION: 2020

CONSTRUCTION OF A WORKPLACE – ANNEX (BLDG 34/1)

CONSTRUCTION OF A WORKPLACE (INSIDE OF BLDG. 34)

INSTALLATION OF THE FURNACE

SCRAP METAL CRUSHER

PROJECTS UNDER IMPLEMENTATION - HIGHLIGHTS

D4.1 MODIFICATION OF THE PLANT AND INSTALLATION OF NEW EQUIPMENT

PROJECT SCOPE:

- Prepare reactor building, auxiliary building and other civil buildings or external areas for **dismantling of systems and equipment** and its consequent **decontamination and demolition**. These modifications will reduce the time demandingness of later implemented decommissioning works, minimize collective doses and increase the capacity of transport routes.

Sub-projects in progress:
"Modification of cooled and demineralized water supply system for Interim Spent Fuel Storage (ISFS);
"Modification of contaminated waters drainage from ISFS";
"Construction of the ISFS pumping station and installation of pipeline routes for pumping of regen./decont. solutions in ISFS."

COMPLETION: 2020

MODIFICATION OF COOLED WATER PRODUCTION SYSTEM

INSTALLATION OF AEROSOL FILTRATION UNIT TO EXHAUST AIR FROM REACTOR HALL

REPLACEMENT OF COOLING UNITS FOR PRODUCTION OF CHILLED WATER FOR HVAC EQUIPMENT

CIVIL MODIFICATION IN SIDING CORRIDOR (FLOOR LEVELING)

PROJECTS UNDER IMPLEMENTATION - HIGHLIGHTS

D4.4B DISMANTLING OF SYSTEMS IN V1 NPP CONTROLLED AREA – PART 1

PROJECT SCOPE:

- **Pre-dismantling decontamination, dismantling and fragmentation, sorting and packaging, handling and transportation of components and systems** located in the controlled area (outside the hermetic zone boundaries) that are *not essential* for further activities of V1 NPP Decommissioning.
- Works related to this project are mainly performed in: V1 NPP Reactor building *(800:V1);*
  V1 NPP Auxiliary building *(801:V1).*

COMPLETION: 2021

DISMANTLING OF PIPELINES

EMPTY ROOM SK210 AFTER DISMANTLING OF EQUIPMENT

TAG-OUT ACTIVITIES

WORKPLACE: FIXATION OF SLUDGE

PROJECTS UNDER IMPLEMENTATION - HIGHLIGHTS

D4.2 DISMANTLING OF REACTOR COOLANT SYSTEM LARGE COMPONENTS

PROJECT SCOPE:

- **Dismantling of large components of the V1 NPP Nuclear Steam Supply System** (Steam Generators, Reactor Pressure Vessels, etc.);
- **Fragmentation of shielding assemblies** (72 pcs.);
- Emptying of the contents of the **remote-handled waste storage** and its dismantling, etc.

Currently, it is the most important project with regard to scope of works, project duration and labour involved (200 workers per day)
After completion of the project, 99.9% of RA-activity will be removed from the V1 NPP site.

COMPLETION: 2022

TRANSPORT OF STEAM GENERATOR

STEAM GENERATORS BUFFER STORAGE IN FORMER TURBINE HALL

CONSTRUCTION OF DRY CUTTING WORKPLACE IN FORMER TURBINE HALL

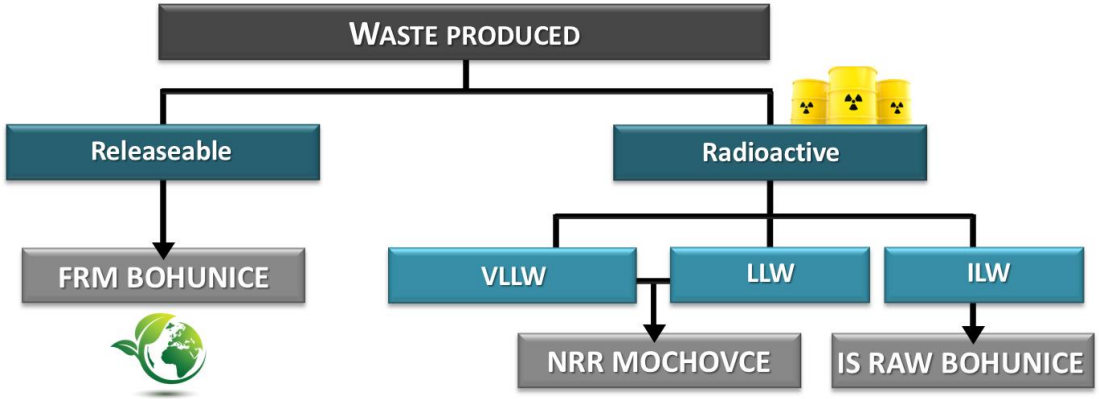
UPPER BLOCK DISMANTLING

PROJECTS UNDER IMPLEMENTATION - HIGHLIGHTS

D4.2 DISMANTLING OF REACTOR COOLANT SYSTEM LARGE COMPONENTS

CURRENT PROGRESS:
(COMPLETED AND ON-GOING ACTIVITIES)

- ✓ **Dismantling of Reactor Shaft Protection Lids;**
- ✓ **Dismantling of Steam Generators** and their transport to the former turbine hall;
- ✓ Removal and fragmentation of **Emergency and Control Rod Drives**;
- ✓ Dismantling of **Thermal Insulation** of Reactor Pressure Vessel, Unit I;
- ✓ Preparatory works for construction of a pool as part of **Wet Cutting Workshop**;
- ✓ Dismantling of **Main Circulation Pumps**;
- ✓ Preparatory works for dismantling of **Bubble Tank and Pressurizer**;
- ✓ Establishment of **Dry Cutting Workplace** in the former Turbine Hall;
- ✓ Dismantling of **ionization chambers** for neutron flux monitoring; etc.



THANK YOU FOR YOUR ATTENTION!