VF Flexible solutions

BIDSF C7-A3

ERECTION OF THE NEW LARGE CAPACITY F&D FACILITY NPP V1

BRIEF SUMMARY FROM THE REPORT PREPARED PURSUANT TO THE ENVIRONMENTAL IMPACTS ASSESSMENT ACT NO. 24/2006 COLL.

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CONTENT

LIST OF ABBREVIATIONS

BIDSF	Bohunice International Decommissioning Support Fund, which is set up and managed by EBOR bank according to rules of fund
BAS	The building of an auxiliary service
BPC	Bohunice processing center
PMS	Particles monitoring system
DDB	Decommissioning Data Base – BIDSF project B6.4.
DL	Decontaminating line
EBRP	European bank for recovery and progress
EC	European commission
ESTE	Program for purposes in declaration leavings discharges of RA substances into atmosphere and hydrosphere
F&D (FaD)	Fragmentation and decontamination
MCP	The main circulatory pump
HMG	Harmonogram
MRA	The main regulation assembly
HL	Hygienic loop
MCF	Main closing fitting
IMS	Integrated management system
JAVYS	Nuclear and Decommissioning Company
NPP V1	Nuclear power station V1
NES	Nuclear energy system
NS	Nuclear system
CA	Controlled area
TC	Thorough check
LaC	Limits and conditions
BSBF	Buffer stock of burnt out fuel
MSK 64	Seismic scale
OOPP	Personal protective equipment
PT	Pretesting
PMU	Project manager unit
QA	Quality assurance
PPC	Steam-gas power station
RS	Radioactive substances
RAW	Radioactive waste
BO	Building object
PCSR	Protection and control system of the reactor
SR	The Slovak Republic
NRA	Nuclear regulatory authority
PHA	Public health authority
CfW	Contract for work
ENV	Environment

INTRODUCTION

1. Annotation

Evaluation report on the proposed activity in accordance to article 31 of act no. 24/2006 Coll. regarding assessment of effects to the environment and supplement laws as amended by ensuing rules (in text read only “the act”) for project BIDSF C7-A3 “Erection of the new large capacity F&D facility NPP V1“. The main logical framework of this project is specified by technical specifications of the project BIDSF C7-A3 which has been elaborated by PMU JAVYS, a.s.

Part I. The main statements about proposer

1. Name

Nuclear and Decommissioning Company, plc. - (Jadrova a vyradovacia spolocnost, a.s)

2. Identification number

35 946 024

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PART II. THE MAIN STATEMENTS ABOUT PROPOSED ACTIVITY

1. CHARACTER OF THE PROPOSED ACTION AND ITS AIM

1.1 Name

"Erection of the new large capacity F&D facility NPP V1".

1.2 Intention

The intention of the proposed action „ Erection of the new large capacity F&D facility NPP V1" is to *minimize a RAW volume which is produced during NPP V1 decommissioning*. This intention will be reached by delivery, installation and operation of the necessary resources for the processing of surface contaminated metal and building materials from NPP V1 decommissioning.

Metal and building surface contaminated material must be dismantled (segmented), fragmented, assorted, decontaminated. Subsequently will be released into the environment or processed and prepared in a form suitable for storage in the National Radioactive Waste Repository in Mochovce.

Contaminated metallic materials are processed to useful parts, separated and returned for reuse. The aim is that the amount of remaining radioactive waste would be minimal with regard to the further handling.

For buildings and buildings structures is predominant method mechanical separation of the radionuclides from the material surface by abrasion, blasting or using other methods. The separated material from the surface is further processed as the radioactive waste and the basic material can be released into the environment.

In present, JAVYS, a.s. is possessor of the decision no. 400/2011, by which the NPP V1 operation has been ended and concession issued to decommission the NPP V1 I. phase which includes primary dismounting of the non-reactive devices and systems and demolition of unnecessary non-active building objects.

Its completion is expected by the end of 2014. II phase will follow (and possible other subsequent phases) decommissioning of the NPP V1, which will be a decontamination, dismantling of the active and consequently the remaining technological systems and the demolition of empty buildings.

1.3 User

Nuclear and Decommissioning Company, plc (Jadrová a vyraďovacia spoločnosť, a.s.)

1.4 Character of the proposed action

The subject of the proposed activity „Erection of the new large capacity F&D facility NPP V1" is delivery and installation of new equipment into the current rooms, creation of new fragmentation and decontamination workplaces and their commissioning.

The proposed activity is presented for considering in one local optional solution. On the basis of the demand of the proposer according to article 22, paragraph 7, MoE SR by note no. 6236/2012-3.4./hp relinquished from optional solution requirement of location selection for operation which is proposed by project C7-A3 "Erection of the new large capacity F&D facility NPP V1". At Report pursuant to the EIA are described possible options of technological solutions.

1.5 Dividing of the proposed activities

Proposed activity carried out within realization the second phase and the next phases of NPP V1 decommissioning can be divided to:

- Dismantling (segmentation)
- Fragmentation
- After fragmentation decontamination
- Decontamination of the building parts
- Auxiliary activities

Demounting (segmentation)

Demounting (segmentation) is gradual separating of the technological equipment and their parts from the building, in case of dividing to the parts which can be safely transported to the fragmentation workplaces.

Fragmentation is dividing of the removed parts from the nuclear equipment to the size which are (in case of radioactive waste) available for decontamination and for relieving.

Decontamination can be performed:

- using chemical or electrochemical tank methods (if necessary together with the ultrasound), which can release radioactive substances from metal radioactive waste and their crossing into working (decontamination) solution or electrolyte. Decontamination action is usually ended by an appropriate rinsing. Used decontamination solutions will be elaborated by defined actions for liquid radioactive waste processing.
- suitable mechanical methods (grinding or blasting), which result in the separation of radioactive substances from the surface of the material. Worn abrasive and brushed material usually in the form of small dust parts will be processed by standard actions for processing of solid radioactive waste.

Auxiliary activity within suggested activity includes mainly the activity connected to transport and scaling of processed materials.

Radiologic inventory of contaminated equipment's and building parts has been specified on the basis of the result of a physical stocking NPP V-1 within BIDSF B6.4 sub task D4 and the result of monitoring within D6 sub task.

Total fixtures of contaminated equipment and building parts has been specified at 11,78 TBq. This contamination correspond to the total weight of 241 000 tons of material. 99,9% of activity and 61,4% of weight lies in SO 800:V1.

In the range of delivered equipment's and activities the following step will be performed:

- dismantled, fragmented and decontaminated radioactively contaminated equipment from the V1 power plant with a total weight of about 11,000 tons
- dismantled (if applicable fragmented) and radioactive decontaminated of contaminated steel structural parts of buildings from the NPP V1 with a total weight of about 12,000 tons.
- decontaminated - surface radioactively contaminated building structures with a total weight of about 217,000 tons

Total activity of the radioactive contaminated building constructions is 11,7 TBq.

The capacity of the equipment supplied is designed to be able to handle inventory in question.

Location of these activities in the controlled area of NPP V1 is selected with the main emphasis on the minimum effect to the environment and the working environment, to minimize secondary waste for safe treatment and also with respect economics of the decommission.

In the NPP V1 there are the best building spaces for work in space with ionizing radiation, there are built working environment monitoring systems, air filtration systems with high effective aerosol, collection and treatment system of active waters treatment, systems of monitoring and draining of low-level discharges. All of these systems and workplaces are authorized by state inspection NRA SR and PHA SR.

1.6 Location of proposed action

Location of proposed action which has been suggested is the same for all versions.

All of this delivered equipment will be installed and operated in JAVYS NPP V1 area in HVB building no. 800. V1

Region:	Trnava
District:	Trnava
Town:	Jaslovske Bohunice
Cadastral district:	Bohunice
The parcel number:	701/10, 20 996 m2
Constructive object:	SO 800 V1 – Building reactors of the first and second block NPP V1 – controlled area room no: R301, R303/1 and R303/2, on the floor +10,5 m; room no: R215 on the floor +6,3m; room no: R117/2 on the floor 2.7 m; room no: R033/2, R034/2, R035/2 and R036/2 on the floor -1,8 m.

1.7 Type of required approval for proposed activity according to special requirements

1.7.1 Building license

According to article 55 of the act no. 50/1976 Coll about planning and building code (the building act) as amended by ensuing rules and decree no. 453/2000 Coll, which some establishment are executed of building act, the proposed activity is subject to the building license.

1.7.2 Approval for the change realization at the nuclear facility

According to paragraph 4.article (2) letter f) point 2 of act no. 541/2004 Coll. about peaceful using of nuclear energy (atomic act) about supplement some acts as amended by ensuing rules.

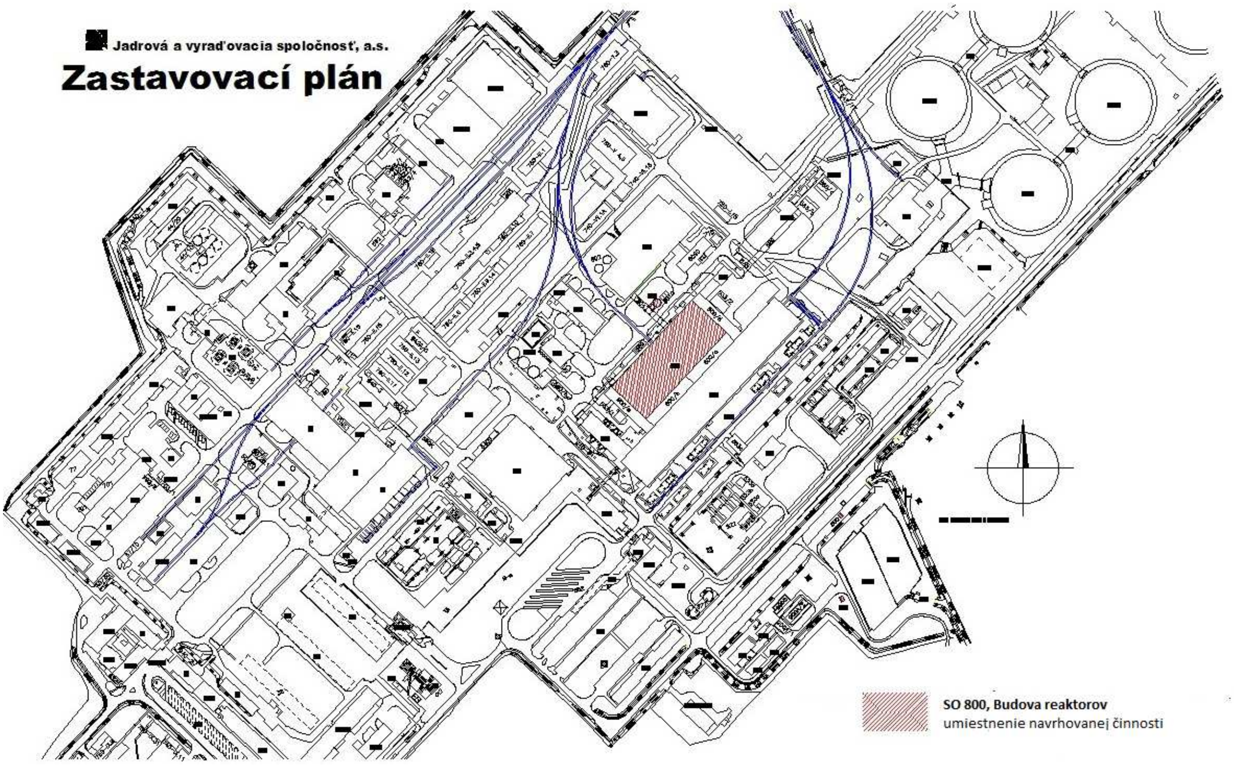
1.7.3 Decision about building and technological change

According to paragraph 13 article (5) letter a) point 4 act no. 355/2007 Coll. about protection and development of public health and about supplement some acts as amended by ensuing rules.

1.8 General overview of location the proposed activity

General overview of location the proposed activity on a scale 1: 50,000 picture II. 1.

General overview of location of the proposed activity on a scale 1: 50 000.



General overview of location the proposed activity in NPP V1 area.

Another pictures for location of the proposed activity are in the attachment.

1.9 Date of commencement and completion the construction and operation of the proposed activity

Solution of project BIDF C7-A3 is contractually ensured from 21st February 2012 to 21st February 2015 i.e. 36 months. Supposed start the assembly F&D unit is from 9/2013 and the end of the assembly and testing of equipment is expected to 12/2014.

F&D units are designed for 20 years of service life for normal operation, the duration decommission is planned to 2025.

2. DESCRIPTION OF REASONABLE VERSIONS (LOCATION OR TECHNOLOGY)

2.1 Short description of the technical and technological solutions

Evaluation report on the proposed activity is submitted for consideration in the following variants:

- Variant 0 – the current status
- Variant 1 – combined variant with using dry and wet decontaminated actions
- Variant 2 – using only wet decontaminated actions
- Variant 3 – using only dry decontaminated actions

2.2 Variant 0 – the current status

Variant 0 represents the current state of technological variant of the existing fragmentation and decontamination equipment to the NPP V1, which have been built with the NPP V1 project and have been used when performing operation tasks during general repairs, refueling, reconstruction and modernization of NPP V1 blocks.

2.2.1 Description of fragmentation equipment in the NPP V-1

This installed equipment is used for preparing of solid radioactive waste on NPP V-1 (fragmentation, volume reduction). They are installed in the BAS room no.237. The inventory of fragmented equipment contains:

Hydraulic cutters NCU 250

The cutter are used for cutting steel profiles up to 260 mm and for cutting strip steel up to 20 x 400 mm. The device is in operation since 2001.

Picture II. 3 Hydraulic cutters NCU 250

Hydraulic hack saw KFD-400 (2 x)

The devise is used for fragmentation of steel materials. Hack saws are in operation since 1993, or more precisely 2001.

Picture II. 4 Hydraulic hack saw KFD-400 (2 x)

Hand cutting scissors

This equipment is used for fragmentation of metal tube and for fragmentation of pale with thinner average. Hand cutting scissors has been in operation since 2001.

Low-pressure bailing press LIS PL 12

This equipment is used for preparing (volume reduction) of solid compressible radioactive waste on NPP V-1. The device has been in operation since 1986.

Picture II. 5 Low-pressure bailing press LIS PL 12

2.2.2 Description of decontamination equipment in the NPP V-1

This system is used for decontamination of the primary circuit and for decontamination rooms HVB and BAS The design is adapted to requirement of individual equipment decontamination of the primary circuit.

Specifications and decontamination equipment description are following:

Decontamination tank DZ30N-6 (stator tank)

Decontamination tank DZ30N-6 is cylindrical tank with a volume 4,9 $m^{3.}$ It is single purpose equipment for chemical decontamination.

Decontamination tank DZ30N-7 (rotor tank)

Decontamination tank DZ30N-7 is cylindrical vessel with a volume 1.4 $m^{3.}$ It is anchored in a carry frame in room no. R113. It is single purpose equipment for chemical decontamination.

Decontamination tank DZ30N-11 (long tub parts)

Decontamination tank DZ30N-11 is self-supporting cylindrical vessel with a volume 3 $m^{3.}$ The inside diameter of the tank is 630 mm and its height is 7030mm. This device is intended for a chemical decontamination for another object up to 6000 mm long. The equipment is installed in R113 room (+ 2,7m).

Decontamination ultrasound tank DZ30N-3

Decontamination US tank DZ30N-3 is cuboid vessel in volume 0,66 m^3 (working volume for US cleaning is 0,63 m^3). Decontamination US tank is used for decontamination, cleaning and for scouring of the primary circuit equipment and also can be used like a chemical decontamination vessel.

Picture II. 6 Decontamination US tank DZ30N-3 and electrochemical tank DZ30N-8

Electrochemical decontamination tank DZ30N-8 (VZ-DEKOZ)

Electrochemical decontamination tank DZ30N-8 is cylindrical vessel of volume 1.1 $m^{3.}$ The inside diameter of the tank is 1,500 mm and its height is 780 mm. It is used for electrochemical decontamination.

It is single purpose equipment which is used only for electrochemical decontamination of HCC parts after disassembly.

Decontamination tank of drives HRK DZ30N-4, DZ30N-5

The whole equipment consists of two stationary vessels with volume 2x0,792 m^3 with an inside diameter 300 mm and 11 300 mm height. A single purpose equipment is used for decontamination the drives

Decontamination tanks of tiny devices DZ30N-1, DZ30N-2

Two simple decontamination tanks DZ30N-1 and DZ30N-2 form one unit. The tanks have cuboid shape and volume 2 x 1,18m^3. Within both of tanks there are two removable bins where contaminated items are located. Decontamination tanks are used for chemical decontamination of equipment parts up to size 0,7 m. Disadvantage of this equipment is complicated material supply which is intended for decontamination through the reactors hole opening. The equipment is installed in R218 room (+ +6.6 m).

Picture II. 7 Decontamination tanks of a small equipment DZ30N-1 and DZ30N-2

Mobile decontamination device

For decontamination of some not demountable parts of the primary circuit NPP V-1 there are two special single purpose devices which are used as „in-site“.

DEKOZ PG – chemical decontamination device for inside surfaces of the steam generator This equipment was delivered in 1983.

DEKOZ HUA – electrochemical decontamination device of inside surfaces of the main closing fitting. This equipment was delivered in 1985.

DEKOZ HCC - electrochemical decontamination equipment for inside surface of the main circulation pump. This equipment was delivered in 1985.

DEKOZ NR – equipment for semidry electrochemical decontamination of reactor pressure vessel sleeves. This equipment was delivered in 1988.

2.2.3 Summary

Advantages

The advantage is that it doesn´t need capital expenditure.

Disadvantages

The current equipment of fragmentation and decontamination workplace has been adjusted to fragmentation and decontamination needs during the NPP operation and it doesn´t conform to de-commission needs due to the following reasons:

- Fragmentation facilities are intended for use in operation and technical parameters and capacity don´t fulfill demands on removal and fragmentation during decommission.
- Most of the decontamination equipment knots are single purpose facilities adapted to the needs of removable decontamination technology equipment of the primary circuit.
- The facilities are dimensionally and geometrically adapted to other types and parts of the primary circuit.
- Complicated transport routes
- The facilities are worn out physically and they´re not suitable in terms of required daily capacity.
- The facilities don´t have transport and other auxiliary devices.

Resume:

The actual equipment (variant 0) can be used once and exceptionally but it can´t be used during de-commission as a key for fragmentation and decontamination workplace.

2.3 Variant 1 – combined workplace variant F&D

This variant is combination of technological variants with using dry and wet operation during decon-tamination. Technical workplace equipment includes:

- Demounting (segmentation)
- Fragmentation
- After fragmentation decontamination
- Decontamination of the building parts
- Auxiliary and manipulative activities

2.3.1 Demounting (segmentation)

The aim of the removal (segmentation) is to remove technological units of the nuclear power station gradually and their unblocking to use repeatedly in the highest amount, respectively to segment size that they were transported carefully to the F&D workplace and to the next processing.

2.3.1.1 Methods used during removal

The following methods are designed for the removal activities:

a) Hydraulic cutting
b) High speed cutting
c) Low speed cutting
d) Thermic cutting

Hydraulic cutting

- Usage – for materials where we don´t expect next processing (including internal decontamination) e.g. pulse pipes, cables,…
- Advantages – prevention of radioactive contamination and ambient air
- Disadvantages – it cannot be used for large equipment, shape deformation hinder potential internal decontamination.
- Impacts – zero emissions and radioactive contamination

High speed cutting

- Usage – in places where we can´t use other mechanical methods, preferably during materials dividing with low contamination.
- Advantages – division rate
- Disadvantages – risk of dispersion radioactive contamination , thermic fixation of contaminant into material, fire risk.
- Impacts – emissive production, potential deterioration of the working environment

Low speed cutting

- Usage – for materials with higher decontamination
- Advantages – minimization of radioactive contamination and ambient air, elimination of thermic fixation of contaminant into the material.
- Disadvantages – longer time for dividing materials, higher special requirement
- Impacts – minimization of the impact on the environment

Thermic cutting

- Usage – in places where we can´t use any other mechanical methods
- Advantages – division rate
- Disadvantages – risk of toxic gas inception, dispersion radioactive contamination , thermic fixation of contaminant into material, high fire risk.
- Impacts – emissive production, potential deterioration of the working environment

2.3.1.2 Technological accessories for removal

Technological accessories for removal are listed in the following table: Equipment description is in attachment no.1. If it necessary, you can use equivalent facility.

Tab. II. 1Examples of technological accessories for removal

Item	Name	Quant.	type	Note
1.01	Self-Tightening Tube Saw „Guillotine“	2	Portable	Low speed cutting
1.02	Orbital Cutter for Pipes	2	Portable	Low speed cutting
1.03	Hydraulic Shears	2	Portable	Hydraulic cutting
1.04	Cable Saw	1	Portable	Low speed cutting
1.05	Power Nibbler	1	Portable	Hydraulic cutting
1.06	Angular Grinding Devices	3	Portable	High speed cutting

Item	Name	Quant.	type	Note
1.07	Electrical-Hydraulic Cable Cutter	2	Portable	Hydraulic cutting
1.08	Electrical-Hydraulic Cable Cutter	1	Portable	Thermic cutting
1.09	Flame Cutting Device	1	Portable	Thermic cutting

2.3.2 Fragmentation

The aim of the fragmentation is to divide materials into smaller pieces to be transportable to the FAD workplace. Fragmentation activities will be performed in steady dedicated work places. Workplaces will be modified for the particular used method with stress on maximal safety ensuring, minimization of RAW production and will be connected to NPP V1 vent systems, which contain high capacity high efficient aerosol filters and which flow into NPP V1 ventilation stack.

2.3.2.1 Methods used for fragmentation

Fragmentations will be effected:

a) Low speed dividing
b) Hydraulic dividing
c) Thermic dividing

Low speed dividing

- Usage – for materials with higher decontamination
- Advantages – minimization of radioactive contamination and ambient air, elimination of thermic fixation of contaminant into the material.
- Disadvantages – longer time for dividing materials, higher special requirement
- Impacts – minimization the impact on the environment due to turbulence in equipment places, minimization the second wastes and their light elaboration.

Hydraulic dividing

- Usage – for materials where we don´t expect next processing (e.g. pulse pipes, cables,…)
- Advantages – prevention of radioactive contamination and ambient air.
- Disadvantages – it cannot be used for large equipment, shape deformation hinder potential internal decontamination.
- Impacts – zero emissions and radioactive contamination

Thermic dividing

- Usage – in places where we can´t use any other mechanical methods
- Advantages – division rate
- Disadvantages – risk of toxic gas inception, dispersion radioactive contamination , thermic fixation of contaminant into material, high fire risk.
- Impacts – emissive production, potential deterioration of the working environment

2.3.2.2 Technological accessories for fragmentation

Technological accessories for fragmentation are listed in the following table: Equipment description is in attachment no.1. If it necessary, you can use equivalent facility.

Tab. II. 1 Examples of technological accessories for fragmentation

Item	Name	Quant.	type	Note

Item	Name	Quant.	type	Note
2.01	Hydraulic Band Saw for Transverse Cutting	1	Stationary	Low speed cutting
2.02	Hydraulic Band Saw for Lengthwise Cutting	1	Stationary	Low speed cutting
2.03	Stationary Hydraulic Shears	1	Stationary	Hydraulic cutting
2.04	Hydraulic Band Saw up to 1000 mm	1	Stationary	Low speed cutting
2.05	Plasma Arc Cutting Device	1	Stationary	Thermic cutting
2.06	Flame Cutting Device	1	Stationary	Thermic cutting

2.3.3 After fragmentation decontamination

Purpose of after-fragmentation decontamination is to reduce surface contamination to a level that the materials used can be released into the environment in accordance to the legislation valid at the time of execution or at the level of the selected method of disposal. During the decontamination must also be made conditions for processing of secondary waste, where will be located a substantial part of the radioactive inventory of contaminated equipment NPP V1.

During decontamination will be used only decontamination media, which must meet conditions of processing and storing in the NRWR. Decontamination workplaces will be connected to suction ventilation system of NPP V1, there are placed large-volume aerosol filters, and the outlet pipe is connected in the ventilation stack of V1. These workplaces will be also connected on the system of collection and processing of radioactively contaminated water.

2.3.3.1 Methods used during decontamination

After fragmentation methods of decontamination that are suggested:

a) Electrochemical decontamination in decontamination tank
b) Ultrasound decontamination in decontamination tank
c) High pressure admission in decontamination tank
d) Abrasive blasting in basket
e) Manual abrasive blasting

Electrochemical decontamination in decontamination tank

- Usage – to eliminate fixed contamination from surfaces of removed and fragmented pieces of contaminated equipment parts.
- Advantages – safe transport and collection of the secondary liquid radioactive wastes for the next manipulation.
- Disadvantages – preparation of decontaminated solutions and manipulation with liquid radioactive wastes.
- Impacts – formation of the liquid radioactive waste, vaporization

Ultrasound decontamination in decontamination tank

- Usage – to clean low-fix contamination materials by reference of ultrasound after previous electro-chemical decontamination
- Advantages – safe transport and collection of the secondary liquid radioactive wastes for the next manipulation.
- Disadvantages – preparation of decontaminated solutions and manipulation with liquid radioactive wastes.
- Impacts – formation of the radioactive waste, vaporization

High pressure admission in decontamination tank

- Usage – to wash the material and eliminate the rest free contamination in sub-attainable surfaces after previous electrochemical and ultrasound decontamination.
- Advantages – safe transport and collection of the secondary liquid radioactive wastes fot the next manipulation.
- Disadvantages – requirement elaboration the liquid RAW
- Impacts – formation of the radioactive waste

Abrasive blasting in basket

- Usage – metal surface fragmented contaminated pieces blast cleaning which are free (single batch form) situated in basket moved around and blasted.
- Advantages – safe transport and collection of the secondary liquid radioactive wastes for the next processing.
- Disadvantages – need to process solid RAW
- Impacts – formation of the radioactive waste

Abrasive manual blasting

- Usage – for manual blasting of the high size items with a big pipe, they are contaminated in a surface
- Advantages – blasting of the high size items with a big pipe
- Disadvantages – requirement of sanitary knot for disposal the auxiliary OOPP and control of surface contamination, requirement the hermetically closed cab.
- Impacts – elaboration of the radioactive waste, risk to contamination the operating personnel

Electro-chemical tank decontamination

This method is integrated of the ultrasound tank cleaning and high pressure admission and it will be used for steel anticorrosive decontamination. You can use mechanical actions (abrasive blasting and grinding) to eliminate places with the highest activity.

Decontamination link has to be provided of means that are able to bailing up the decontamination solutions, filtration and regeneration of the processed solutions, manipulation with decontaminated materials, operating measure of material contamination, operating control, separation and movement of produced RAW to the secondary RAW processing workplace .

F&D facilities workplaces will be installed in rooms where will be connecters for distribution energy and following media.

- electricity
- water
- air exhaust system
- drain off the liquid active media
- compressed air

Dry mechanical abrasive blasting

The main method which is used for surface decontamination from carbon steel grade is dry blasting of the fragmented pieces by abrasive. The aim of this method is to eliminate the surface layer (protective coat, corrosion coat) to the basic material.

Dry abrasive blasting methods will be used for elimination of the materials like - oil, grease, oxides and color's or the other coat. Abrasive blasting will be used for stainless steel in order to assure the effect of the electro-chemical decontamination which can be degreased by the existence of materials that are adhered on the surfaces of components assigned for decontamination.

All of the facilities have to have the exhausting system with filtering module appropriate for this application. The equipment has to be able to eliminate any fixed material including the corrosive coat.

The workplace has to be equipped with the operating tables, the electric lifting tackle, forklift stackers, fork-lift trucks.

2.3.3.2 Technological accessories for after fragmentation decontamination

Technological accessories for after fragmentation decontamination are mentioned in following table: Equipment description is in annex no.1. If it necessary, it is possible to use equivalent facility.

Tab. II. 3 Examples of technological accessories for after fragmentation decontamination

Item	Name	Quant	Type	Note
3.1	Decontamination line (DL)			
3.1.01	DL Electrochemical Baths	2	Stationary	Electro-chemical decontamination
3.1.02	DL Ultrasonic Baths	2	Stationary	Ultrasound decontamination
3.1.03	DL Rinsing Bath (Bath for Super High-Pressure Water Pump	1	Stationary	High pressure admission in the tank
3.1.04	DL Other Equipment	1	Stationary	Auxiliary arrangement
3.2	Dry mechanical-abrasive blasting equipment			
3.2.01	Suspended blasting device	2	Stationary	Abrasive blasting in basket
3.2.02	Manual abrasive blasting cabin	1	Stationary	Abrasive manual blasting

2.3.3.3 Preparation of the decontamination solutions

The electrolytes used in electro-chemical solutions will be suitable for decontamination of materials like stainless steel, low-alloyed steel, nonferrous materials. The structure of decontamination solutions will be following: Organic and inorganic acids and their salts (singly or combination) with chemical addition whose intention is to raise the efficiency of the electrolyte, decontamination and capacity, to reduce inefficient removal, to minimalize the redeposition of the radionuclides and recontamination the material. Bulk chemical concentration in electrolyte will be 15 – 20% (weight).

Similar decontamination solution used in ultrasound tank will contained the organic acids, complex forming agents and detergents (singly or combination) their effect will increase in decontamination process. Intensive mixing of decontamination solutions results in a large number of micro-bubbles in solution by ultrasound to increase the effect of chemical treatment. Total concentration of chemical compounds in the solution must not exceed 15-20% (weight).

During the solution preparation will be the weighed items of the decontamination solution diffused in preparing vessels with water. Prepared concentrate will be pumped from the preparing vessels to target vessels and it will be added to working volume. During decontamination the solution will be floating through the system of two filters, there will be caught rough (more than 100 μm) and smooth (more than 5 μm) fixed debris (from the corrosion coat). The volume of the radioactive contamination will be reduced repeatedly in the solution, so the effective usage will be ensured.

Processed solution and electrolyte will be pumped for pretreatment of the processed solutions. After sample collection and analysis the solution parameters, the solution will be retreated and will be drained away to the special canalization existing system for its treatment in the future. It is guaranteed that all of the processed solutions will be processable in JAVYS with using available technologies and will be acceptable for disposal site after final treatment.

2.3.4 The building parts decontamination

The building parts decontamination is intended for buildings, constructions and rooms after technical equipment removal, so it allow the smooth release of parts of the buildings out of administrative control.

Decontamination methods that are suggested:

a) High pressure water cleaning
b) Abrasive blasting
c) By froth, gel and wet drawing out
d) Grinding
e) Cutting out

2.3.4.1 Methods used for building parts decontamination

High pressure water cleaning

- Usage – for lining surfaces with anti-corrosive steel, for decontaminated protective coats stripping from building surfaces or for concrete decontamination
- Advantages – minimal aerosol production
- Disadvantages – the impact to the working environment, depth contamination of the building parts that is caused by injection the RAW into buildings parts material that could be clean up by this way. Requirement of sanitary knot for disposal the auxiliary OOPP and body surface contamination control.
- Impacts – production the liquid RAW

Abrasive blasting

- Usage – intended to floor decontamination with concrete surface by dry grinding.
- Advantages – high-removal efficiency surface contamination such as oils, greases,…
- Disadvantages – risk of the radioactive aerosols
- Impacts – to the working environment, creation the solid RAW – radioactive filters

By froth, gel and wet drawing out

- Usage – for decontamination the membered surface building with protective coat that are contaminated by dust parts, greases to other places where we can ´t use high pressure water cleaning (e.g. because of places reason).
- Advantages – usage for the membered surface building, high decontamination factor
- Disadvantages – production the liquid RAW
- Impacts – production the liquid RAW

Grinding

- Usage – for decontamination of the deeper fixed contamination in building materials
- Advantages – using for deeper fixed contamination removal
- Disadvantages – risk of production the radioactive aerosol, noisiness, exhausting
- Impacts – to the working environment, creation the solid RAW – radioactive filters

Cutting out

- Usage – intended to floor decontamination with concrete surface by dry grinding.
- Advantages – using for deeper fixed contamination removal
- Disadvantages – risk of the radioactive aerosols, time intensity
- Impacts – to the working environment, creation the solid RAW – radioactive filters

Building surfaces will be decontaminated after technological facility removal. Inbound equipment for mechanic abrasive method decontamination have to have the exhausting system with filtering module. For different type of building surfaces have to be used different decontamination methods.

Lining surfaces with anti-corrosive steel

Lining surfaces with anti-corrosive steel will be decontaminated by mechanical action in the first phase (high pressure water admission in combination with gels, abrasive ect.) and in the second phase by semi-dry electrochemical method of decontamination.

Lining surfaces made of carbon steel

Lining surfaces made of carbon steel with the main epoxide coat will be decontaminated by mechanical facilities in limited supply (high pressure water admission with exhaust, coat elimination by mechanical abrasive method).

Building surfaces with the main epoxide coat

Building surfaces with the main epoxide coat will be decontaminated by decontamination froth on the surface (geometric complicated surface) or high pressure water admission with exhaust (big flat surface). In case of need , the surfaces can be decontaminated through dry abrasive of the main epoxide coat and by concrete. All of these facilities have to have the air exhaust system with filtering module.

Non-protected building surfaces

Surfaces without lining or without the main epoxide coat will be decontaminated though the mechanical abrasive to the necessary depth (5-10 mm). The facilities in use have to have the air exhaust system with filtering module.

2.3.4.2 Technological equipment for building parts decontamination

Technological accessories for building parts decontamination are mentioned in following table: Equipment description is in annex no.1. If it necessary, you can use equivalent facility.

Tab. II. 4 Examples of technological accessories for building parts decontamination

Item	Name	Amount	type	Note
4.01	Super High-Pressure Water Pump	1	Portable	High pressure water cleaning
4.02	Floor Shaving Device	1	Portable	Abrasive blasting
4.03	Foam Generator	1	Portable	Froths, gels and wet drawing out
4.04	Breaker Hammer	1	Portable	Cutting out
4.05	Angular Grinding Devices	5	Portable	Grinding

2.3.5 Capacity of the fragmentation and decontamination equipment

Necessary capacity fragmentation and decontamination facilities required for the smooth processing of the main flow of material from the NPP V1 (excluding reactor parts) are listed in Table

Tab. II. 5 The total amount shown in the table is the maximum amount, as part of these materials will not be probably submitted on the process of fragmentation and other parts will not need decontamination.

Tab. II. 5 Capacity used for fragmentation and decontamination equipment for the different types of material

	Material		
	Stainless steel	**Carbon steel**	**Electro material**
Total (8 years)	4,818 t	4,664 t	285 t
Capacity (1 year)	650.4 t	629.6 t	38.5 t
Capacity	2.50 t/ change	2.41 t/ change	0.15 t/ change

Following table shows the required decontamination capacity of the equipment and individual types of building surfaces. Total amount mentioned in the table is maximal because some parts of these surfaces won´t need probably decontamination.

Tab. II. 6 Capacity used for fragmentation and decontamination equipment for single types of building surfaces

	Building surface			
	Perimeter walls		**Lining**	
	Building boards	**FEAL**	**Stainless steel**	**Carbon steel**
Total (8 years)	10,650 m2	8,000 m2	23,237 m2	7,312 m2
Capacity (1 year)	2,130 m2	1,600 m2	4,647.5 m2	1,462.5 m2
Capacity	8,16 m2/ change	6.13 m2/ change	17.8 m2/ change	5.6 m2/ change

Fragmented Stainless steel materials have to be enclosed to decontamination titan baskets 600 x 1800 x 600 mm and also to measuring pallets that are used for Free release monitoring and releasing into environment with measure 800 x 800 x 1200 mm. Fragmented carbon steel have to be enclosed into blasting equipment in volume 1000 liters probably. The piece weight must not be higher than 50 kg.

2.3.6 Secondary RAW from decommission

Type and structure of the secondary RAW, created in phase of decommissioning from the operation won´t be differ from wastes created during reconstruction and operation of the NPP V1. Secondary RAW from decommission will be processed by standard technologies that are standardly used in the world and in JAVYS, a.s. too (e.g. cementation, bituminization, high pressure compression, combustion, etc.).

Estimated annual production of secondary radioactive waste at the stage of decommissioning of NPP V1 for individual technologies is noted in the following table.

Tab. II. 7 Informative average annual production of secondary RAW during the NPP V1 decommissioning

Technology	Fixed RAW	Radioactive sediment (20% of the solid)	Liquid RAW (*)
Electrochemical and ultrasound decontamination	-	1,000 kg	50 m3
Abrasive blasting	5,500 kg	-	-
Building surfaces decontamination	4,000 kg	2,000 kg	200 m3
Demounting and fragmentation	10,400 kg	-	-

(*) – non-concentrated liquid RAW

All of the working places will be equipped with air filtering system. Liquid wastes will be aggregated in special canalization. Solid wastes (gloves, clothes, etc) will be enclosed in RAW sack.

For all the liquid and solid RAW will be secured sorting, collection and recording in accordance to applicable directives, operational and instructional rules of NPP V1.

2.3.7 Summary

Advantages

The advantages of this option over other variants can be summarized as follows:

- high decontamination effect for stainless carbon steel such a building surfaces
- adequate capacity for all fulfill activities

Disadvantages

The disadvantages of this option over other variants can be summarized as follows:

- higher capital costs
- higher space demands

Resume:

Variant 1 allows complex solution of fragmentation such as after-fragmentation decontamination for all material types at the cost of higher investment costs

2.4 Variant 2 – using only wet decontaminated actions

Variant 2 - technological variant with economic after-fragmentation decontamination solution. Technological equipment is differ from variant 1 in after-fragmentation equipment. After-fragmentation decontamination includes only technical facilities for wet decontamination methods of usa. This variant, similar as variant 1 the workplace includes facilities for:

- Demounting (segmentation)
- Fragmentation
- After-fragmentation decontamination
- Decontamination of the building parts
- Auxiliary and manipulative activities

2.4.1 Demounting (segmentation)

Technological equipment and methods used for removal are the same for variant 2 such as variant 1 and they are described in chapter 2.3.1.

2.4.2 Fragmentation

Technological equipment and methods used for removal are the same for variant 2 such as variant 1 and they are noted in chapter 2.3.2.

2.4.3 After-fragment decontamination

The after-fragmentation decontamination impact is the same in variant 1 and is specific in chapter 2.3.3.

During after-fragmentation decontamination in this variant are not used dry decontamination methods, it benefit capital costs saving and lower space demands. On the other hand, it also brings restrictions and reduces the effectiveness of decontamination for some materials.

2.4.3.1 Methods used during decontamination

Suggested After-fragmentation methods of decontamination:

a) Electro-chemical decontamination in decontamination tank
b) Ultrasound decontamination in decontamination tank
c) High pressure spraying

Electro-chemical decontamination in decontamination tank

- Usage – to eliminate the fixed contamination from removal surfaces and fragmentation pieces, contaminated equipment parts.
- Advantages – safe transport and collection of the secondary liquid radioactive wastes for the next manipulation.
- Disadvantages – preparation of decontaminated solutions and manipulation with liquid radioactive wastes.
- Impacts – formation of the radioactive waste, vaporization

Ultrasound decontamination in decontamination tank

- Usage – to cleaning of the low-fix contamination materials by reference of ultrasound after previous electro-chemical decontamination

- Advantages – safe transport and collection of the secondary liquid radioactive wastes for the next manipulation.
- Disadvantages – preparation of decontaminated solutions and manipulation with liquid radioactive wastes.
- Impacts – formation the radioactive waste, vaporization

High pressure admission

- Usage – to wash the material and elimination of the rest free contamination in sub-attainable surfaces
- Advantages – safe transport and collection of the secondary liquid radioactive wastes for the next manipulation.
- Disadvantages – requirement elaboration the liquid RAW
- Impacts –the radioactive waste formation

2.4.3.2 Technological accessories for after-fragmentation decontamination

Technological accessories for after-fragmentation decontamination are mentioned in following table: The single facilities description is in annex no. 1

Tab. II. 8 Technological accessories for after-fragmentation decontamination

Item	Name	Quant.	Type	Note
3.1	Decontamination Line Equipment			
3.1.01	DL Electrochemical Baths	2	Stationary	Electro-chemical decontamination
3.1.02	DL Ultrasonic Baths	2	Stationary	Ultrasound decontamination
3.1.03	DL Rinsing Bath (Bath for Super High-Pressure Water Pump	1	Stationary	High pressure admission
3.1.04	DL Other Equipment	1	Stationary	Auxiliary arrangement

2.4.4 The building parts decontamination

Technological equipment and methods used for removal are the same for variant 2 such as variant 1 and they are noted in chapter 2.3.4.

2.4.5 Summary

Advantages

The advantages of this option over other variants can be summarized as follows:

- high (adequate) effective decontamination for not coated and polluted stainless
- adequate capacity for removal, fragmentation and after-fragmentation decontamination of the stainless steel
- lower capital costs and space demands against the variant 1

Resume:

Lower investment costs for cost of reduced efficiency of decontamination of coated steel or surface contamination, decontamination does not allow large-scale parts.

2.5 Variant 3 – with usage of mechanical (dry) decontaminated operation

Variant 3 - technological variant with economic after-fragmentation decontamination solution. Technological equipment is differ from variant 1 in after-fragmentation decontamination equipment. After-fragmentation decontamination includes only technical facilities for mechanical (dry) decontamination methods usage. This variant, similar as variant 1 the workplace includes facilities for:

- Demounting (segmentation)
- Fragmentation
- After-fragmentation decontamination
- Decontamination of the building parts
- Auxiliary and manipulative activities

2.5.1 Demounting (segmentation)

Technological equipment and methods used for removal are the same for variant 3 such as variant 1 and they are noted in chapter 2.3.1.

2.5.2 Fragmentation

Technological equipment and methods used for removal are the same for variant 3 such as variant 1 and they are noted in chapter 2.3.2.

2.5.3 After fragmentation decontamination

The after-fragmentation decontamination impact is the same in variant 1 and is specified in chapter 2.3.3.

In after-fragmentation decontamination of this option are not used wet methods to decontamination, which saves investment costs, reduce space requirements and reduce production of the liquid secondary RAO. On the other hand, this version brings some limitations and reduces the effectiveness of decontamination for some materials

2.5.3.1 Methods used during decontamination

Used methods are similar as methods in variant 1 that are described in chapter 2.3.3.1 in this part of report. Suggested methods of after-fragmentation decontamination:

a) Abrasive blasting
b) Manual blasting

2.5.3.2 Technological accessories for after-fragmentation decontamination

Technological accessories for after-fragmentation decontamination are mentioned in following table: Particular description is in annex no. 1

Tab. II. 9 Technological accessories for after-fragmentation decontamination

Item	Name	Quant.	type	Note
3.2	Dry mechanical-abrasive blasting equipment			
3.2.01	Suspended blasting device	2	Stationary	Abrasive blasting
3.2.02	Manual abrasive blasting cabin	1	Stationary	Manual blasting

2.5.4 The building parts decontamination

Technological equipment and methods used for the building parts decontamination are the same for variant 3 such as variant 1 and they are noted in chapter 2.3.4.

2.5.5 Summary

Advantages

The advantages of this option over other variants can be summarized as follows:

- high (adequate) decontamination effect for carbon coated steel
- adequate capacity for removal, fragmentation, after-fragmentation decontamination for carbon coated steel
- lower capital costs against the variant 1
- lower space demands against the variant 1

Disadvantages

The disadvantages of this option over other variants can be summarized as follows:

- inadequate decontamination effect for stainless steel
- inadequate capacity for stainless steel

Resume:

Lower capital costs at the expense of lower decontamination effect for stainless steel.

2.6 Activity on workplaces

Predicted maximum level of activity, deposited on individual workplaces is listed in Table A.II.10

The total radiological inventory of NPP V-1 is 260 000 TBq, according the Table II.1 of "Intention" [25] from 1.1.2010. Total activity for individual FaD workplaces is 1.5 GBq, which is a value for about 8 orders of magnitude lower than the total inventory of NPP V-1.

In the column of AM (55%) (See Table A.II.10), the maximum activity of the surface contamination of material on the workplace is less than 0.3 Bq/cm3 if processing materials of radiobiological Class 1. When processing materials of radiobiological Class 2 (surface contamination is less than 1 Bq/cm3), which represents about 55% of the total weight. AMmax is the maximum activity of the material on the workplace and Amax is the maximum total activity on the workplace.

Tab. A.II. 10 Predicted maximum level of activity, deposited on individual workplaces.

Option	Workplace	Activity on workplace (MBq)			Note
		AM(55%)	AMmax	Amax	
FP1, (1,2,3)	Fragmentation workplace 1 (3x saw +1x shear)	5	150	300	Activity is in the material and sawdust
FP2 (1,2,3)	Fragmentation workplace 2 (flame + plasma)	5	150	300	Workplace is normally without material and activity
DKP1 (1,2)	Decontamination workplace 1 (electrochemistry, ultra-sound, spraying)	5	150	500	Activity is mainly in the decon-tamination solution
DKP2	Decontamination workplace 2	1	10	100	Activity is mainly in the blasting

(1, 3)	(2x abrasive basket)				fumes
DKP3 (1, 3)	Decontamination workplace 3 (Manual abrasive blasting large size cabin)	0,1	1	100	Activity is mainly in the blasting fumes

2.7 Reasons for activity location

Currently are at Bohunice in decommissioning phase two nuclear power plants, the NPP A1 and NPP V1. On the basis of Government Resolution no. 801/1999 and in accordance to the Treaty of Accession to the European Union was 31 of December 2006 shut down I. block of NPP V1 and 31 of December 2008 was shut down II. block of the NPP V1 out of commercial operation.

As part of the project BIDSF (Bohunice International Decommissioning Support Fund), was as the output of the project BIDSF C7-A1 assessed study [1], which includes the document "Draft equipment (Task 4)" ev. no. C7A1-RE-ALD-0005/SK of 31 1 , 2008.

In this document, it is recommended that part of the metal radioactive waste from V1 (metal wastes from V1 were called "historical waste") were processed using devices of JAVYS organization. It also contains a recommendation that the reprocessing capacity of these devices should be increased.

Therefore, an effective variant disposal of radioactive metal seems to be building of new FaD workplace for the V1 in the building HVB no. 800 V1. Suitable spaces to accommodate new FaD facilities are available in the controlled area of V1 and after small adjustments will be appropriate for work with contaminated materials. The principal advantages of this location are proximity to all the places where will be generated radioactive wastes and proximity to transport corridors.

The main objective of the new Post-dismantling decontamination FaD workplace will be reduction of surface contaminated materials to level, allowing the release of these materials into the environment in accordance with the legislation of the Slovak Republic or the level of the selected method of waste management in decommissioning of V1. This objective will be successful in achieving a minimum of secondary radioactive waste, which can be further processed and stored while minimizing the costs and while minimizing professional doses and minimal environmental impact.

3. DESCRIPTION OF AGGRIEVED PARTS AND THE ENVIRONMENT ELEMENTS

The proposed activity in terms of the impact on the operating parameters of equipment in the area has a marginal character without measurable impact in the area of V1 and much less to environment around or outside the borders of the Slovak Republic

3.1 Characteristics of the natural environment including protected areas

In term characteristics of the natural conditions we understand such as the affected area with a radius zone of 5 km. We introduce the characteristics of the particular components of the natural for this area.

In terms of socio-economic characteristics and the population characteristics we consider about the affected communities union. It is involved following villages Jaslovke Bohunice, Malzenice, Pecenady, Ratkovice, Nizna, Zlkovce, Velke Kostolany and Radosovce and Dolne Dubove.

In describing the environmental characteristic is used surrounding, respectively the wider environmental area. We understand this term such as the geomorphological parts of the unit in the radius of 30 km from the proposed activity. As regards the alleged indicators is a part of the district Trnava, Piestany, Hlohovec.

Under review territory is occurred in Trnava highland.

3.1.1 Climatic conditions

The area and its surroundings are under [14] in warm climate, warm, moderately dry district with mild winters, which are characteristic for the average January temperatures above 3°C and Koncek irrigation index Iz= 0 až -20.

3.1.2 Hydrologic conditions

Surface watercourses

The affected area belongs to River Vah basin, which flows east from the affected area. The assessment of hydrological conditions is included because the most of the wastewater from the site NPP Bohunice is drained through pipe collector SOCOMAN Drahovský channel in Vah and only a smaller amount of wastewater is discharged through the channel Manivier to Dudváh (basically since 2007 is used only rarely). Both rivers Vah and Dudváh, keeping north-south direction of flow.

3.1.3 Hydrogeological conditions

According to Slovakia hydrologic zoning, the affected environmental belongs into following hydrologic district or sub-district: The Vah quaternary in Podunaj lowland, north of the Sala-Galanta (Q 048) line, Trnava highland (N 049), Trnava highland quaternary (Q 050).

3.1.4 Pedological conditions

Soil types, kinds

On the territory of Trnava upland and marginal mountain ranges occur in different soil types species and often transitional forms. Markedly predominant type at the western edge is the brown soils. A substantial part of Trnava boards covering black soils.

3.1.5 Biotic conditions

Flora

Considered territory belongs to the cultural landscape of the dominant agricultural production. Degree of biodiversity in the agricultural landscape is very low.

Fauna

In the surroundings of the NPP Bohunice, is the character of animal communities typical for agricultural and cultural settlement landscape, with a predominance of species monocultures field, with low species diversity and abundance.

3.1.6 Protective area and protective belt

The affected area is not subject to a special regime for the protection of nature, even into it doesn't interfere and it doesn't contain any large-scale or small-scale protected areas. The free surface is covered by a basic, first level of protection within the meaning of the Act no. 543/2002 Coll. on nature and landscape protection.

3.1.7 Development of environmental system

The location does not interfere with the elements of territorial system of ecological stability.

3.1.8 Settlements

In affected area, there are 8 villages with the countryside character from three districts. From Trnava district there are Jaslovske Bohunice, Malzenice, Radosovce and Dolné Dubové. From Hlohovec district there are Zlkovce and Ratkovce, from Piestany district there are Velke Kostolany, Nizna and Pecenady.

3.1.9 Industrial production

The industrial production in JAVYS, a.s. area (NPP Jaslovke Bohunice area part) is focused on liquidation of NPP A-1, disposal and for RAW and NPP V-1 decommission.

In direct connect to JAVYS, a.s. area, is the operating area NPP V-2 that is important electric and heat energy producer (NPP A-1, NPP V-1 and NPP V-2 created the common area in the past).

The other industrial and building manufacture in affected villages has the auxiliary character.

3.1.10 Agriculture

The Agriculture usage potential of the surrounding is quite high. Beside electric energy production in NPP and activities of JAVYS, a.s. is the agriculture production the third dominant industry. Predominant vegetable production, especially cereals, oilseed, corn and other crops, to a lesser extent root crops and vegetables.

3.1.11 Transport

Around the affected area is road, rail and airways transport network. To ensure passenger and freight transport the complex of the NPP Bohunice is connected to road and railway transport network.

3.1.12 Engineering infrastructure

Area of interest is supplied with drinking water by public water systems supply chain, electricity and gas and is severaged.

3.2 Actual state of the environment

3.2.1 Air pollution

JAVYS, a.s. is the operator of several air pollution sources in all of these categories (small, medium and large).

Air pollution resources of the JAVYS, a.s. and amount of deflated emission in 2011 are mentioned in following table.

Tab. No. III. 10 Resource operation with amount of deflated emission in 2011

Resource	Fuel	Contaminated material				
		TZL	SO_2	NO_x	CO	C_{org}
	Earth-gas (m3)					
NaRK	87 651	0,006662	0,000798	0,146551	0,049127	0,006245
Cresset LOOS	1 593	0,000121	0,000014	0,002362	0,000954	0,000159
Gas infra-radiator	91 619	0,006963	0,000835	0,135779	0,054834	0,009139
Gas Boiler room	104 373	0,007932	0,000952	0,154679	0,062467	0,01041
	Diesel					
Diesel generator (V1) with supply of 1.680 MW	0	0,0	0,0	0,0	0,0	0,0
Diesel generator MSPV	1,344	0,001908	0,000026	0,00672	0,001075	0,000153

Air pollution by Radionuclides

JAVYS organization, a.s. in. 2011 ensured that the summary of activity radioactive discharges into the environment from all sources in the area for normal and specific conditions were such, that the influence of the nuclear facility will not be for one person of the critical group of the population exceeded radiation limit of 0.25 mSv / year [24]. Limits of radioactive discharges have been established by the Public Health Authority and approved by the NRA SR.

Radioactive discharge values into atmosphere from NPP V1 in 2011 are mentioned in following table:

Tab. No. III. 11 . Radioactive discharge values into atmosphere from NPP V1 in 2011.

Discharge type	Discharge	limit	% from limit
Air volume (mil. m3)	4 170	-	-
Noble gases (TBq) limit canceled since 20/7/2011	2,058	2 000	0,10
Iodine 131 (MBq) limit canceled since 20/7/2011	0,423	65 000	0,00
Strontium 90 (KBq)	22,883	140 000	0,02
Carbon 14 (GBq)	27,228	-	-
Tritium (GBq)	36,097	-	-
Total of Aerosol (^{54}Mn, ^{55}Fe, ^{57}Co, ^{60}Co, ^{65}Zn, ^{94}Nb, ^{110}Ag, ^{125}Sb, ^{134}Cs, ^{137}Cs, ^{144}Ce)	9,456	80 000	0,01

(MBq)			
Total of alpha aerosol (KBq)	2,499	20 000	0,01

3.2.2 Water pollution

On the basis of the rating in towns Vah nad Seredou and Vah – Komarno the surface waters were submitted to the first class of quaility – very pure water. Upper Dudvah in Velke Kostolany and Trakovice has similar findings.

JAVYS, a.s. discharge the active liquid discharges into two recipients – to the Vah and to the Dudvah. Water discharged from the JAVYS, a.s. area are monitored in term of volume activity of corrosion and fission products (KSP) and tritium (3H) as well as chemical pollution indicators according to the government decision KUZP no. 1/2006/00273/Fr.

Tab. No. III. 19 –Discharges of radioactive substances into the river Vah in 2011.

Discharge type	**Amount**	**% from limit**
Air volume (m3)	9 175	-
Gama spectrometric analysis – amount (MBq)	20,214	-
Gama spectrometric analysis – amount (MBq)	0,037	-
Strontium89 – strontium90 (MBq)	2,497	-
Corrosion and fission product (MBq)	22,747	0,17
Tritium (GBq)	576,61	28,83

3.2.3 Soil contamination

Soil contamination by radionuclides

Samples of the soil are collected once a year from grass area (collection in two layers in the Spring period) and from topsoil (collection in one layer in the Autumn period).

Monitoring results confirm, that the content of natural and artificial radionuclides in soil are close to the average content for the entire region, without distinguishable anomalies resulting from the operation of the NPP Jaslovske Bohunice

3.2.4 Noise and vibration

In the affected area are not except the equipment of NPP V1 other sources of noise and vibration. Noise in the affected area is negligible in terms of surroundings. Furthermore, the nearest residence is approximately at a distance of 3 km, where the level of noise from NPP V1 is virtually zero.

3.2.5 Radiating source and other physical range

The radioactive source in affected area are all of the primary system components NPP V1 and all types of RAW (the metal one too) which are collected in NPP, stored temporarily and disposed sequentially. The equipment for handling operation sources are radioactive facilities drowned and designed for the purpose of observation hygienic conditions and limits for exposure of staff of NPP Jaslovske Bohunice, which ensure that during performance, the stuff won´t be injured. In the same way, by hygienic conditions and fixed limits must be protected health of the population

around NPP Jaslovske Bohunice. Abidance with standards and limits is monitored continually.

4. DESCRIPTION OF PROPOSED ACTION AND ESTIMATION OF ITS SIGNIFICANCE

4.1 Inputs requirements

4.1.1 Land occupation

Variant 0

Technological equipment for fragmentation and decontamination referred to in this variant are installed on the premises HVB V1, without any additional land take. Spaces in terms of radiation are classified as a controlled area.

Variant 1, 2, 3

Technological equipment for fragmentation and decontamination referred to in these variants are installed also on the premises HVB V1, without any additional land take. Spaces in terms of radiation are classified as a controlled area.

Summary

None of these variants requires land take.

4.1.2 Consumption of water

4.1.2.1 Technologic water

As technological (cooling) water, the surface water is used from the Slnava dam, its deliverer is SE, a.s. the EBO V2 factory. Surface water is used for cooling operations, processing and storage of RAW etc.

Variant 0

JAVYS, a.s. doesn´t measure the technological water consumption for F&D as a separate figure, but in the whole area of V1. Since r. 2008, the consumption of process water has decreasing trend. In following table are showed figures of technological water usage since 2008 - 2011

Tab. IV. 1 The consumption of process water in 2008 – 2011 for NPP V1 and JAVYS, a.s.

Year	The consumption of cooling water Vah (m^3)	
	Area NPP V1	JAVYS a. s.
2008	15 755 053	15 837 843
2009	4 612 000	4 659 325
2010	3 436 698	3 458 729
2011	2 236 568	2 271 160

Variant 1, 2

In the framework of the preparation of decontamination solutions is used demineralized water which is created from technological Vah water by technological clearing. By means of expert appraisement the technological water consumption was determined approximately to 50 m^3/year for decontamination line and approximately 200 m^3/year for building parts decontamination what is in 3 mil level unidentifiable effect against the annually demand (see table IV. 1).

Variant 3

Against the variant 1 and 2, for variant 3 will be used only mechanical (dry) decontamination. In variant 3 isn´t expected almost no technological and decontamination water demanded in wet decontamination.

Summary

In reference to above-mentioned it is obvious that consumption of technological water is the highest in variant 1 and 2. In variant 0 and 3 is the water demand almost no. In reference to block water consumption the impact to variations technological water demand is unidentifiable.

4.1.3 Potable water

Potable water is delivered for NPP Jaslovske Bohunice from TaVOS distribution.

Variant 0

JAVYS, a.s. doesn´t measure consumption of drinking water for F&D equipment as a separate figure, but in the whole area of JAVYS, a.s. Particular operation F&D equipment has insignificant charges for drinking water demand. Portable water is used only for stuff hygienic impact. Drinking water demand in JAVYS, a.s. in 200 – 2011 is listed in the following table.

Tab. IV. 2 Consumption of drinking water in 2009 - 2011 for JAVYS, a.s.

Consumption of drinking water in JAVYS, a.s. area			
Year	2009	2010	2011
Consumption (m3)	164 413	165 673	176 550

Variant 1, 2, 3

Whereas the reconstruction of new fragmentation and decontamination workplace, we expect change the stuff number (12 – 16 operators, see chapter 4.1.7. in this part) of these facilities and besides drinking water is used only for hygienic purposes, the consumption of drinking water can be bigger but against the total consumed water in level of 100,000 m3 level it is unidentifiable effect. See table IV. 2).

Summary

In reference to different stuff number in particular variants (mentioned in chapter 1.6.) it is obvious that the consumption of drinking water is the highest in variant 1, lower in variant 3 and the lowest in variant 2. In reference to block water consumption the impact to variations technological water demand is unidentifiable.

4.1.4 Raw material resources

Variant 0

Fragmentation equipment mentioned in this variant was used in normal operation period in loading system with RAW entered in NPP V1 and designed to RAW metal division, for the next processing. In fragmentation, the inhabited raw material amount is fractional because the cooling emulsion is involved, that are recycled in division process. Raw materials for preparation of decontamination solutions that will be used during the decontamination:

- NaOH – caustic soda
- HNO3 – nitric acid

- HCCOH – formic acid (methanoic acid)
- Syntron B – tetrasulphide the ethylene-diamine-tetraacetic acid (EDTA)
- C6H8O7 – citric acid
- NH4NO3 – ammonium nitrate

Variant 1, 2

We don´t expect in these variants application any other raw materials into decontamination process, used for preparation decontamination solutions. Its amount will be entered into more factors e.g. metal RAW amount, its contamination etc. Expected energy and raw materials demand in following table

Tab. IV. 3 Expected consumption of raw material

Expected consumption for	Variant	1 year (kg)	8 years (kg)
HNO_3 65% nitric acid (kg)	1, 2	4 615	36 920
$C_6H_8O_7$ H_2O - citric acid (kg)	1, 2	12 000	96 000
NH4NO3 – ammonium nitrate (kg)	1, 2	6 000	48 000
SYNTRON B – 30-35% tetrasulphide solution the he ethylene-diamine-tetraacetic acid (EDTA)	1, 2	300	2 400
Abrasive	1, 3	5 500	44 000

Variant 3

We don´t expect consumption of any raw materials for wet decontamination in variant 3.

Summary

In view of the above it is clear that the consumption of raw materials is the greatest for variant 1, lower for variant 3 and the smallest for variant 2. The variant 0 is almost no consumption of raw materials. With regard to the total consumption of raw materials in the area JAVYS represents the difference between the annual consumption of raw materials in different variants no marginal effect (about 10 tons per year for option 1).

4.1.5 Energy sources

4.1.5.1 Thermic energy

For heating we don´t need any fuel. Objects are heated with existing heating systems, using water as the heat transfer medium heated by steam turbines operated by donations from V2.

Variant 0

We can´t to define the thermic energy demand for decontamination and fragmentation workplaces used during the operation, because these workplaces are part of operation systems and the thermic energy demand has not been measured.

Variant 1, 2, 3

Variants 1, 2, 3 are the same like variant 0 in term of heating.

Summary

Particular variants don´t have any effect to thermic energy demand.

4.1.5.2 Electric energy

Variant 0

Electricity supply provides power system, its majority part has been built during the NPP V1 construction and then the individual sites demand have not been measured and has been calculated for the internal consumption calculated for the individual sites demand have not been measured into internal electric station consumption. We expect the technological usage only exceptionally, the demand is around 0 kWh.

Variant 1

In variant 1 the technology will be modernism and amend with key current consumer the electric energy in app. No. 1 against the variant 0, per annum the electric energy demand is expected about 360,000 kWh.

Variant 2

The variant 2 will be used such as wet decontamination against the variant 1, the assumption the electric energy will be lower than variant 1, it is about 300,000 kWh/year.

Variant 3

Against the variant 1 and 1, for variant 3 will be used only mechanical (dry) decontamination. Expected electric energy demand is about 240,000 kWh/year.

Summary

In reference to above-mentioned, it is obvious that the electric energy demand is the highest in variant 1, lower in variant 2 and the lowest in variant 3. In variant 0 is the electric energy demand almost none. In reference to block energy consumption, the particular variants impact is unidentifiable.

4.1.6 Claims for transport and other infrastructure

The infrastructure has been built in NPP A-1 construction and during periods of construction the NPP V1 and NPP V2. The range of activities fragmentation and decontamination line does not require construction the additional infrastructure. HVB NPP V1 area has been connected to the necessary infrastructure since the construction – roads, water, heat, electric energy, sewerage and so on.

NPP Jaslovkse Bohunice area is connected with roads network by two communications and railway siding to the Czech Republic railway network. One of the communications connects the area with Jaslovske Bohunice village, the second one is included in Zlkovce village. The railway siding connects to the SR railway network in Velke Kostolany railway station.

Summary

In neither of the considered variants is necessary competition infrastructure or transport network.

4.1.7 Labour power requirement

Variant 0

During the normal NPP V1 operation has not been built some special organization structures for fragmentation and decontamination activities but the chemical operation assistance has been performed. In reference to moral and physical depreciation of equipment, we can expect that the equipment will be used only exceptionally and it won´t need any worker.

Variant 1

Induction into operation F&D workplaces, we expect following number of workers for F&D workplace operation in one-way operation.

- Fragmentation, mechanical technology 2 workers
- Fragmentation, heat technology 3 workers
- Fragmentation, transport 2 workers

- Decontamination, line decontamination servicing 3 workers
- Decontamination, line blasting technologies 4 workers
- Transport 2 workers

Expected number of new workers in variant 1 is 16. Of course, the activity can be assured by vendor..

Variant 2

Induction into operation F&D workplaces, we expect following number of workers for F&D workplace operation in one-way operation.

- Fragmentation, mechanical technology 2 workers
- Fragmentation, heat technology 3 workers
- Fragmentation, transport 2 workers
- Decontamination, line decontamination servicing 3 workers
- Transport 2 workers

Expected number of new workers in variant 2 is 12. Of course, the activity can be assured supply.

Variant 3

Induction into operation F&D workplaces, we expect following number of workers for F&D workplace operation in one-way operation.

- Fragmentation, mechanical technology 2 workers
- Fragmentation, heat technology 3 workers
- Fragmentation, transport 2 workers
- Decontamination, line blasting technologies 4 workers
- Transport 2 workers

Expected number of new workers in variant 3 is 13. Of course, the activity can be assured supply.

Summary

In reference to above-mentioned, it is obvious that the labor force is the highest in variant 1, lower in variant 3 and the lowest in variant 2. In variant 0 is the labor force almost none. In reference to block workers amount, the particular variants impact is unidentifiable.

4.2 Output specifications

4.2.1 Air pollution sources

Exhaust ventilation system on individual workplaces is connected to the existing ventilation system HVB V1, which is exhausting the air from workplace of FaD facility at volume of 54,000 m3/h. The ventilation system is connected to the ventilation stack of V1.

Documenting the impact on the environment is in the annual reports until year 2011, and since 2012 it is in the quarterly reports for the whole site JAVYS (it is not separately for V1), but each nuclear facility is evaluated activity of gaseous discharges to the percentage specified limit. Values of radioactive releases into the atmosphere from V1 for year 2011 are listed in the following table

Tab. IV. 4 Values of the air pollution sources from NPP V1 for 2011

Discharge type	Discharge	% from limit	limit
Air volume (m3)	4 170	-	-
Noble gases (TBq) limit canceled since 20/7/2011	2,058	2 000	0,10
Iodine 131 (MBq) limit canceled since 20/7/2011	0,423	65 000	0,00
Strontium 90 (KBq)	22,883	140 000	0,02
Carbon 14 (GBq)	27,228	-	-
Tritium (GBq)	36,097	-	-
Total of Aerosol (^{54}Mn, ^{55}Fe, ^{57}Co, ^{60}Co, ^{65}Zn, ^{94}Nb, ^{110}Ag, ^{125}Sb, ^{134}Cs, ^{137}Cs, ^{144}Ce) (MBq)	9,456	80 000	0,01
Total of Alfa aerosol (^{238}Pu, $^{239+240}$Pu, ^{241}Am) (kBq)	2,499	20 000	0,01

Variant 0

Regard to moral and physical wear of equipment is expected rarely use and therefore risk of air pollution is insignificant.

Variant 1, 2, 3

To minimize the risk of air pollution, each technology used in FaD workplaces will be equipped with a suction of air mass and radioactivity monitoring of aerosols. The output of the exhaust system will be terminated in an existing HVAC system of the building 800 V1, which is connected to a ventilation stack of NPP V1.
Expected values of radioactive aerosols in the air are mentioned in the following table n. B.4a. Values of other radioactive vapors are insignificant and they were not analyzed.

Tab IV.4a Predicted values of radioactive aerosols from the discharges in the atmosphere.

Option	Workplace	Predicted values of radioactive aerosols in the atmosphere (MBq/rok)		
		Variant 1	Variant 2	Variant 3
FP1, (1,2,3)	Fragmentation workplace 1 (3x saw +1x shear)	0,001	0,001	0,001
FP2 (1,2,3)	Fragmentation workplace 2 (flame + plasma)	0,0005	0,0005	0,0005

DKP1 (1,2)	Decontamination workplace 1 (electrochemistry, ultrasound, pressure)	0,003	0,003	0
DKP2 (1,3)	Decontamination workplace 2 (2x abrasive blasting)	0,002	0	0,002
DKP3 (1,3)	Decontamination workplace 3 (Manual abrasive blasting in cabin)	0,001	0	0,001
	Total	0,0075	0,0045	0,0045
	Discharges year 2011	9,456		
	Proportion to discharges in 2011	**0,08%**	**0,05%**	**0,05%**
	Limit	80 000		
	Proportion to limit	0,000009%	0,000006%	0,000006%

Summary

Table no. IV.4a indicates that the values of radioactive aerosoles are biggest for variant 1 and lowest for variant 0. Effect FaD work on discharges is so small that it is undetectable and is irrelevant to distinguish the impact of each variant. It can be concluded that the impact of each option on gaseous discharges is negligible.

4.2.1.1 Surface source

The HVB NPP V1 object is not surface source of pollution.

4.2.1.2 Line and mobile source

The HVB NPP V1 object is not line and mobile source of pollution.

4.2.2 Sewerage water

In affected area (JAVYS, a.s.) are in operation following canalization types:

- Rainwater – flows in the Dudvah recipient through the open Manivier channel
- Sanitary sewerage – is flown into cleaning station – Bioclar and in The Vah through Socoman header.
- Industrial reservoir treatment plant – waters contaminated by oil substances are flown in central gravity oil separator, after clarification, water is leaded to cooling water adaptation by decantation to SE, a.s. – EBO V2,
- Special – is flown in collection tanks objects of special active discharge water for specific area and after clarification and control, discharge water is exhausted in an orderly manner.
- The final Socoman sewer – removes other discharge waters from technological equipment , elaborations and regulations the liquid RAW in Vah recipient.

JAVYS, a.s. discharge the active liquid discharges into two recipients – to the Vah and to the Dudvah. Water discharged from the JAVYS, a.s. area are monitored in term of volume activity of corrosion and fission products (KSP) and tritium (3H) as well as chemical pollution indicators according to the government decision KUZP no. 1/2006/00273/Fr. Limit for discharges of corrosion and fission products into the Váh river is 13 000 MBq / year and in Dudváh river is 130 MBq / year. The total activity of corrosion and fission products released into the hydrosphere from NPP V1 it was 22.747 MBq (limit is 13 130 MBq) in year 2011. Information about the amount of discharged water into Vah and Dudvah recipient are in the following table.

Tab. IV. 5 The amount of discharge water from JAVYS in 2007 – 2011

The amount of discharge water from JAVYS [m3']					
Recipient	year				
	2007	2008	2009	2010	2011
Váh	4 458 956	4 932 150	2 112 228	1 918 462	961 117
Dudváh	343 928	315 360	315 360	315 360	315 360

Average concentration of chemical pollution into the Vah recipient gives following table:

Tab. IV. 6 Average concentration of chemical pollution into the Vah recipient

Chemical pollution of the Vah	**Average concentration**		**Maximum limit allowed**
	Year 2010	**Year 2011**	
Acidity , alkalinity - pH	8,172	7,819	9
	The average concentration of pollution emitted [mg/l]		**The maximum allowed concentration [mg/l]**
Biochemical oxygen demand – BOD5	2,961	4,558	8,00
Chemical oxygen demand - ChODCr	10,639	11,458	30,00
Insoluble substances	15,000	14,167	20,00
Soluble substances	315,333	376,333	1000,00
Ammonia - N-NH	0,431	1,387	4,00
Nitrate - N03"	10,124	17,886	50,00
Sulphate - SO/'	29,943	31,504	350,00
Chloride - Cl"	11,782	20,478	100,00
Nonpolar extract- NEL	0,027	0,035	0,35
Phosphates overall - Pce|k	0,271	0,456	2,00
Iron - Fe	0,374	0,161	2,00
Hydrazine hydrate - N2H4	0,020	0,000	2,00
Detergents - PAL	0,057	0,051	0,50

At the decontamination line (DKP1) is the predicted maximum activity of processed decontamination solutions after prolonged use 165 kBq/dm3 (for use of decontamination solutions is set limit of activities on their use). For decontamination of building surfaces is the volume activity of decontamination solutions for several orders of magnitude lower and is negligible compared to the activity of decontamination solutions in the workplace DKP1.

In annual operation is the estimated consumption of technical water for about 50 m3/year for decontamination line and for decontamination of building parts, for about 200 m3/year.

The decontamination line (DKP1) will be processed decontamination solutions collected in the tank for the pretreatment of the decontamination solutions, which is part of the decontamination line, where will be performed neutralization and sedimentation of the solutions. Once settled sludge is the liquid part drained to special sewage and sediment into 200 liter steel drums Meva. Sludge is further processed according to the rules for processing liquid radioactive waste set out in JAVYS (NO/RA/SM-07 Management of Radioactive Waste from V1) and stored at the national repository.

Water from special sewage is after treatment transported to a cleaning station. Purified water is collected in the control tanks. After checking and after measuring the doses drained through piping collector Socoman into river Vah. Estimated values of annual discharged activities in the hydrosphere are listed in Table B.6a.

Tab IV.6a Predicted values of radioactive liquid discharges hydrosphere.

Variant	Workplace	Predicted values of radioactive liquid discharges in the hydrosphere (MBq/rok)		
		V1	V2	V3
FP1, (1,2,3)	Fragmentation workplace 1 (3x saw +1x shear)	-	-	-
FP2 (1,2,3)	Fragmentation workplace 2 (flame + plasma)	-	-	-
DKP1 (1,2)	Decontamination workplace 1 (electrochemistry, ultrasound, pressure)	0,033	0,033	-
DKP2 (1,3)	Decontamination workplace 2 (2x Abrasive blasting in basket)	-	-	-
DKP3 (1,3)	Decontamination workplace 3 (Manual abrasive blasting cabin)	-	-	-
	Total	0,033	0,033	-
	Discharges year 2011	22,747		
	Proportion to discharges in 2011	**0,15%**	**0,15%**	**-**
	Limit	13 000		
	Proportion to limit	0,00025%	0,00025%	-

Variant 0

The variant 0 are not pending activities related to fragmentation and decontamination at all or only rarely. So the estimated amount of wastewater generated from these activities will be very low, almost zero.

Variant 1 and 2

Segmentation and fragmentation is involved in production of wastewater minimal. Major source of liquid waste are wet decontamination technologies. In annual operation is the estimated consumption of technical water for about 50 m3/year for decontamination line and for decontamination of building parts, for about 200 m3/year. It is clear that the amount of waste water cannot be larger. At the sewage water can be assumed that the amount of wastewater discharged will increase according the number of staff (variant 1 for about 480 m3, option 2 for about 360 m3). The total increase of waste water will be 730 m3 in variant 1 and 610 m3 in variant 2.

Variant 3

For variant 3 are not installed wet decontamination technologies. Segmentation and fragmentation are involved in the formation of wastewater minimally. Estimated amount of wastewater generated in this variant will be very low, almost zero. It is possible to assume that the amount of wastewater discharged will increase according the number of staff for about 390 m3.

Summary

With respect to the nature and position of the individual variants is obvious that the amount of rainwater will not be affected by any of the variants.

It is possible to assume that the amount of wastewater will increase according the number of staff (variant 1 for about 480 m3, variant 2 for about 360 m3 and 3 variants for about 390 m3).

Low-level waste waters will arise especially during wet decontamination. It is clear that most low-activity waste water resulting in variants 1 and 2, less at variant 3 and a lowest at variant 0 Based on our experience, it can be concluded that a substantial contribution to the total quantities of waste water, which are presented in table Tab. IV. 5 (expected water consumption of FaD workplace is at level order of 100 s m3 per year. Total discharges of waste water from JAVYS is more than one million cubic meters per year).

4.2.3 Wastes

Wastes production is desirable to separate in two stages:

- Wastes production during the installation and induction new F&D facilities to operation. It will be the waste from removal works and waste from building design in estimated spaces and used building materials.
- In operation stage will concern the secondary liquid RAW, sludge, blasting materials, work aids, filters and radioactive contaminated material.

4.2.3.1 The procedure for processing of waste in JAVYS a.s.

Solid wastes are collected in specified places and after measurement of radiation are put into:

- Waste for release into environment.
- Waste for further processing as radioactive waste at the Bohunice RAW Treatment Center (BSC)
- Solid waste for further processing as RAW are classified as possibility of processing. modification to the relevant technology
- High pressure machine to reduce the volume of combustible waste,
- combustion equipment to reduce the volume of solid and liquid combustible RAW
- the concentration of the liquid radioactive waste,
- cementation facility for strengthening and stabilization of concentrated wastes, other liquid radioactive waste, solid waste and compressed solid waste non compressed

The whole process of treatment of radioactive waste is the final product the fiber-container (FCC) filled with cement mixture, respectively. free disposal of solid waste molded cement mixture designed for permanent storage in the National RAW Repository in Mochovce.

Combustion of solid and liquid radioactive waste is carried out at a temperature of 750-950 ° C in the incinerator. Ash generated during the combustion process is regularly after discharge treated in a homogenizer using process of paraffination into barrels and then transported to a high-pressure press, where it is pressed. Produced moldings of ash are inserted into fiber container and cemented together with other solid radioactive waste on cementation equipment. The gaseous products of combustion are further combusted in after combustion chamber at a temperature of about 1000 ° C and subsequently rapidly cooled, cleaned by two-stage wash and treated on absolute filters.

Compressible waste sealed in metal drums is from sorting facility transported to high-pressure press. Produced moldings are then stored into fiber containers.

Reduction of the volume of liquid radioactive waste is carried on evaporator flow type. In the process of evaporation of liquid radioactive waste the activity remains concentrated in the rest -

concentrate, which is adjusted on cementation line. Treated water is discharged to the outside drains. If the water does not have the limit for discharge, it is pumped from the control tanks for re purification into waste water to the tanks.

Cementation facility is intended for fixation of concentrates processed washing water from the incineration of radioactive sludge and sorbents. Further is used to create a cement mixture, which is used for watering of barrels and moldings of high-pressure molding in fiber-concrete containers.

Part of Bohunice Conditioning Centre are also sorting lines, transportation systems, systems security issues operating media, chemical laboratory equipment and radiation monitoring, including monitoring systems.

The quality assurance system for wastewater management ensures that waste water can be discharged outside the premises is only organized, after control (chemical and radiochemical control), in accordance with the limits set by the relevant supervisory authorities.

4.2.3.2 Waste from the installation

For the purpose of installation and placement of new technologies will be required dismantling original technologies and adaptation of building surfaces, and as a result there may be a limited amount of construction debris and demolition of building materials. Contribute to the production of waste will be unnecessary construction and assembly material from the assembly. It is expected to rise following categories of waste:

Tab. IV. 7 Expected waste of building character

Waste classification num.	Group of wastes	Waste category	Waste type	Amount (t)
17 01 07	Concrete, bricks, lining, paver and ceramics	O	mixing of these materials don´t comprise dangerous goods	30
17 04 05	Metal work	O	Iron and steel	5
17 04 07	Plate covering (e.g. galvanization)	O	Mixed metals	0,2
07 04 11	Cable Cu, Al	O	Other cables than mentioned V17 04 10	0,1
17 09 04	Other wastes from buildings and demolitions	O	Other mixed wastes than are mentioned in 17 09 01, 7 09 02, 17 09 03	0,1

Variant 0

In this variant, is not expected the waste formation from new installed facilities, if new equipment won´t be installed.

Variant 1,2,3

The quantity of waste is estimated in the order of about 36 tons (mostly concrete), that comes to a negligible amount. For option 2 and 3 is about 10 tons of concrete less. Under operating rules and regulations as JAVYS must also be the waste measure the radiation control technicians. Following the results of measuring the waste will be disposed of in accordance to the results of radiation monitoring using procedures under the rules of JAVYS.

4.2.3.3 Waste from operation workplace F&D

During operation F&D workplace, RAW are produced, we can divide them according to their character into following table:

- Primary RAW
- Used OOP and used material
- secondary solid RAW
- Secondary liquid RAW
- Secondary gas RAW

Primary RAW are decontaminated pieces of material with certain residual contamination that can´t be released in the environment.

As a secondary wastes are considered the one which are generated during the decontamination process as used decontamination media containing radioactive components, used protective means, various auxiliary material, contaminated during normal operation, respectively. incident. The generated waste will be treated in accordance to legislation of the Slovak Republic and operating rules as JAVYS.

4.2.3.3.1 Primary metal RAW

On FaD workplace is done cutting of metal radioactive waste and decontamination of surfaces contaminated by RA substances in limit values of contamination. The amount of the received material on lines is limited by treatment capacity of the lines.

Metallic material is after completion of the decontamination process measured for residual contamination.

If the measured values of residual contamination, measured on a certified workplace for measurement, comply with the limits for release of materials from KP to the environment specified in the Regulation of the Government. 345/2006 Coll. and the decree of the Ministry of Health 545/2007 Coll. then can be transmitted as a secondary raw material down to processing organization. If the value exceeds the permissible limits even after repeated decontamination, metal waste will be stored in 200 l steel drums. On BPC prior to the permanent deposit is further reduced volume of the drums on high-pressure press and moldings are after cementation in FCC containers permanently stored in National Radioactive Waste Repository.

Tab. IV. 8 Expected primary metal RAW amount

	Building parts in KP		Mechanic equipment in KP			sum
	C steel	N steel	C steel	N steel	Other material	
Inventory	12 024	587	5 152	4 873	876	**23 512**
variant 1 - efficiency	90%	90%	90%	90%	90%	
variant 1 – free release	10 822	528	4 637	4 386	788	**21 161**
variant 1 - RAW	1 202	59	515	487	88	**2 351**
variant 2 - efficiency	40%	90%	40%	90%	90%	
variant 2 - free release	4 810	528	2 061	4 386	788	**12 573**
variant 2 - RAW	7 214	59	3 091	487	88	**10 939**
variant 3 - efficiency	90%	40%	90%	40%	90%	

variant 3 - free release	10 822	235	4 637	1 949	788	**18 431**
variant 3 - RAW	1 202	352	515	2 924	88	**5 081**

Variant 0

The variant 0 does not take decontamination of the machinery and steel structural parts of buildings at all or only rarely. So the expected number of primary metal RAW responds to total inventory that is 100% (23,500 tons).

Variant 1,2,3

Expected material volume released to the environment and primary metal RAW for each variant are listed in part Tab. IV.8 .

Summary

From the above it is clear that minimum of the primary metal radioactive waste is created by variant 1, more variant 3 then variant 2 and most variant 0, at which is no reduction amount of metal-containing wastes. Production of metallic wastes, respectively, the amount of decontaminated waste is a key parameter and is strongly dependent on the used variant.

4.2.3.3.2 Used PPE and auxiliary material

During the elimination of used PPE, the action has to be according to regulation NO/RA/SM-07 Management of Radioactive Waste from NPP V1.

Variant 0

The variation of 0 not pending activities related to decontamination at all or only rarely. Thus, the estimated amount of used PPE and consumables for these activities will be very low, almost zero

Variant 1,2,3

The amount of contaminated personal protective working means and other auxiliary material in operation process F&D workplaces isn´t dependent on usage variant nor amount worked material but on the stuff amount, time and quality executed activities.

Summary

In above-mentioned is possible to expect that the most contaminated PPE and auxiliary material arise in variant 1, lower in variant 3, than in variant 2 and the lowest in variant 0, in reference to total amount contaminated PPE have every single variant to the waste creation fractional effect.

4.2.3.3.3 Solid secondary RAW produced from F&D workplaces

During operation fragmentation process will be generated following secondary wastes:

- RAW from segmentation and fragmentation will be about 10400 kg/year on the basis of designer appraisal. The most part will create file dust from fragmentation.
- RAW generated during decontamination of the building surfaces will approximately 4000kg/year.
- RAW generated during decontamination using blasting will be about 5,500 kg/year on the basis of designer appraisal.
- The annual production of the other solid RAW can´t be over 1,000 kg.

RAW will be elaborated according to regulation NO/RA/SM-07 charging process with RAW from NPP V1.

Variant 0

In variant 0 the decontamination doesn´t proceed in general or only exceptionally. Expected amount of created solid secondary RAW during these activities will be very low, almost none.

Variant 1,2,3

Segmentation and fragmentation is involved in the formation of secondary solid radioactive same for all variants, the solid secondary wastes amount is practically linearly dependent on decontaminated and fragmented material amount. In variant 1 and 3 to solid secondary RAW elaboration assists the foreworn blasting charge.

Summary

In above-mentioned is possible to expect that the most secondary solid RAW amount will be formed in variant 1, than in variant 3, less in variant 2 and the lowest in variant 0. In reference to total RAW amount, particular variants have the accessory effect to RAW formation (percent from worked material).

4.2.3.3.4 Liquid secondary RAW produced from F&D workplaces

Liquid secondary radioactive wastes are mainly processed decontamination solution. Chemical composition processed solutions (chemical substances and their concentrations) are indicated in Table IV.9. The estimated maximum activity of decontamination solutions in longer-use (for use decontamination solutions is set the limit of activity on their use) in the decontamination line (DKP1) is 165 kBq/dm3. For decontamination of building surfaces of the volume activity of the decontamination solutions by an order of magnitude lower, and some are minor compared to the activity of decontamination solutions in the workplace DKP1.

Tab. IV. 9 The estimated maximum concentration of decontamination agents during exchange of solution

Decontamination agent	**Maximum concentration g/dm^3**
HNO_3 , nitric acid	20
$C_6H_8O_7 . H_2O$ - citric acid	100
NH_4NO_3 - ammonium nitrate	50
SYNTRON B - 30-35% solution of salts of ethylenediaminetetraacetic	5
HCCOH, formic acid	25

Processed decontamination solutions will be collected in the tank for the pretreatment of the decontamination solutions, which is part of the decontamination line, where will be performed neutralization and sedimentation of the solutions. Once settled sludge is the liquid part drained to special sewage and sediment into 200 liter steel drums Meva. Sludge is further processed according to the rules for processing liquid radioactive waste set out in JAVYS (NO/RA/SM-07 Management of Radioactive Waste from V1) and stored at the national repository.
When processing water will be about 90% water released into the environment and 10%, or approx. 25 m3 will be further processed as liquid radioactive waste.

Variant 0

In variant 0 the decontamination doesn´t proceed in general or only exceptionally. Expected amount of created solid secondary RAW during these activities will be very low, almost none.

Variant 1,2,3

Segmentation and fragmentation is involved in the formation of secondary liquid radioactive same for all variants. Determinative sources of liquid wastes are wet decontamination technologies. During annual operation, we expect technical water consumption for decontamination line approx. 50 m^3/year and for decontamination building parts about 200 m^3/year. Processed water will be further processed as liquid RAW.

Summary

In above-mentioned is possible to expect that the most of liquid secondary RAW amount will be formed in variant 1 and 2, less in variant 3 and the lowest in variant 0. In reference to total RAW amount, particular variants have the irrelevant effect to RAW formation (percent from worked material).

4.2.3.3.5 Secondary gas RAW (emissions)

F&D workplace is equipped with local exhausting systems, which provided health harmless in working environment. Local systems are connected to central exhausting HVB NPP V1 system, whereby the trapped air is overruled to ventilation stack of NPP V1 that is monitored and coming under provided limit. Local exhausting systems are supplied with aerosol filters with 99.99% effect. The air exhausting system is supplied with three level of filtration with 99.99% efficiency. The ventilation system is fitted with a three-stage filtration efficiency of 99.99%. More detailed discharges into the atmosphere are described in section 4.2.1.

4.2.4 Noise and vibration

Variant 0

In variant 0 the decontamination and fragmentation activities don´t proceed in general or only exceptionally . The impact to noise situation is fractional in object no. 800 .

Variant 1, 2, 3

F&D workplaces present the irrelevant elevation of noise situation in object no. 800 (HVB). The biggest noise sources will be portable facilities with high mobility division during the equipment removal for building parts decontamination that will create local places with high noise level (variant 1,2 and 3). Wet decontamination technologies are practically without effect to noise situation (variant 1 and 2).

Will be elaborated manual „Operating rules for working activities with noise exposure during the work“, for F&D workplaces, which will defined precautions to avoid exceeding allowable limits under Decree No. NC SR. 115/2006 Coll. Organization of the putting into service shall perform measurement of noise in the workplace.

Fragmentation and decontamination workplaces doesn´t represent any higher noise situation besides the 800 (HVB) object.

Summary

In above-mentioned that the biggest impact to noise situation in object no. 800 have variants 1 and 3, less impact has variant 2 and the lowest variant 0. In view of total noise situation in object no. 800, the effect from mentioned variants is adaptable. Radiating source and other physical range

4.2.5 Radiation and other physical fields

4.2.5.1 Ionizing radiation

Variant 0

At the variant 0 are not pending activities related to fragmentation and decontamination at all or only rarely. Impact on the exposure of operator, other workers and the population is negligible.

Variant 1,2,3

For variants 1, 2 and 3 activity is optimized, so the exposure of FaD workplace operators does not exceed 1 mSv / year. The exposure of other workers due to activities FaD work is negligible. Effect of exposure to members of the public is also negligible. The total exposure of workers (CED) is for individual variants depending on the number of workers.

Summary

From the above it is clear that the exposure of workers is largest in variant 1. then, in the variant 3 and at lowest at variant 2. Impact is negligible.

4.2.5.2 Ultrasound

Variant 0

Ultrasound generators have not been installed.

Variant 1, 2

Decontamination line will use ultrasound generators and radiant about frequency 30 – 40 kHz with capacity 6,5 $\pm$ 0,5 W.dm^{-3} during decreasing surface contamination process in decontaminated variants. Ultrasound will be fully transported to heat (mainly heating decontaminated solution). As secondary effect, can occur the spread of sound in hearing range, due to vibrations of decontaminated materials.

Variant 3

Ultrasound generators are not installed.

Summary

In above-mentioned ensue that the ultrasound is used only in variants 1 and 2. The impact is fractional.

4.2.6 Odor and other discharges

Variant 0

At variant 0 are not pending activities related to decontamination at all or only rarely. The impact of the odor in the house no. 800 is negligible.

Variant 1, 2

The facilities are located in closed spaces HVB and BAS objects that have a status of controlled area and it is equipped with air exhausting system that prevents to free air spread. The decontamination tanks DL could be the fetor resources in case of the decontamination solutions surface will be in air connection. Decontamination tanks are equipped with cover caps.

Variant 3

In variant 3 are not installed technologies that could be the source of odors.

Summary

Follows from the above, that the only sources of odor are in variants 1 and 2. Impact is negligible.

4.3 Facts about direct and indirect expected impacts to the environment

4.3.1 The impacts to inhabitanst

All of the studies have exposed that statistically is impossible to connect the NPP existence in Jaslovke Bohunice location with the inhabitant's health progress. A facility through which is reduced the amount of metal RAW in principle cannot have a negative impact on the population.

Jaslovske Bohunice location is characterized from the point of view environmental pollution assessment mainly the NPP existence, its operation causes real and potential environment pollution, mainly due to discharges, rsp. fading radioactive substances and heat release. Radioactive substances from the several NPP are exhausted into atmosphere or hydrosphere. Radionuclide activity in gas emissions and in liquid wastes is limited – so called authorized limits. Its accomplishment (not exceeding) is prerequisite on only for the F&D equipment operation but for all of the Javys, a.s. facilities the operation too.

Emissions from F&D workplaces are getting to the environment by means of ventilation stack Emission activity is reduced in aerosol filter systems. Directive values abidance (are mentioned on page 22 art. 4 The PHA SR issue no. OOZPŽ/3760/2011) is monitored and measure results are exhibited in reports and summary by appropriate government sanitary inspection authority.

Real discharges of radioactive emissions into the atmosphere and hydrosphere are within the permitted benchmarks and the estimated discharges are still several orders of magnitude lower (see Tab. IV.4).

All of the existing experiences and knowledge advert to the impact of radioactive gas emissions exhausting in the environment is so small , that is practically at the monitored required level values, very difficult detectable in the environment part. Present radiation situation in JAVY, a.s. surround producing radiation to the inhabitants in hand of gas emissions was isn´t practically differ from radiation background which is forming by cosmic radiation existence and natural radionuclides in the environment parts.

The real impact of the operation in NPP Jaslovske Bohunice region dividing rule, is shown up as the item, which increases the radiation background. The radiation situation in JAVYS, a.s. surround is not specially in comparison to situation in random location with similar geo-chemical bottom layers structure. Integrant gamma rays dote rate in location, created by radionuclides, in bottom layer and cosmic rays is in level 95 $nGy.hour^{-1}$.

Variant 0

In variant 0 the decontamination and fragmentation activities don´t proceed in general or only exceptionally . Expected effect to the inhabitants will be very low, almost none.

Variant 1,2,3

In variant 1,2 and 3 will be attend to gas and liquid elaboration of radioactive discharges under level 1% limits.

Summary

In above-mentioned ensues that the biggest impact to the inhabitants will have variant 1, smaller variants 2 and 3 and the smallest impact will have variant 0. In view of the discharges limits, particular variants have fractional effect to the inhabitants (supposed discharges are less than 1% of the limit).

4.3.2 The effects to the natural environment

Variant 0

At variant 0 are not pending activities related to fragmentation and decontamination at all or only rarely, with very low production of radioactive waste. So in the short term there is preservation of of the current status. In the long term can be expected to either increase the cost of the keeping quality of existing protective envelopes or increase the impact on the natural environment.

Variant 1,2,3

Based on data contained in the chapters 4.1 and 4.2, can be concluded that the negative impact of the FaD work on the geological, mineral deposits, geodynamic and geomorphological conditions, climatic conditions, hydrosphere and atmosphere is negligible.

After termination of the activity the entire current inventory of contaminated materials will be either stored in the form of radioactive waste in the repository for or radioactive waste will be released into the environment. For the long term the impact on the environment is significantly positive.

Summary

The negative impact of the operation FaD on the natural environment in all variants is negligible. With a long-term perspective, the impact variants 1,2 and 3 positive.

4.4 Health risk assessment

FaD impact on the workplace health risks best characterize the discharge of radioactive aerosols into the atmosphere shown in Table IV.4 in Section 4.2.1, radioactive discharges into the hydrosphere in Table IV.6 in section 4.2.2 and exposure of operators mentioned in chapter 4.2. 5.1 The above data show that the impact on the health risk of operators is small (below the target of 1 mSv / year. For other workers and members of the public is negligible (well below 1% of the current situation). Potential health risks to the population in the affected villages with respect to the V1 are influenced primarily by possible radiation load associated with the existence of radioactive materials in unprocessed form in the area is. Operation FaD workplace but will gradually reduce the inventory of these radioactive materials situated in the area of the nuclear power plant and thereby will reduce the potential risk of radiation exposure of the population in the area of NPP Bohunice.

Summary

Impact of operation of the FaD workplace on health risks are negligible (discharges radioactive aerosols into the atmosphere and radioactive discharges into the hydrosphere are well below 1% of the current situation). It is very likely that the treatment of the RA inventory (material will be released into the environment or placed in the form of radioactive waste on repository), will emissions of RA substances of V1 close to zero. Potential health risk for the population in the affected villages and the staff is more dependent on the amount of unprocessed radioactive materials then on the variant used. Gradual lowering inventory of these radioactive materials is potentially reducing the risk of the effects of radioactive material present at the area.

4.5 Information on the estimated impacts of of the proposed activity on protected areas

The proposed activity will not have the effect on protected areas or their protective zones.

4.6 Overall assessment of expected impacts in terms of significance and their comparison with current legislation

Comprehensive assessment of the expected impact of FaD devices for the overall parameters of NPP V1 are shown in Table IV.10. The column “chapter” describes in which chapter are given parameters described. In column “V1” is an indication for V1 and the column “FaD” shows the expected impact of the erection of new fragmentation and decontamination equipment.

Table IV.10 comprehensive assessment of the expected impacts of fragmentation and decontamination equipment for overall parameters of the NPP V1

Chapter	Parameter	Total V1	FaD	Share in %
2.6	Total activity in the workplace (GBq)	270 000 000	1,5	0,0000005%
4.1.2	Technical water consumption (m3/year)	2 236 568	250	0,01%
4.1.2	Water consumption (m3/year)	176 550	480	0,27%
4.1.7	Demands on the workforce (number of employees)	850	16	1,9%
4.2.1	Limit discharges of radioactive aerosols in the atmosphere (MBq / year)	80 000	0,008	0,00001%
4.2.1	Real discharges of radioactive aerosols in the atmosphere (MBq / year)	9,456	0,008	0,085
4.2.1	Discharge of waste water (m3/year)	961 117	730	0,052%
4.2.2	Discharge limit of RA substances in hydrosphere (MBq/ year)	13 000	0,033	0,00025%
4.2.2	Real discharge of RA substances in hydrosphere (MBq/ year)	22,7	0,033	0,15%

The table shows that the impact of fragmentation and decontamination apparatus for the overall parameters of NPP V1 is negligible.

Implementation of the project to build a new fragmentation and decontamination equipment on the the V1 can be performed weight and volume reduction of materials contaminated with radioactive substances in accordance with the schedule of V1 NPP. Volume reduction of radioactive materials brings substantial reduction in the cost of storage RAW and also allows the use of decontaminated materials as secondary raw material.

4.7 Operational risks and their potential impact on the area (possibility of accidents)

After building a new FaD workplace on the V1, these devices will be incorporated to the workplace, where the operations may lead to exposure. Activities leading to irradiation can be carried out only if comply with the Act no. 355/2007 Coll. and only with the consent of the Public Health Authority. One of the conditions is, that the areas where operations are carried out, are called controlled area.

The release of radioactive materials out of administrative control, can organizations perform only upon a decision issued by the Public Health Authority. Each of these statements of the PHA SR, organization receives only on the basis, that the PHA SR examine its ability (i.e. the ability of equipment and personnel) meet the requirements for nuclear safety.

In terms of nuclear safety, equipment will be assessed in accordance to Decree 430/2011 Coll. “Requirements for nuclear safety” of the NRA SR It is probable that the holding tank of the decontamination line will be classified as the selected device of III. safety class.

In addition to the risks associated with nuclear and radiation safety must be during the design, installation, commissioning and operation taken into account the requirements of the Act no. 124/2006 Coll. “Safety and health at work” and amendments to certain laws.

The Contractor shall further assess and classify all supplied components of the equipment in accordance to Decree no. 508/2009 Coll. describing details on safety and health at work with equipment for air pressure, lifting, electrical and gas and laying down the technical equipment that are considered as the classified technical equipment. Manufacture, installation, maintenance and operation of facilities as well as documentation and instructions for operating and maintenance instructions shall be in full compliance to the above mentioned legislation.

Even such a strict system doesn’t completely exclude the possibility of an accident. But the ability of equipment and personnel to handle emergency situations is very high and as far as possible eliminate the impact of the accident on public health.

4.7.1 The risk of losing control over radiation sources

In assessing the risk of losing control over radiation sources is an important factor the activity value, which is deposited on individual workplaces and in what form is this activity. In the table II.10 in chapter II.2.6 is clear that the overall maximum activity on individual workplaces of FaD device is about 1.5 GBq, which is for 8 orders of magnitude lower than the total inventory of the NPP V1 (270 000 TBq) .

Workplaces of FaD device are sources of ionizing radiation in the following form:

a) solid surface contaminated materials with a very small participation of wipeable contamination

b) sawdust and dust from blasting and fragmentation in barrel

c) decontamination solutions in decontamination bathtubs or sedimentation tank.

4.7.1.1 Loss of control on sources of ionizing radiation without room destruction and other systems

The loss of control on radiation sources may be due to equipment failure, improper handling or foreign interference. This chapter analyzed the case in which the influence of initial event occur total destruction containers. Room and downstream systems remain functional.

For solid surface contaminated wastes is the most probable cause loss of control on sources of ionizing radiation accident or improper handling during transportation of material to FaD workplace. It is clear that the maximum impact of accident during transport is the discharge of the material from the shipping container and the "movement" of RA substances on workplaces. Clean-up will require collecting the various pieces of material, measuring of surface contamination and possible decontamination of contaminated surfaces. It is clear that the radiation situation in the workplace is virtually unchanged, and the event will not have a measurable impact on employee exposure or the exposure of the population.

Slightly more complicated is the situation with waste from blasting and fragmentation, which are stored in barrels and have the character of bulk material (sawdust and dust). When tipping this material from barrel, is more demanding of its harvesting and is more likely to be necessary to carry out decontamination of the surface. However, similarly as in the previous case, is the situation on of the radiation in the workplace, virtually unchanged, and the event will not have a measurable impact on the irradiation employed or not irradiation of the population.

At of decontamination line may accident during the transport of material cause damage of decontamination baths. Equipment of decontamination line includes retention areas, which are able to even at the destruction of all decontamination baths capture a decontamination solution to allow a gradual release of decontamination solution into a special drain. After the release of the decontamination solution is a solution on the bottom of retention areas gradually evaporated and on the residue of radioactive arises. In the course of events in the short term will increase the volume activity of aerosols in on the air of workplaces to about 4.3 Bq/m3 (an increase input of effective dose in the workplace to 0,035 µSv / h) and emission activity at the outlet ventilation system will increase on the value about 1.2 Bq / h (limit 80 000 MBq / year). Dose equivalent at the baths during the event declined to fix value that corresponds to the activity of the materials in the workplace. It is clear that the event does not have a measurable impact on the irradiation of employees or exposure of the population.

4.7.1.2 Loss of control on RA sources with total destruction of the environment

The maximum activity in the workplace (listed in Table II.10 in Section II.2.6) are so low (maximum activity at all workplaces is less than 1300 MBq), even though there would be an explosion with complete evaporation of all of material from all departments of FaD workplaces and its immediate release to the environment, does not cross the limit for discharges of radioactive aerosols in the atmosphere (80 000 MBq / year). It is obvious that the release into the environment of any on RA inventory of all departments in a time when all workplaces is maximum activity, the worst situation and the likelihood of such an explosion with total destruction is negligible.

4.7.2 The risk of falling element during transport by crane

When transporting large-size metal radioactive waste are mainly used handling devices that are part of fragmentation and decontamination line. Maximum capacity (2,500 kg) has battery forklift truck. For other devices is typically load 1000 kg or less. A possible crash in handling element work it would not mean the possibility of an accident affecting the considered territory.

On the crane and slings are also carried out regular inspections and tests according to Ministry of Labour Decree Nr. 508/2009 Coll, on details on the safety and health at work with technical pressure devices, lifting, electrical and gas and laying down the technical equipment that are considered classified technical equipment.

Crane operators are holders of the crane licenses and binders are graduates of binder courses.

Situation that the transport will lose control on RA emitters are described in section II.4.7.1.

4.7.3 The explosion and subsequent fire

This event is operating under consideration as a conservative envelope for emergency scenario 2 stage of V1 NPP Decommissioning and corresponds to the maximum possible release of radioactive substances into the environment at this stage of decommissioning, but not the project C7-A3.

In case of Project C7-A3 are fragmentation and decontamination workplaces for the fragmentation and decontamination of surface-contaminated materials. The maximum activity in the workplace (stated in the table II.10 in Section II.2.6) is so low that even if there would be an explosion with complete evaporation of all of material and its immediate release to the environment, it would not cross the limit for discharges of radioactive aerosols into the atmosphere. It is clear that such an event would damage to also other areas V1.

4.7.4 The risk of failure of air filtration, exhaust ventilation systems to ventilation stack

Exhausted air through ventilation system from any workplace CA NPP V1 is filtered on multiple, mutually independent air filtering equipment. A key filtering devices are devices that perform three-stage filtration. In case of failure of the ventilation system will be immediately suspended all activities in the workplace fragmentation and decontamination equipment. Influence of evaporation decontamination solutions may work on the decontamination line gradually increase the volume of activity to about 15 Bq/m3, which is internal exposure about 0.2 µSv / h. After repairing the HVAC system and its startup, volume activity drops to normal working value and the activity on the decontamination line will be started.

4.7.5 The risk of accidents on the facilities, conducts worn decontamination solutions the further processing

Worn decontamination solutions from decontamination baths are transported by pipeline (a pipeline under the retention and collection tanks) to the so called. sedimentation tank. From this tank after neutralization and possible adjustment of the pH to take control measurements of parameters of the solution. Based on the results of these measurements and the consent of the AR-TP solutions from the settling tank through the drain special sewage pipelines paid back to the storage tank special sewage. An important technical measure is that worn decontamination solutions are "moved" in the so-called. batch mode (non-continuous), ie if the fixed storage volume fills. Solid wastes are transported in standard approved for this purpose packaging.

Operational risks can be identified according to the classification given in the "STN 01 0380 Mana žérstvo-risk" include the risks that barely occur or probably occur, the consequences of non-significant or small. Risks of this nature just follow the normal procedures, without taking emergency measures.

4.7.6 Risks due to external factors

4.7.1.3 The risk of flooding

According to public information arising from § 14 of Act no. 42/1994 Coll. Trnava District Office informed the population about two potential threats: radiation accident V2 and disruption of water structure Liptovská Mara. The risk of flooding in area JAVYS, OJSC from disruption of water construction Liptovská Mara is negligible

4.7.1.4 The risk of plane crash

According to the circular air flight information service AIC SR, C 34/07 of 17 9 2007, are in Slovakia three prohibited areas. One is forbidden airspace LZP29 Bohunice. It is a space defined circle 2000 m (its center is located at Bohunice NPP site) extending from the ground to 1500 m. The risk of a plane crash this measure is eliminated as much as possible. In the event that such an event has occurred and the aircraft fell directly the SO 800, there would be a breach of a security barrier - building blocks of object. In case of such risks, the organization has JA-TX, and produced guidelines "Emergency planning and preparedness" (currently in issue no. 6), rules to govern other activities (activation of the warning system, etc..). The situation would require interaction with the components of civil protection.

The impact of leakage on RA substances of fragmentation and decontamination work of the overall consequences of such an accident would be negligible and is described in Chapter II.4.7.1.

4.7.1.5 The risk of torrential rain

In the case of torrential rain is reasonable to assume that the storm sewer will not be able in a short time drain rainwater. It can be assumed that the rainwater, which will be able to divert rainwater drainage, will be drained towards the surface of the object 364 and 880 V1 and then Manivier valley towards the village Žlkovce.
Building structure. no. 800 is designed so that it can withstand the torrential rain, but in intensive and prolonged torrential rains can be expected that there may be water penetration into the building. The water would accumulate in the basement, where they would after torrential rain had to be pumped and would be disposed as radioactive liquid under standard operating procedures established by applicant for processing liquid radioactive waste.

4.8 Assessment of the expected area development , if the proposed activity would not be realized

In case that will not be constructed fragmentation and decontamination of workplaces and will not contaminate New materials from decommissioning decontaminated, will not be able to continue decommissioning of V1, or only at a very high financial cost of storing excess RAO.

Summary
JAVYS a.s. evaluate their impacts on the environment (and hence the impact of actions in the workplace of FaD workplaces workplaces) very carefully, precisely and with full respect for the requirements of legislative documents.
"Erection of the new large capacity F&D facility NPP V1" to the current situation for the affected area does not mean the creation of new organization JAVYS yet unidentified effects, only lower limits can increase the level of existing impacts. For all effects, this increase in the level of impact is almost negligible.
Not even part or element of the environment will not be seriously affected by the proposed activity.

5. MITIGATION MEASURES ON IMPACT OF THE ENVIRONMENT.

All activities associated with fragmentation and decontamination metal radioactive waste will be carried out in areas controlled area NPP V1, which are equipped with devices to separate the CA from the surrounding environment and equipped with devices to prevent the release of radioactive substances into the environment.
Implementation of this project will be replaced obsolete and physically worn out technologies that were used during the operation, the new advanced technologies with higher efficiency and capacity. This decreases the risk of environmental impact and there is no need to introduce further measures.

Summary
Use any of the variants does not require any special measures to mitigate adverse environmental impacts.
Sufficient measures are technical and organizational measures applicable to the controlled area V1, the correct functioning of the device variant and correct operation of ventilation sys-tems and radiation control systems.
Is not therefore necessary to introduce further measures

5.1 Other possible risks associated with the implementation of the proposed activity

This project realization doesn’t mean realization of new activity, that will bring new risks in under review location above exist and identified risks.

Main identified risks connected with realization and operations of the supposed activity are:

- RA substances fading to the working environmental
- Chemical substances escape to the working environmental
- Workers injury during manipulation with material

All activities connected with fragmentation and decontamination metal RAW and building parts will be effected in controlled area NPP V1, this area is equipped with technical facilities to division KP from surroundings, and is equipped with technical facilities to RA substances fading into the envi-ronment. To solve of these similar events there are in JAVYS, a.s. elaborated special methods.

The analysis results show that during compliance with principles and radioactive protective optimiza-tion during activities that are connected with F&D operation workplaces, workers radiation during standard operation as emergency situation creation, limits won´t be over the personal workers doses nor surrounding inhabitants, that are determinate in statutory rules SR no. 345/2006 Coll. About basis requirements for workers health protection and inhabitants against ionizing radiation.

One of the most important systems which secured the optimal workplaces activity to fragmentation and decontamination, is safe and fail-safe operation the air exhausting systems HVB NPP V1 – ex-hausting system or clean air supply system. Air exhausting system secured controlled area exhaust-ing, the air is exhausting through filtration systems and monitoring radioactive control equipment into ventilation stack.

Summary
„Erection of the new large capacity F&D facility NPP V1“ doesn’t mean realization of new activity, that will bring new risks in under review location above exist and identified risks. Existing risks aren´t

depend on used variant but they´re depend on right function the particular facilities in specific variant and right function the air exhausting system and radioactive control systems.

6. USED ASSESSING METHODS AND INITIAL PREREQUISITES

During assessing estimate, we used catalog information of facilities producers, BIDSF C7-A1 project results and other basements are specified in part IV.

7. IDENTIFICATION DEFICIENCY IN COGNITION

Authors don´t know any deficiency in cognition and in equivocation, that could have the effective impact to information in this document.

8. PROJECT ANALYSES

„Erection of the new large capacity F&D facility NPP V1“ against the present situation for affected activities doesn´t mean the creation of new unidentified impacts by JAVYS, a.s. organization. It means F&D workplaces capacity elevation and equipment these workplaces with the most modern facilities that are available for expected volume materials elaboration without capacity increasing in these workplaces.

JAVYS, a.s. evaluates its impact to the environment (plus impacts due to practiced activities in workplaces F&D workplace) very closely, rigorously and with respect to legislative document requirements.

Summary

In reference to proposed actions is not necessary to change the monitoring impact to the surround. In this project framework, will be updated documentation which is necessary for operation of new facilities.

9. GENERAL EXECUTIVE SUMMARY

9.1 The applicant

Nuclear and decommissioning company a.s. (Jadrová a vyraďovacia spoločnosť, a.s.)
Tomášikova 22
821 02 Bratislava

9.2 Proposed activity

“Erection of the new large capacity F&D facility NPP V1”

9.3 Purpose and certain other characteristics of the proposed activity:

9.3.1 Purpose and certain other characteristics of the proposed activity:

The purpose of the proposed activity "Erection of the new large capacity F&D facility NPP V1" is the reduction of the volume and weight of surface-contaminated materials during decommissioning of NPP V1.

9.3.2 Location of the proposed activity

Workplace of fragmentation and decontamination equipment will be placed in a controlled area SO no. 800: V1 - Reactor building 1.a 2. NPP V1

9.3.3 Reason for the given location

Radioactive materials that will be at the workplaces of the fragmentation and decontamination equipment V1 processed, are located in controlled area HVB V1.

Areas of the controlled area are designed for handling with radioactive materials. They are equipped with through ventilation systems, drainage, monitoring systems, security systems, organizational measures and so on. Ra material will be processed directly at the point of fragmentation will not be required any transport outside facilities of an existing CA.

9.3.4 Date of beginning and completion of construction and operation of the proposed activity

Solving of the project BIDSF C7-A3 contractually from 21.02.2012 to 21 02 2015 i.e. 36 months. Planned start installation of FaD equipment is from 3/2014 and completion of installation and testing of equipment is expected by 12/2014. FaD are designed and projected for durability 20 years for normal operation, the duration of decommissioning is planned to 2025.

9.4 Brief description of the technical and technological solution

The document evaluated the following options:
• Option 0 – current state
• Variant 1 - combined variant using wet and dry decontamination procedures
• Variant 2 - variant using only wet decontamination procedures
• Variant 3 - variations using only dry decontamination procedures

Variant 0 represents the current state of existing fragmentation and decontamination facilities for

the V1, which were built with project the V1 and have been used in the performance of operational tasks during overhaul, refueling, reconstruction and modernization of NPP V1. This variant is described in more detail in section II.2.2. Usage of this variant would be to use fragmentation and decontamination only limited and only minimal reduction of the volume resp. RAW weight, and thereby requirement for change of the concept of decommissioning.
The following section specifies the technical means for variant 1, 2 and 3

Hardware fragmentation and decontamination equipment can be divided, as determined by equipment:
- Removing (segmentation)
- Fragmentation
- After fragmentation decontamination
- Decontamination of building parts
- Auxiliary and handling activity

9.4.1 Hardware for dismantling

9.4.1 Equipment in this group are mobile (portable) devices that will be used in areas of CA segmentation (splitting) of material removal. Hardware is the same for variants 1, 2 and 3. Specification of equipment for the segmentation of material during removal is in the following table. Description of possible equipment is in Annex 1.

Table X.1 equipment specification for the segmentation of material for removing

Item	Name	pcs	Workplace	Note
1.01	Hydraulic cutters	2	Mobile	Low speed cutting
1.02	Portable Angle Cutter	2	Mobile	Low speed cutting
1.03	Portable hydraulic shears	2	Mobile	Hydraulic cutting
1.04	Wire saw	1	Mobile	Low speed cutting
1.05	Punch nibbler	1	Mobile	Hydraulic cutting
1.06	Angle Grinders	3	Mobile	High speed cutting
1.07	Hand electrohydraulic cable shears	2	Mobile	Hydraulic cutting
1.08	Plasma cutting machine	1	Mobile	Thermic cutting
1.09	Device for flame cutting	1	Mobile	Thermic cutting

9.4.2 Fragmentation

The aim of fragmentation is using the proposed facility cut materials into smaller pieces to be transportable on FaD workplaces. Fragmentation activity will be performed in a dedicated stable workplaces. Individual workplaces will be tailored to the methods used, with an emphasis ensuring maximum safety in the workplace and minimization of radioactive waste and will be connected to exhaust ventilation systems of power plant the V1, which contains an high efficiency large volume aerosol filters and the outlet pipe is mouthed to ventilation stack of V1.
Hardware is the same for variants 1, 2 and 3. Hardware for fragmentation is shown below.
Description of possible equipment is in Annex 1.

Table IX.2 equipment specification of the fragmentation

Item	Name	pcs	Workplace	Note
2.01	Hydraulic band saw for cross cutting	1	FP1	Low speed cutting
2.02	Hydraulic band saw slitting	1	FP1	Low speed cutting
2.03	Stationary hydraulic shears	1	FP1	Hydraulic cutting
2.04	Hydraulic band saw up to 1000 mm	1	FP1	Low speed cutting
2.05	Plasma cutting machine	1	FP2	Thermic cutting
2.06	Device for flame cutting	1	FP2	Thermic cutting

9.4.3 After fragmentation decontamination

The purpose of the after fragmentation decontamination is to reduce surface contamination to a level that materials could be released into the environment in accordance with the legislation in force at the time of execution or level of the selected method of disposal. Decontamination must also be made to the processing conditions for secondary waste, where will be located a substantial part of the inventory of radioactive contaminated equipment V1.

For decontamination will be used only such decontamination media, which must meet the requirements for processing and storing in the National Radioactive Waste Repository. Decontamination workplaces will be connected to exhaust ventilation systems of power plant the V1, which contains an large volume high efficiency aerosol filters, and the outlet pipe is mouthed to the ventilation stack of V1. At the same time, these workplaces are connected to the collection and processing of radioactive contaminated water.

9.4.3.1 Electrochemical decontamination tank

The method of electrochemical decontamination tanks by cleaning in ultrasonic bath and sprayed with high pressure water will be used for decontamination of stainless steel. Decontamination line will be equipped with means enabling the preparation and execution of decontamination solutions, filtering and regeneration of used solutions, handling decontaminated materials, operational measurements of contamination of material, operational control, separation and transfer of radioactive waste produced workplace secondary processing RAW.
The method of electrochemical decontamination tanks by cleaning in ultrasonic bath and sprayed with high-pressure water is used in variant 1 and 2

9.4.3.2 Dry mechanical abrasive blasting

The main method which is used for surface decontamination from carbon steel grade is dry blasting of the fragmented pieces by abrasive. The aim of this method is to eliminate the surface layer (protective coat, corrosion coat) to the basic material.

Dry abrasive blasting methods will be used for elimination of the materials like - oil, grease, oxides and color's or the other coat. Abrasive blasting will be used for stainless steel in order to assure the effect of the electro-chemical decontamination which can be degreased by the existence of materials that are adhered on the surfaces of components assigned for decontamination.

All of the facilities have to have the exhausting system with filtering module appropriate for this application. The equipment has to be able to eliminate any fixed material including the corrosive coat.

The workplace has to be equipped with the operating tables, the electric lifting tackle, forklift stackers, fork-lift trucks

Tab. IX. 3 Examples of technological accessories for after fragmentation decontamination

Item	Name	Quant	Type	Note
3.1	Decontamination line (DL)			
3.1.01	DL Electrochemical Baths	2	Stationary	Electro-chemical decontamination
3.1.02	DL Ultrasonic Baths	2	Stationary	Ultrasound decontamination
3.1.03	DL Rinsing Bath (Bath for Super High-Pressure Water Pump	1	Stationary	High pressure admission in the tank
3.1.04	DL Other Equipment	1	Stationary	Auxiliary arrangement
3.2	Dry mechanical-abrasive blasting equipment			
3.2.01	Suspended blasting device	2	Stationary	Abrasive blasting in basket
3.2.02	Manual abrasive blasting cabin	1	Stationary	Abrasive manual blasting

9.4.4 The building parts decontamination

The building parts decontamination is intended for buildings, constructions and rooms after technical equipment removal, so it allow the smooth release of parts of the buildings out of administrative control.

Decontamination methods that are suggested:

a) High pressure water cleaning
b) Abrasive blasting
c) By froth, gel and wet drawing out
d) Grinding
e) Cutting out

Technological accessories for building parts decontamination are mentioned in following table: Equipment description is in annex no.1. If it necessary, you can use equivalent facility.

Tab. IX. 4 Examples of technological accessories for building parts decontamination

Item	Name	Amount	type	Note
4.01	Super High-Pressure Water Pump	1	Portable	High pressure water cleaning
4.02	Floor Shaving Device	1	Portable	Abrasive blasting
4.03	Foam Generator	1	Portable	Froths, gels and wet drawing out
4.04	Breaker Hammer	1	Portable	Cutting out
4.05	Angular Grinding Devices	5	Portable	Grinding

9.4.5 Activity on workplaces of fragmentation and decontamination equipment NPP V1

Predicted maximum level of activity, deposited on individual workplaces is listed in Table IX.5. The total radiological inventory of NPP V1 is 260 000 TBq from 1.1.2010, according the Table II.1 of “Intention” [25]. Total activity for individual FaD workplaces is 1.5 GBq, which is a value for about 8 orders of magnitude lower than the total inventory of NPP V1.

In the column of AM (55%) (See Table A.II.10), the maximum activity of the surface contamination of material on the workplace is less than 0.3 Bq/cm3 if processing materials of radiobiological Class 1. When processing materials of radiobiological Class 2 (surface contamination is less than 1 Bq/cm3), which represents about 55% of the total weight. AMmax is the maximum activity of the material on the workplace and Amax is the maximum total activity on the workplace.

Tab. IX. 5 Predicted maximum level of activity, deposited on individual workplaces.

Option	Workplace	Activity on workplace (MBq)			Note
		AM(55%)	AMmax	Amax	
FP1, (1,2,3)	Fragmentation workplace 1 (3x saw +1x shear)	5	150	300	Activity is in the material and sawdust
FP2 (1,2,3)	Fragmentation workplace 2 (flame + plasma)	5	150	300	Workplace is normally without material and activity
DKP1 (1,2)	Decontamination workplace 1 (electrochemistry, ultra-sound, spraying)	5	150	500	Activity is mainly in the decon-tamination solution
DKP2 (1, 3)	Decontamination workplace 2 (2x abrasive basket)	1	10	100	Activity is mainly in the blasting fumes
DKP3 (1, 3)	Decontamination workplace 3 (Manual abrasive blasting large size cabin)	0,1	1	100	Activity is mainly in the blasting fumes

9.4.6 Inputs requirements

The input requirements are summarized in the following table IX.6.

Table IX.6 Requirement Specification inputs

Input	**Evaluation**		
Land	No variant requires land use		
Technological water	The consumption of process water in the area of V1 in 2011 was 2,236,568 m3/year		
	variant 1: 250 m3/year	variant 2: 250 m3/ year	variant 3: negligible
	increase consumption of less than 0.012%		
drinking water	The consumption of drinking water in the area of JAVYS in 2011 was 176 550 m3.		
	variant 1: 480 m3	variant 2: 360 m3	variant 3: 390
	increase about approx. 0,27%	increase about approx. 0,20%	increase about approx. 0,22%
Raw material	variant 1: <11 t	variant 2: <5 t	variant 3: < 6 t
Work force	At the Bohunice site on workplaces of JAVYS operates about 850 workers		
	variant 1: + 16	variant 2: +12	variant 3: +13
	Approx. + 1,9%	Approx. + 1,4%	Approx. + 1,5%
Traffic	Claims for transport are negligible in all variants		

9.4.7 Output requirements

The output requirements are summarized in the following table IX.7.

Table IX.7 Information on expected outputs

<table>
<tr><th>Output</th><th colspan="3">Evaluation</th></tr>
<tr><td rowspan="4">Discharges of radioactive aerosols into atmofphere from FaD workplaces</td><td colspan="3">In 2011, the value of the discharges of RA aerosols was 9,456 MBq / year.
Limit for discharge radioactive aerosols is 80,000 MBq / year for the V1.</td></tr>
<tr><td>variant 1: 0,075 MBq/year</td><td>variant 2: 0,045 MBq/ year</td><td>variant 3: 0,045 MBq/ year</td></tr>
<tr><td>0,08% to discharges</td><td colspan="2">0,05% to discharges</td></tr>
<tr><td>0,000009% to limit</td><td colspan="2">0,000006% to limit</td></tr>
<tr><td rowspan="3">Wastewater (sewage + technology)</td><td colspan="3">In 2011 was 961 117 m3 of discharged wastewater</td></tr>
<tr><td>variant 1: 730 m^3</td><td>variant 2: 610 m^3</td><td>variant 3: 390 m^3</td></tr>
<tr><td>Increase about 0,076%</td><td>Increase about 0,064%</td><td>Increase about 0,041%</td></tr>
<tr><td>Liquid RaO</td><td colspan="2">variant 1, 2: <25 m^3</td><td>variant 3: negligible</td></tr>
<tr><td>Solid RaO</td><td>variant 1: cca 20,0 t</td><td>variant 2: cca 10,5 t</td><td>variant 3: cca 20,0 t</td></tr>
</table>

9.5 Summary of expected impacts on the environment

Erection of the new fragmentation and decontamination equipment the V1 and future operation of these fragmentation and decontamination facilities will be part of the NPP V1. Based on data contained in the previous chapters we can conclude that the expected impact of the activities associated with implementation of this project is the level of tenths of percent to percent units compared to the state of V1 in 2011, ie erection of the new fragmentation and decontamination equipment on the V1 and not even the operation itself will not cause any identifiable impacts in that area.

Implementation of the project to build a new fragmentation and decontamination equipment on the V1 can be performed weight and volume reduction of materials contaminated with radioactive substances in accordance with the schedule of V1 NPP. Reducing the volume and weight of materials contaminated with radioactive substances, storing these materials as radioactive waste and gradual release of uncontaminated material out of the the administrative control is a condition for further usage of the area.

9.6 Suggestion of optimal variant

With regard of the above, it appears that the optimal variant is no. 1, which represents a new comprehensive solution to practically all actions required in the actual process of decommissioning of V1.

In the proposed solution is expected utilization of spaces HVB V1, which may be released for construction of a new fragmentation and decontamination workplace for process of decommissioning of V1. This area is in the controlled area of V1 with connections to air technical systems, to special drainage and after the simple preparation also to supply of electricity and water. Will be installed new technological equipment's that have good references in many decommissioning of nuclear power plants in the world. Indispensable are especially good experiences from the similar workplace of decommissioning of A1

9.7 Proposed Activity Transboundary Impacts Reports

Erection of the new large capacity F&D facility NPP V1 to the radiological conditions is at level or in some cases well below 1% of the current impacts of V1. Impact of new equipment FaD V1 can be considered negligible in comparison with the operational impacts and other technologies treatment and conditioning of radioactive waste or MSVP, which are installed in the premises of JAVYS and operation of nuclear power plants V2 (SE, plant Bohunice V2).

Are not expected significant impacts that would cross state boundaries with respect to their distance from the affected area. All effects of radiation character will be restricted to the site of JAVYS, respectively. affected municipalities and socio-economic impacts and the wider environment (districts Trnava, Piestany, Hlohovec).

Erection of the new facilities FaD V1 does not increase the limits of gaseous and liquid effluents, the impact on the population is evaluated annually in a summary report "Radiation protection in JAVYS and impact of JAVYS, a.s. for vicinity of the year ". Based on reviews from the year 2011 it can be concluded that the impact on the population, based on actual releases to the atmosphere and hydrosphere is several times lower than is currently specified effective dose limit for representative person from the population. The annual exposure limit for individuals from the population from the discharges of radioactive substances originating from nuclear installations JAVYS Bohunice is 20 µSv and was established by state regulation no. OOZPŽ/3760/2011.

Evaluation of impact NPP at Bohunice site is carried out since 2011 individually for company JAVYS a.s. based on the balance of radioactive discharges from JAVYS, a.s. and real meteorological situation. In 2011 were calculated:

- highest values of individual effective doses in a zone 76 (Ratkovce Žlkovce - southeast from NPP Bohunice and reached the critical group 12-17 years. For this category has been calculated total effective dose and time paths for all considered representative person 0,414 µSv.

Note: the main contribution is from the atmosphere, the hydrosphere contribution from the total effective dose is in the sector less than 1%.

- highest values of collective doses were calculated in the zone 115 (Trnava). The collective effective dose and time all considered paths (sum over all categories) in the sector is 0,203 manmSv.

A comparison of gaseous and liquid discharges into the atmosphere and hydrosphere from the current operation of the V1 and limits for these discharges results that activity released into the surrounding environment is only a fraction of the limits, which creates a presumption that it will be so even after the construction workplace of the new FaD at the NPP V1.

Activities related to the project BIDSF C7-A3, even operation of FaD workplace after start of the service will not cause a significant increase of activity of RA substances in gaseous and liquid discharges from V1 and thus the NPP complex in the area as a whole. Based on the nominal operating characteristics of installed equipment is assumed that the activity values of RA substances released into the environment during all three alternatives remain under consideration with a sufficient margin below the limit.

Calculation of the radiation exposure of the population at distances that come into consideration for the assessment of trans boundary impacts of SR shows that this is negligible.

In the surroundings of the West Bohunice in a circle of radius 100 km are three neighboring countries:

- Czech Republic - from a distance of about 40 km in the direction of S and SW
- Austria - from a distance of about 75 km in the direction Z, SE and SW
- Hungary - also from a distance of about 75 km in the direction SW, S and SE

From the impact assessment NPP at Bohunice site from the table Tab. IV.10 shows that not even after the project BIDSF C7-A3 "Erection of the new fragmentation and decontamination workplace V1" are not exceeded authorized limits set for the current state of NPP Bohunice. This means that the radiation load of the population nearby, and therefore at a distance of over 40 km is negligible.

In a separate project BIDSF B6.3 - Plan I. stage of V1 NPP Decommissioning and other licensing documentation was solved role "General data required in Article 37 of the Euratom. This task has been through the NRA SR submitted to the European Commission in Brussels, where was issued a favorable final position of the European Commission dated 15.07.2011 and published in the European Journal 16.07.2011.
The documentation project BIDSF B6.3 supply 26 General data were reviewed including unplanned releases RAL (crises) that could arise during the decommissioning of V1 such.:

- Power supply failure - due to: high voltage, network congestion and consequent short, accidentally disconnected (connected) el. circuits, storm and adverse weather conditions.
- Failure of the air-conditioning - due to: Power failure. energy, insufficient ventilation.
- The fall of charged solid RAW - like, wrong handling, slipping the load of holder of manipulator.
- Leakage of volume of historical RAW of all storage tanks - failure of the operation or weld cracking of storage tank
- An explosion and subsequent fire during the removal of selected primary system (PO) with surface contamination - serious damage (explosion) oxy-acetylene kit with subsequent fire.

Calculated results confirmed [VII.13] that even in such emergency events would not in any way prevent of crossing the border activity levels for the implementation of measures to protect the population as large margin would not be even exceeded the annual limit of effective dose for individuals from the population (1mSv) . [VII.14] - č.345/2006 Government Ordinance on the basic requirements to protect the health of workers and the population against ionizing radiation.

The final formulation of EU positions (quote) [VII.21]:

The Commission concluded that the implementation of the plan for the disposal of radioactive waste in whatever form arising from the the decommissioning of the Bohunice V1, which is located in the Slovak Republic, and in normal operation and in the event of an accident of the type and magnitude considered in the general data will not cause radioactive contamination of water, soil not even air in another member State.

9.8 Summary

Implementation of the project erection of the a new fragmentation and decontamination equipment for the V1 can be performed weight and volume reduction of materials contaminated with radioactive substances in accordance with the schedule of V1 NPP. Volume reduction of radioactive materials brings substantial reduction in the cost of saving RAW and also allows the use of decontaminated materials as secondary raw material

Selected variant number 1 allows to perform an efficient decontamination of all primary of RA materials arising from decommissioning of V1. Reduction of the volume and weight of materials contaminated with radioactive substances, storing these materials as radioactive waste and gradual release of uncontaminated material from the the administrative control is a condition for further usage of the area.

The proposed solution does not require construction of new facilities, use of spaces of the nuclear facilities V1, which are no longer needed for further activity.

PART III. MAPS AND OTHER PICTURE DOCUMENTATION

1. APPENDIX

The equipment location in building area SO800:V1 is in following drawings that are in app. in this document.

[1] Appendix no. 1 - BIDSF C7A3, Erection of the new large capacity F&D facility NPP V1, Technical specifications of the equipment's.
[2] Appendix no. 2 - BIDSF C7A3, Erection of the new large capacity F&D facility NPP V1, The overall situation of building (building plan) JAVYS, a.s.
[3] Appendix no. 3 - Disposition of workplaces SO800:V1 +10,5m, romm no. R301. General view.
[4] Appendix no. 4 - Workplace FP1, SO800:V1; +10,5m; romm no. R301/1
[5] Appendix no. 5 - Workplace FP2, SO800:V1; +10,5m; romm no. R303/2
[6] Appendix no. 6 - Workplace DKP1, SO800:V1; -1,8m; romm no. R033, R034, R035, R036
[7] Appendix no. 7 - Workplace DKP2, SO800:V1; +2,7m; romm no. R117/2
[8] Appendix no. 8 - Workplace DKP3, SO800:V1; +10,5m; romm no. R303/1, R306/1
[9] Appendix no. 9 - Disposition of workplaces, SO800:V1, +6,3m, romm no. R215
[10] Appendix no. 10 - A copy of the letter Ministry of the Environment SR č. 6236/2012-3.4/hp of 8.8.2012: „Abandonment from request of the alternative solution for the proposed action C7-A3 – Erection of the new large capacity F&D facility NPP V1“
[11] Appendix no. 11 - A copy of the EUROPEAN COMMISSION OPINION 2011/C 210/05 of 15.7.2011 relating to the plan for the disposal of radioactive waste arising from the decommissioning of the Bohunice V-1 Nuclear Power Plant, located in the Slovak Republic, in accordance with Article 37 of the Euratom Treaty
[12] Appendix no. 12 - Description how the comments have been worked in

2. LIST OF TEXT AND GRAPHIC DOCUMENTATION AND USED MATERIALS

2.1 References list

2.1.1 References

[13] ETIAM a.s., Miletičova 23 Bratislava: „Integrálny sklad RAO v lokalite Bohunice“, zámer k projektu BIDSF C8, IPR č.: 100TSBD20001, 02. 2011.
[14] PP U-98: „Prevádzkový poriadok pre pracovné činnosti s expozíciou hluku pri práci, NPP A1 – objekt 34, PS 007 Pracovisko priečnej a pozdĺžnej píly a otryskávania, PS 001 Pracovisko páliacej komory“, vydanie 1.
[15] Lapin, M., Faško, P., Zeman, V.: „Očakávané globálne oteplenie a možné zmeny niektorých charakteristík klímy na Slovensku“ Národný klimatický program Slovenskej republiky 2/94“ SHMÚ Bratislava, 1994.
[16] Futák, J.: „Fytogeografické členenie“, Atlas SSR, Bratislava 1980.
[17] Mihály, B. a kol.: „Správa o životnom prostredí za rok 2011“, JAVYS, a.s., 2012 Jaslovské Bohunice.

[18] Bínovský, P., a kol: Správa „Bezpečnostné analýzy rekonštrukcie fragmentačného pracoviska s kontamináciou nad 3000 Bq/cm^2“, VÚJE, a s., 2008 Trnava, ev. č.: VJEA-1/RAO 3.2.8/SPR/01/0710/ 07/N1.
[19] Mihály, B. a kol.: „Správa o radiačnej ochrane za rok 2010“, JAVYS, a.s., 2011 Jaslovské Bohunice.
[20] Kaizer, J. a kol.: 8-INF-005-2011 „Súhrnná správa Radiačná ochrana v JAVYS, a.s. a vplyv areálu JAVYS, a.s. na okolie Rok 2011“, JAVYS, a s., 2011 Jaslovské Bohunice.
[21] PP 5 TPP – 265 Vzduchotechnika 1. vydanie, 2011 JAVYS, a.s.
[22] PP 5 – BSP – 001 Bezpečnostná správa NPP V1, 2012 JAVYS, a.s.
[23] Rehák, M.,Letkovičová,M., Klocok,Ľ., Príkazský,V., Žirko,M., Koštial,J.,Stehlíková,B., Monitorovanie stavu životného prostredia a zdravotného stavu obyvateľov okolia jadrovej elektrárne Jaslovské Bohunice - hodnotené obdobie 1993-1996, výskumná správa, VUJE Trnava, a.s. 1997
[24] BIDSF projekt B6.3, dodávka D26
[25] Nariadenie vlády SR č.345/2006 o základných požiadavkách na ochranu zdravia pracovníkov a obyvateľov pred ionizujúcim žiarením.

2.1.2 Web sites

[26] http://www.ujd.gov.sk
[27] http://www.enviroportal.sk
[28] http://www.sazp.sk
[29] http://www.shmu.sk
[30] http://www.statistics.sk
[31] http://jaspi.justice.gov.sk

PART IV. CONFIRM THE ACCURACY OF THE STATEMENTS

Place	Jaslovske Bohunice
Date	28.6.2013

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